AKTIVITAS FISIK DAN KESEHATAN MENTAL LANSIA SELAMA PANDEMI COVID-19

SKRIPSI

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FAKULTAS ILMU KESEHATAN
UNIVERSITAS dr. SOEBANDI
2021

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Untuk Memenuhi Persyaratan
Memperoleh Gelar Sarjana Ilmu Keperawatan (S. Kep)

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MOTTO

"Dan aku tidak tahu, boleh jadi hal itu adalah cobaan bagi kamu dan akan menjadi kesenangan sampai waktu yang ditentukan"

(QS. Al-Anbiya: 112:111)

"Jika Allah menghadirkan cobaan di hidupmu, jangan hanya minta semuanya segera berlalu. Tetapi mintalah untuk diberikan kekuatan melaluinya"

(Mitha Anggraini)

LEMBAR PERNYATAAN ORISINALITAS

Saya yang bertanda tangan di bawah ini, menyatakan dengan sesungguhnya bahwa skripsi *literature review* yang berjudul "Aktivitas Fisik dan Kesehatan Mental Lansia Selama Pandemi COVID-19" adalah asli dan belum pernah diajukan sebagai syarat memperoleh gelar kesarjanaan di perguruan tinggi manapun.

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Adapun bagian-bagian tertentu dalam penyusunan *literature review* yang saya kutip dari hasil karya orang lain telah dituliskan secara jelas sesuai dengan norma, kaidah dan etika penulisan ilmiah.

Apabila dikemudian hari terdapat penyimpangan dan ketidak benaran dalam pernyataan ini, maka saya bersedia menerima sanksi akademik dan atau sanksi lainnya, sesuai dengan norma yang berlaku dalam perguruan tinggi ini.

Jember, 10 Juni 2021

Yang menyatakan

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Skripsi ini telah diperiksa oleh pembimbing dan telah disetujui untuk mengikuti seminar hasil pada Program Studi Ilmu Keperawatan

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HALAMAN PENGESAHAN

Skripsi yang berjudul "*Aktifitas Fisik dan Kesehatan Mental Lansia Selama Pandemi COVID-19*" telah diuji dan disahkan oleh Program Studi Ilmu Keperawatan Fakultas Ilmu Kesehatan pada:

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SKRIPSI

AKTIVITAS FISIK DAN KESEHATAN MENTAL LANSIA SELAMA PANDEMI COVID-19

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ABSTRAK

Anggraini, Mitha* Susanto, Tantut** Maurida, Nurul***. 2021. **Aktivitas Fisik dan Kesehatan Mental Lansia Selama Pandemi COVID-19.** Tugas Akhir. Program Studi Ilmu Keperawatan Universitas dr. Soebandi.

Pendahuluan: peningkatan jumlah penyebaran COVID-19 membuat virus tersebut secara resmi dinyatakan sebagai pandemi global, hal tersebut mengakibatkan pemerintah di berbagai negara mengambil tindakan isolasi, lansia diminta untuk melakukan isolasi mandiri dan tinggal di rumah untuk waktu yang lama. Permasalahan pada lansia yaitu kurangnya kemampuan lansia dalam beradaptasi terhadap stressor dari luar. Rekomendasi untuk melakukan isolasi sosial secara mandiri dapat mengakibatkan masalah kesehatan bagi lansia terutama meningkatnya masalah kesehatan mental. Tujuan penelitian untuk mengidentifikasi aktivitas fisik dan kesehatan mental lansia selama pandemi COVID-19 serta hubungan antara aktivitas fisik dan kesehatan mental lansia selama pandemi COVID-19.

Metode: desain penelitian ini sintesis naratif. Pencarian *database Google Scholar* dan *Science Direct* artikel tahun 2020-2021. Identifikasi menggunakan PICOS dengan inklusi lansia yang berada di komunitas dan menjalankan isolasi sosial selama pandemi COVID-19. Penilaian kualitas menggunakan *critical apprasial* lalu dijelaskan dalam PRISMA *flow diagram* terkait alur, desain artikel: *cross sectional* dan *cohort study*.

Hasil: diperoleh 6 artikel yang membahas aktivitas fisik dan kesehatan mental. Aktivitas fisik yang dilakukan lansia selama pandemi diketahui mengalami peningkatan dan penurunan kemudian masalah kesehatan mental yang sering ditemui pada lansia adalah depresi dan kecemasan. Hasil identifikasi menunjukkan bahwa melakukan aktivitas fisik secara teratur dengan intensitas lebih tinggi memiliki kesehatan mental baik. lansia yang lebih tua memiliki kesehatan mental stabil

Kesimpulan: terdapat hubungan antara aktivitas fisik lansia dengan kesehatan mental lansia selama pandemi.

Diskusi: diharapkan dapat memperhatikan terkait keterbatasan yang dialami lansia, perlu diperhatikan terkait istrumen pengambilan data yang menyeluruh terkait aktivitas fisik lansia. terkait kesehatan mental perlu memperluas faktor terkait sosiodemografi responden.

Kata Kunci: kesehatan mental, aktivitas fisik, lansia, pandemi COVID-19

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ABSTRACT

Anggraini, Mitha* Susanto, Tantut** Maurida, Nurul***. 2021. ***Physical Activity and Mental Health of the Elderly During the COVID-19 Pandemic***. Thesis. *Nursing Science Study Program University of* dr. Soebandi

Introduction: *the increasing number of COVID-19 spreads has made the virus officially declared a global pandemi, this has resulted in governments in various countries taking isolation measures, the elderly are asked to self-isolate and stay at home for a long time. The problem in the elderly is the lack of ability of the elderly to adapt to external stressors. Recommendations for self-isolation can lead to health problems for the elderly, especially increasing mental health problems. The purpose of the study was to identify the physical activity and mental health of the elderly during the COVID-19 pandemi and the relationship between physical activity and mental health of the elderly during the COVID-19 pandemi.*

Methods: *This research design is a narrative synthesis. Search the Google Scholar database and Science Direct articles for 2020-2021. Identification using PICOS with the inclusion of the elderly who are in the community and carry out social isolation during the COVID-19 pandemi. Quality assessment using critical appraisal is then explained in the PRISMA flow diagram related to flow, article design: cross sectional and cohort study.*

Results: *obtained 6 articles that discuss physical activity and mental health. Physical activity carried out by the elderly during the pandemi is known to increase and decrease then mental health problems that are often encountered in the elderly are depression and anxiety. The identification results show that doing regular physical activity with higher intensity has good mental health. older elderly have stable mental health*

Conclusion: *there is a relationship between the physical activity of the elderly and the mental health of the elderly during the pandemi.*

Discussion: *it is expected to pay attention to the limitations experienced by the elderly, it is necessary to pay attention to the comprehensive data collection instrument related to the physical activity of the elderly. related to mental health, it is necessary to expand the factors related to the sociodemography of the respondents.*

Keywords: mental health, physical activity, elderly, COVID-19 pandemic

*Researcher	: Mitha Anggraini
** Supervisor I	: Ns. Tantut Susanto, M.Kep., Sp.Kep. Kom, Ph.D
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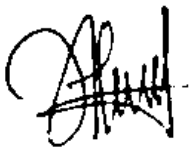
Dalam penyusunan *literature review* ini penulis menyadari masih jauh dari kesempurnaan, untuk itu penulis sangat mengharapkan kritik dan saran untuk perbaikan di masa mendatang.

Jember, 10 Juni 2021



Penulis

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COVID	**:** Corona Virus Disease
WHO	**:** World Health Organization
KEMENKES	: Kementerian Kesehatan
LANSIA	: Lanjut Usia
HAS	**:** Hamilton Anxiety Scale
BDI	: Beck Depression Inventory
ASDI	: Acute Stress Disorder Inventory
PASE	: Physical Activity Score Elderly
IPAQ	: International Physical Activity Quesstionare

BAB I

PENDAHULUAN

1.1 Latar Belakang

Peningkatan jumlah penularan dan penyebaran *Corona Virus Disease* 2019 (COVID-19) yang tak terkendali membuat virus tersebut secara resmi dinyatakan sebagai pandemi global oleh *World Health Organization* (WHO) pada Maret 2020. Kondisi tersebut mengakibatkan pemerintah di berbagai negara mengambil tindakan isolasi untuk mencegah bertambahnya jumlah penularan (Garcia-Fernandez, et al., 2020). Lanjut usia (lansia) merupakan salah satu kelompok rentan yang dapat tertular COVID-19 dan memiliki resiko tinggi hal tersebut disebabkan karena lansia penurunan fungsi dari organ tubuh (Callow e. a., 2020). WHO merekomendasikan lansia untuk melakukan isolasi mandiri dan tinggal di rumah untuk waktu yang lama (Aseem Mehra, 2020). Seiring bertambahnya usia seseorang akan mengalami perubahan baik secara fisiologis dan psikologis. Permasalahan pada lansia yang sering dijumpai karena perubahan psikologis yaitu kurangnya kemampuan lansia dalam beradaptasi terhadap perubahan dan stressor dari luar, hal ini diperparah dengan adanya isolasi sosial yang disebabkan oleh COVID-19 (Herlinda, 2020). Rekomendasi untuk melakukan isolasi sosial secara mandiri dapat mengakibatkan masalah kesehatan bagi lansia terutama meningkatnya risiko masalah kesehatan mental (Shahid, et al., 2020).

Depresi, kecemasan dan kesepian merupakan permasalahan kesehatan mental atau psikologis yang sering dijumpai pada lansia. Suatu meta-analisis dari 74 penelitian yang melibatkan 487.275 lansia menunjukan bahwa prevalensi

depresi pada lansia di dunia berkisar 4,7-16,0%. Penelitian yang melibatkan lansia sebanyak 1088 lansia di Jakarta menyatakan bahwa prevalensi depresi pada lansia adalah sebanyak 21,0% Studi yang dilakukan di Gresik Jawa Timur menyatakan sebesar 44,0% dari 41 orang lansia mengalami masalah kecemasan (Sutikno, 2015). Studi lain tentang kesepian pada masyarakat saat pandemi COVID-19 yang dilakukan di Jerman sebesar 51,3% dari 2513 lansia mengalami kesepian (Klein, et al., 2021). Gangguan kesehatan mental tidak hanya dialami oleh lansia di negara berkembang tetapi juga terjadi di negara maju. Hal tersebut dibuktikan dengan studi yang dilakukan di beberapa negara maju seperti Kanada dan Korea Selatan dengan prevalensi gangguan kesehatan mental pada lansia mencapai lebih dari 30% (Sutikno, 2015). Penelitian terbaru yang dilakukan di Inggris menunjukkan sebanyak 36,8% dari 932 responden memiliki kesehatan mental yang buruk (Smith, et al., 2020).

Selama masa pandemi lansia menghadapi tantangan khusus sehingga mereka harus dilindungi dan didukung secara optimal. Pandemi COVID-19 mengancam kesehatan secara fisik. Seiring berjalannya waktu, pandemi COVID-19 juga bisa berakibat menjadi krisis kesehatan mental yang besar (World Federation for Mental Health (WFMH), 2020). Salah satu tugas perkembangan pada lansia adalah membentuk hubungan dengan orang-orang yang sekitar dan seusia mereka, lansia harus menyesuaikan diri dengan peran di dalam masyarakat. Tindakan isolasi sosial secara mandiri mengakibatkan masalah relasi dengan lingkungan sosialnya. Isolasi sosial membuat lansia mengalami kesulitan penyesuaian diri yang diakibatkan dari intensitas lansia untuk bertemu dengan

orang lain, teman sesama organisasi atau masyarakat disekitar tempat tinggal akan berkurang. Hal tersebut mengurangi kontak sosial yang dilakukan oleh lansia sehingga dapat meningkatkan terjadinya masalah kesehatan mental (Pavon, Baeza, & Lavie, 2020). Isolasi mandiri membuat lansia lebih banyak berdiam di rumah. Beberapa laporan menyebutkan bahwa pandemi COVID-19 membuat lansia melakukan aktivitas fisik lebih sedikit dari biasanya (Pavon, Baeza, & Lavie, 2020).

Melakukan aktivitas fisik akan berdampak sangat baik terhadap kesehatan mental lansia terutama saat pembatasan sosial (*social distancing*) sedang berlangsung seperti saat ini. Seperti penelitian pada remaja dan usia dewasa awal yang dilakukan di Inggris pada tahun 2020 melaporkan bahwa remaja dan usia dewasa awal yang sering melakukan aktivitas fisik dapat menurunkan gejala masalah kesehatan mental (Theis, Campbell, Leeuw, Owen, & Schenke, 2021). Studi meta-analisis berdasarkan 49 studi prospektif menunjukkan bahwa aktivitas fisik dapat berpengaruh terhadap kesehatan depresi dan masalah mental lainnya (Schuch, et al., 2018).

Selama pandemi ini masalah psikologis jarang menjadi perhatian sehingga mengakibatkan tidak ada solusi terkait masalah kesehatan mental. Hal tersebut apabila terus menerus diabaikan maka dapat menyebabkan masalah yang lebih serius terkait kesehatan mental lansia bahkan sampai dapat menyebabkan lansia mengalami gangguan jiwa. Oleh karena itu, diperlukan studi *literature review* untuk mengetahui lebih jauh hubungan aktivitas fisik dengan kesehatan mental lansia selama pandemi COVID 19.

1.2 Rumusan Masalah

Rumusan masalah dari studi *literature review* ini adalah bagaimana aktivitas fisik dan kesehatan mental pada lansia selama pandemi COVID-19?

1.3 Tujuan Penelitian

1.3.1 Tujuan Umum

Tujuan umum dari studi *literature review* ini adalah untuk mengidentifikasi aktivitas fisik dan kesehatan mental lansia selama pandemi COVID-19

1.3.2 Tujuan Khusus

a. Mengidentifikasi aktivitas fisik pada lansia selama pandemi COVID-19
b. Mengidentifikasi status kesehatan mental pada lansia selama pandemi COVID-19
c. Mengidentifikasi hubungan aktivitas fisik dan status kesehatan mental pada lansia selama pandemi COVID-19

1.4 Manfaat Penelitian

1.4.1 Manfaat Teoritis

Hasil *review* ini dapat memberikan informasi kepada masyarakat khususnya pada lansia dan anggota keluarga agar dapat memahami tentang aktivitas fisik dan kesehatan mental lansia selama pandemi COVID-19 dan

1.4.2 Manfaat Praktis

Hasil *review* ini dapat digunakan sebagai referensi bagi pelayanan kesehatan khususnya bagi perawat komunitas atau kader kesehatan tentang aktivitas fisik dan kesehatan mental pada lansia selama pandemi COVID-19

BAB II

TINJAUAN PUSTAKA

2.1 Konsep Lansia

2.1.1 Definisi dan Batasan Usia Lansia

Lansia atau lanjut usia adalah seseorang yang telah mencapai usia 60 tahun ke atas. Bertambah tua merupakan proses yang berangsur-angsur mengakibatkan perubahan kumulatif, proses menurunnya daya tahan tubuh dalam menghadapi rangsangan dari dalam dan luar tubuh. Pada manusia, penuaan berkaitan dengan perubahan degeneratif pada kulit, tulang, jantung, pembuluh darah, paru-paru, saraf, dan jaringan tubuh lainnya. Karena kapasitas regenerasi yang terbatas, mereka lebih mungkin untuk menderita berbagai penyakit, sindrom dan penyakit dibandingkan orang dewasa lainnya (Kholifah, 2016). Lansia secara perlahan akan mengalami penurunan jaringan untuk memperbaiki dan mempertahankan keadaan normal, sehingga lansia sering kali berisiko mengalami berbagai macam penyakit (WHO, 2018). Sebagian besar lansia berusia 60 tahun ke atas akan mulai mengalami perubahan fisik dan mental. Sejak seseorang memasuki usia tua kesehatan fisik akan memburuk, dan kualitas hidup menurun seiring dengan berubahnya usia dan status ekonomi (Budi, 2016).

Seseorang dikatakan lanjut usia di Indonesia ketika beumur 60 tahun. Hal ini sesuai dengan Undang-Undang Nomor 13 Tahun 1998 tentang Kesejahteraan Lanjut Usia menekankan hal ini pada Bab 1 Pasal 1 ayat 2, 3 dan 4 (Nugroho, 2008). Usia seorang lansia yang menjadi acuan berbeda hal ini sesuai dengan beberapa pendapat ahli tentang batasan usia lansia berikut:

a. Menurut Organisasi Kesehatan Dunia (WHO, 2018) ada empat tahapan yaitu:
    1. Usia pertengahan (*middle age)* lansia dengan usia 45-59 tahun
    2. Lansia (*elderly*) lansia dengan usia 60-74 tahun
    3. Lansia tua (*old*) lansia dengan usia 75-90 tahun
    4. Usia sangat tua (*very old*) lansia dengan usia >90 tahun
b. Menurut Kementerian Kesehatan Republik Indonesia (Kemenkes RI, 2019) pembagian usia lanjut ada 4 yaitu:
    1. Kelompok usia virtilitas atau persiapan usia lanjut (45 sampai dengan 54 tahun) merupakan kelompok yang baru memasuki lansia atau pra lansia
    2. Kelompok usia lanjut dini atau prasemu yaitu kelompok yang mulai memasuki usia lanjut antara usia 55 – 64 tahun.
    3. Kelompok lansia usia pertengahan 65-70 tahun
    4. Kelompok lansia beresiko tinggi yaitu lansia yang berusia lebih dari 70 tahun

2.1.2 Perubahan Pada Lansia

Perubahan pada lansia adalah proses dimana seseorang menua dan berubah. Seiring bertambahnya usia, fungsi organ akan menurun. Banyak faktor yang mempengaruhi penuaan dapat dibagi menjadi dua bagian, yaitu faktor genetik yang melibatkan perbaikan DNA, respons terhadap stres, dan pertahanan antioksidan. Selain itu, faktor lingkungan meliputi asupan kalori, berbagai penyakit, dan tekanan eksternal seperti radiasi atau bahan kimia. Faktor-faktor tersebut mempengaruhi

aktivitas metabolisme sel yang menyebabkan sel stress kemudian teroksidasi, hal ini menyebabkan kerusakan sel dan mengakibatkan proses penuaan (Sunaryo, dkk, 2016).

Menurut Potter & Perry (2009) dalam (Putri, 2019) perkembangan lansia dan proses menua mengakibatkan banyak perubahan yang terjadi pada lansia, meliputi:

a. Perubahan Fisiologis

   Perubahan fisiologis pada lansia biasanya terkait dengan kondisi tubuh lansia. Umumnya pemahaman kesehatan pada lansia bergantung pada persepsi pribadi dari lansia tersebut. Lansia yang memiliki aktivitas fisik yang banyak atau rutin melakukan aktivitas fisik biasanya menganggap dirinya sehat, sedangkan lansia yang mengalami gangguan fisik, piskologis dan sosial akan menganggap dirinya sakit karena mengalami hambatan dalam melakukan kegiatan. Perubahan fisiologis pada lansia biasanya meliputi perubahan pada kulit terjadinya keriput, penipisan rambut atau rambut mulai beruban, terjadinya penurunan pendengaran dan perubahan lainnya. Perubahan tersebut bersifat degeneratif sehingga membuat lansia lebih rentan mengalami berbagai macam penyakit. Perubahan tersebut dapat dipengaruhi kondisi kesehatan, gaya hidup, stressor serta lingkungan (Putri, 2019).

b. Perubahan Kognitif

   Selain perkembangan secara fisiologis lansia juga melaui perkembangan secara kognitif dalam struktur dan fisiologis perkembangan otak pada lansia

yaitu terjadinya penurunan jumlah sel dan perubahan jumlah neurotransmitter. Hal tersebut mengakibatkan lansia mengalami gangguan kognitif. Gejala gangguan kognitif yang dialami lansia biasanya meliputi

1. Disorientasi

   Disorientasi adalah perubahan kondisi mental yang mengakibatkan lansia bingung akan lokasi tempat dia berada, kebingungan terhadap identitas maupun kebingungan terhadap waktu dalam situasi tersebut. Jika masalah tersebut tidak ditangani maka dapat mengganggu lansia dari banyak aspek baik fisiologis dan psikososial.

2. Kehilangan keterampilan

   Lansia yang mengalami masalah pada perkembangan kognitifnya cenderung akan mengalami gangguan dalam keterampilannya seperti tidak dapat berhitung, atau berbahasa

c. Perubahan Fungsional

Perkembangan fungsional pada lansia meliputi fisik, psikologis, kognitif dan sosial. Semua aspek tersebut lansia umumnya akan mengalami penurunan fungsional sehingga mengganggu kesejahteraan seorang lansia. Status fungsional lansia erat kaitannya dengan kemampuan melakukan aktivitas harian *activity daily living* (ADL). Aktivitas harian yang dilakukan lansia sangat penting untuk menentukan tingkat kemandirian lansia. Perubahan mendadak pada ADL akan mengakibatkan terganggunya kesejahteraan lansia (Dahroni et al , 2019).

d. Perubahan Sosial

Selama proses perkembangan sosial lansia pasti akan melewati masa transisi kehidupan dan kehilangan. Semakin panjang usia hidup lansia, maka akan semakin banyak pula transisi kehidupan dan kehilangan yang dialami. Terutama ketika masa pandemi seperti saat ini lansia akan mengalami banyak sekali transisi kehidupan termasuk diantaranya ketika lansia diminta untuk melakukan isolasi sosial, lansia akan kehilangan waktu dan kesempatan untuk dapat berinteraksi dengan orang lain di lingkungannya. Isolasi sosial mengakibatkan lansia lebih banyak berdiam di rumah dari beberapa laporan menyebutkan bahwa pandemi COVID-19 membuat lansia kurang berinteraksi dengan lingkungan sekitar tempat mereka tinggal (Pavon, Baeza, & Lavie, 2020).

Selain beberapa hal yang disebutkan diatas menurut (Ratnawati, 2017) perubahan psikososial pada lansia dapat dipengaruhi keterbatasan produktivitas kerja. Oleh karena itu lansia yang mengalami masa pensiun ketika pandemi seperti saat ini akan mengalami beberapa hal berikut:

1. Kehilangan finansial (berkurangnya pendapatan)
2. Kehilangan status (jabatan/posisi)
3. Kehilangan relasi (teman/kenalan)
4. Kehilangan kegiatan (perkerjaan)

e. Perubahan Psikologis

Selain perubahan yang sudah disebutkan sebelumnya psikologis menjadi salah satu aspek yang mengalami perubahan yang penting bagi lansia, hal

tersebut karena lansia banyak sekali melalui masa-masa di kehidupannya, proses tersebut akan membuat lansia menjadi lebih bijak dalam menghadapi kehidupan (Kholifah, 2016). Namun perkembangan psikologis lain yang dapat terjadi pada lansia karena pengalaman hidupnya adalah sebagai berikut:

1. Merasa takut akan kematian terutama saat pandemi ruang gerak menjadi lebih terbatas karena siapapun dapat membawa virus
2. Kebutuhan hidup yang meningkat disaat pendapatan menurun atau bahkan tidak memiliki pendapatan lagi ditambah dengan pembatasan sosial berskala besar mengajurkan setiap orang untuk tetap di rumah saja hal tersebut membuat lansia semakin sulit untuk memenuhi kebutuhan hidup
3. Mengalami penyakit kronis yang mengakibatkan lansia mengalami penurunan secara fisik
4. Terjadi kesepian akibat isolasi sosial yang mengakibatkan lansia kurang berinteraksi (Aseem Mehra, 2020).

2.2 Aktivitas Fisik pada Lansia

2.2.1 Definisi Aktivitas Fisik

Aktivitas fisik merupakan gerakan tubuh yang dihasilkan oleh otot rangka yang membutuhkan energi dalam setiap gerakannya, termasuk aktivitas saat seseorang bekerja, bergerak, olahraga, dan termasuk kegiatan di rumah. Aktivitas fisik dapat dilakukan secara terencana, terstruktur, berkelanjutan serta untuk tujuan mempertahankan atau memperbaiki kebugaran jasmani dan rohani. Aktivitas fisik

yang dilakukan dengan intensitas ringan misal berjalan kaki, atau melakukan pekerjaan rumah memiliki manfaat mempertahankan kesehatan. Sedangkan aktivitas fisik dengan intensitas sedang hingga kuat dapat bermanfaat untuk membuat seseorang meningkatkan kebugaran dan juga kesehatan (WHO, 2020).

Aktivitas fisik yang dilakukan secara terjadwal dan berkelanjutan pada lansia dapat mencegah atau menunda timbulnya keterbatasam fungsi serta peran inti dari sistem tubuh. Pada beberapa penelitian ditemukan bahwa aktivitas fisik dapat meningkatkan kemampuan fungsional seperti menurunkan terjadinya angka kejadian gangguan kognitif pada lansia. Serta aktivitas fisik dapat mengurangi kejadian jatuh atau cidera pada lansia (King, 2018).

2.2.2 Jenis Aktivitas Fisik pada Lansia

Menurut (CDC, 2020) terdapat 3 macam jenis aktivitas fisik yang dapat lansia untuk menjaga kesehatan jasmani dan rohani yaitu:

1. Aktivitas Aerobik

   Aktivitas aerobik termasuk aktivitas intensitas yang sedang dan berat. Contoh aktivitas aerobik intensitas ringan adalah berkegiatan secara fisik seperti berjalan kaki, aktivitas fisik intensitas sedang adalah jalan cepat, bersepeda sedangkan aktivitas intensitas tinggi contohnya adalah berlari. Menjalankan aktivitas aerobik pada lansia harus dilakukan selama 60 menit atau lebih setiap hari atau minimal 3 hari dalam seminggu.

2. Penguatan Otot

Aktivitas penguatan otot seperti senam, shit-up, push-up dapat dilakukan sebanyak 60 menit dalam sehari atau minimal 3 hari per minggu.

3. Penguatan Tulang

   Aktivitas penguatan tulang seperti lompat tali dapat dilakukan selama 60 menit dalam sehari atau minimal 3 hari per minggu.

2.2.3 Manfaat Aktivitas Fisik pada Lansia di Masa Pandemi COVID-19

Menurut (CDC, 2020) melakukan aktivitas fisik memiliki banyak manfaat yaitu dari hal fisik dan psikologis. Manfaat secara fisik dengan melakukan aktivitas secara rutin dapat menurunkan beberapa resiko penyakit yaitu seperti penyakit jantung coroner, diabetes dll. Juga terdapat beberapa manfaat lain yang bisa didapatkan ketika lansia dengan rutin melakukan kegiatan aktivitas fisik, berikut:

a. Mengelola Berat Badan

   Diet dan aktivitas fisik memiliki peran penting dalam mengelola berat badan, ketika seseorang melakukan aktivitas seluruh makanan dan minuman memiliki banyak kalori akan dibakar dan dijadikan energi namun ketika seseorang hanya diam saja makanan tersebut akan disimpan di dalam tubuh sebagai lemak.

b. Mengurangi Risiko Penyakit

   Aktivitas fisik dapat mengurangi resiko penyakit seperti penyakit jantung, penyakit kardiovaskuler, dan beberapa penyakit kanker seperti kanker payudara, kanker ginjal, kanker usus, dan kanker lainnya. Jika seseorang penderita kanker dengan aktivitas fisik secara rutin maka akan memberikan efek peningkatan pada kualitas hidup seseorang.

c. Menguatkan Otot dan Tulang

Seiring bertambahnya usia sangat penting untuk menjaga tulang, persendian, dan otot. Tulang sebagai penopang tubuh dan membantu Anda bergerak. Menjaga kesehatan tulang, persendian, dan otot dapat membantu seseorang melakukan aktivitas sehari-hari dan aktif secara fisik. Melakukan senam aerobik, latihan penguatan otot, dan tulang secara intens dapat memperlambat berkurangnya kepadatan tulang seiring bertambahnya usia.

d. Mencegah Resiko Jatuh Pada Lansia

Pada lansia latihan fisik juga bermanfaat untuk mengurangi risiko jatuh dan cidera akibat jatuh. Aktivitas fisik yang dilakukan dengan lebih dari satu jenis kegiatan seperti berjalan cepat, jumping jack, dan latihan kekuatan efektif mengurangi risiko jatuh

e. Meningkatkan Harapan Hidup

Banyak peneliti yang melakukan penelitian tentang aktivitas fisik membuktikan bahwa aktivitas fisik berdampak besar pada kesehatan. Seseorang yang aktif secara fisik selama sekitar 150 menit seminggu memiliki risiko 33% lebih rendah dari semua penyebab kematian dibandingkan mereka yang tidak aktif secara fisik.

f. Menjaga Kesehatan Mental

Beberapa penelitian menunjukan bahwa orang yang sehat secara fisik akan memiliki mental yang sehat pula. Sehat secara fisik bisa didapatkan dengan

rutin melakukan aktivitas fisik, ketika seseorang melakukan kegiatan secara fisik maka tubuh akan menghasilkan hormon dopamin yang membuat seseorang bahagia. Beberapa penlitian juga membuktikan bahwa dengan beraktivitas fisik dapat mengurangi kecemasan seseorang (Callow e. a., 2020).

2.2.4 Pengukuran Aktivitas Fisik

Berdasarkan penelitian dari beberapa artikel terdapat dua instrument untuk mengukur aktivitas fisik lansia. yaitu dengan menggunakan IPAQ dan juga PASE berikut uraiannya:

a. IPAQ

Menurut (Carriedo A. , et al., 2020) untuk mengukur aktivitas fisik lansia dapat digunakan instrumen *International Physical Activity Questionnaire* (IPAQ). Intrumen ini berisi tentang pertanyaan terkait jenis aktivitas fisik, durasi, dan berapa hari selama seminggu menjalankan aktvitas fisik. Dalam instrument tersebut membagi aktivitas fisik menjadi 3 tingkatan dengan skor MET (aktivitas fisik setiap minggunya) yaitu tinggi skor MET=1500, Sedang skor = 600 dan rendah jika skor kurang dari 600. Aktivitas fisik yang dapat dilakukan yaitu berjalan (ringan) skor = 3,3 Aktivitas fisik sedang skor = 4, aktivitas fisik berat skor = 8 Hasil dari pertanyaan tersebut kemudian dikalkulasikan dengan rumus: skor aktivitas fisik × durasi lama aktivitas fisik × berapa hari dalam seminggu melakukan aktivitas fisik hasil dari penilaian tersbut kemudian dikategorikan dengan skor MET contoh: seorang lansia berjalan kaki

maka skor = 3,3. Berjalan kaki selama 30 menit 5 hari dalam seminggu maka total menit MET untuk aktivitas fisik itu adalah 3,3×30×5 = 495 (Forde, 2020).

b. PASE

Menurut (Callow, et al., 2020) aktivitas fisik lansia dapat diukur dengan menggunakan kuesioner *physical activity scale for the elderly* (PASE) pada instrument tersebut terdiri dari beberapa bagian aktivitas fisik waktu luang, aktivitas fisik rumah tangga, dan aktivitas fisik terkait pekerjaan. Kuesioner diisi dengan melingkari jawaban yang benar atau mengisi pada bagian yang kosong. Berikut beberapa contoh pertanyaan terkait aktivitas fisik dengan instrument PASE:

a. Aktivitas Waktu Luang

1. Selama 7 hari terakhir, seberapa sering Anda berpartisipasi dalam kegiatan duduk seperti membaca, menonton TV, atau membuat kerajinan tangan? Lanjutkan ke pertanyaan 1a dan 1b

   1a) Apa saja kegiatan tersebut? (pertanyaan akhir terbuka)

   1b) Rata-rata, berapa jam Anda melakukan aktivitas duduk tersebut?

2. Selama 7 hari terakhir, seberapa sering Anda berjalan-jalan di luar rumah atau halaman Anda karena suatu alasan? Misalnya untuk bersenang-senang atau berolahraga, jalan-jalan ke kantor, jalan-jalan dengan anjing, dll. Lanjutkan ke pertanyaan 2a

2a Rata-rata, berapa jam per hari Anda menghabiskan waktu untuk berjalan kaki?

3. Selama 7 hari terakhir, seberapa sering Anda melakukan olahraga ringan atau kegiatan rekreasi seperti bowling, golf dengan kereta, shuffleboard, memancing dari perahu atau dermaga atau kegiatan serupa lainnya? Lanjut ke pertanyaan 3a dan 3b

   3.a Apa saja kegiatan tersebut? (pertanyaan akhir terbuka)

   3.b Rata-rata, berapa jam Anda melakukan olahraga ringan atau kegiatan rekreasi tersebut?

4. Selama 7 hari terakhir, seberapa sering Anda melakukan olahraga sedang dan kegiatan rekreasi seperti tenis ganda, dansa ballroom, berburu, seluncur es, golf tanpa kereta, softball atau kegiatan serupa lainnya? Lanjut ke pertanyaan 4a dan 4b

   4.a Apa saja kegiatan tersebut? (pertanyaan akhir terbuka)

   4.b Rata-rata, berapa jam Anda melakukan olahraga ringan atau kegiatan rekreasi ini?

5. Selama 7 hari terakhir, seberapa sering Anda melakukan olahraga berat dan kegiatan rekreasi seperti jogging, berenang, bersepeda, tenis tunggal, tari aerobik, ski (menurun atau lintas alam) atau kegiatan serupa lainnya? lanjut ke pertanyaan 5a dan 5b

   5.a Apa saja kegiatan tersebut? (pertanyaan akhir terbuka)

   5.b Rata-rata, berapa jam Anda melakukan olahraga atau kegiatan rekreasi yang berat ini?

6. Selama 7 hari terakhir, seberapa sering Anda melakukan latihan khusus untuk meningkatkan kekuatan dan daya tahan otot, seperti angkat beban atau push-up, dll? lanjut ke pertanyaan 6a dan 6b

   6a Apa saja kegiatan tersebut? (pertanyaan akhir terbuka)

   6b Rata-rata, berapa jam Anda melakukan olahraga atau kegiatan rekreasi yang berat ini?

b. Aktivitas Rumah Tangga

1. Selama 7 hari terakhir, apakah Anda melakukan pekerjaan rumah yang ringan, seperti membersihkan debu atau mencuci piring (jawaban YA dan TIDAK)
2. Selama 7 hari terakhir, apakah Anda melakukan pekerjaan rumah atau pekerjaan rumah yang berat, seperti menyedot debu, menggosok lantai, mencuci jendela, atau membawa kayu?
3. Selama 7 hari terakhir, apakah Anda melakukan aktivitas berikut? Harap jawab YA atau TIDAK untuk setiap item.
   - Perbaikan rumah seperti pengecatan, wallpapering, pekerjaan listrik, dll.
   - Pekerjaan rumput atau perawatan halaman, termasuk pemindahan salju atau daun, pemotongan kayu, dll.
   - Berkebun di luar ruangan
   - Merawat orang lain, seperti anak-anak, tanggungan pasangan, atau orang dewasa lainnya

c. Aktivitas yang berhubungan dengan pekerjaan

1. Selama 7 hari terakhir, apakah Anda bekerja untuk dibayar atau sebagai sukarelawan? (jawaban ya dan tidak)

   lanjutkan ke pertanyaan 10.a dan 10.b)

   10a. Berapa jam per minggu Anda bekerja untuk membayar dan atau sebagai sukarelawan? …. jam

   10b. Manakah dari kategori berikut yang paling menggambarkan jumlah aktivitas fisik yang diperlukan pada pekerjaan Anda dan atau pekerjaan sukarela?

   - Terutama duduk dengan sedikit gerakan lengan (Contoh: pekerja kantor, pembuat jam, pekerja perakitan duduk, sopir bus, dll.)
   - Duduk atau berdiri wdengan berjalan kaki (Contoh: kasir, pekerja kantoran umum, pekerja perkakas ringan dan mesin)
   - Berjalan dengan beberapa penanganan material umumnya beratnya kurang dari 50 pon (Contoh: tukang pos, pramusaji, pekerja konstruksi, pekerja alat berat dan mesin)
   - Berjalan kaki dan pekerjaan manual yang berat seringkali membutuhkan penanganan material dengan berat lebih dari 50 pon misalnya: penebang, tukang batu, pertanian atau buruh umum

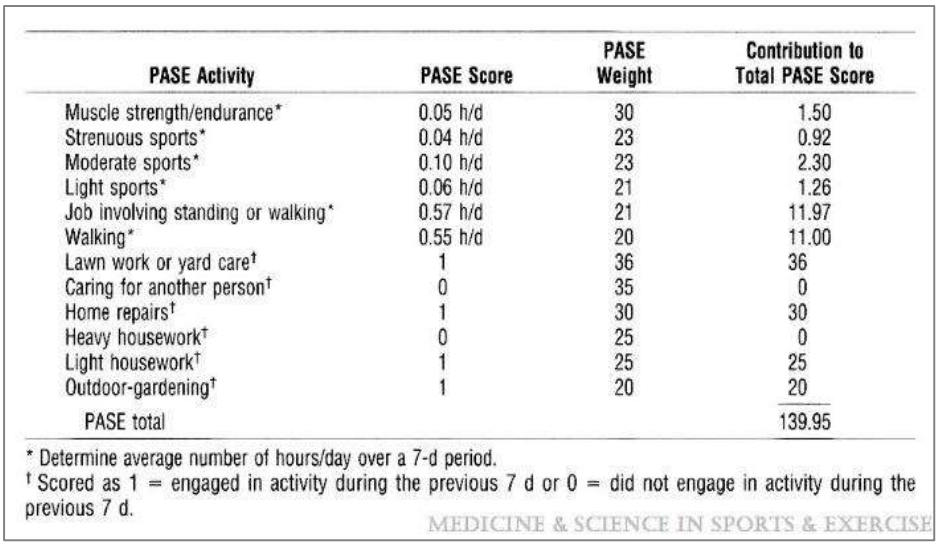
Skor PASE berasal dari jumlah gerakan dari monitor aktivitas fisik yang dilakukan lansia melalui elektronik, buku harian aktivitas dan tingkat aktivitas yang dinilai sendiri. Pada populasi umum orang lanjut usia item

aktivitas rekreasi mengharuskan peserta untuk terlebih dahulu melaporkan jumlah hari per minggu aktivitas dilakukan dan kemudian jumlah jam per hari selama seminggu sehingga didapatkan skor PASE yang merupakan bobot aktivitas fisik dengan frekuensi sesuai aktivitas fisik yang dilakukan lansia untuk masing masing 12 jenis kegiatan yang telah dipaparkan pada penjelasan di atas.

PASE Activity	PASE Weight
Muscle strength/endurance*	30
Strenuous sports*	23
Moderate sports*	23
Light sports*	21
Job involving standing or walking*	21
Walking*	20
Lawn work or yard care†	36
Caring for another person†	35
Home repairs†	30
Heavy housework†	25
Light housework†	25
Outdoor-gardening†	20

* Determine average number of h/d over a 7-d period.
† scored as 1 = engaged in activity during the previous 7 d or 0 = did not engage in activity during the previous 7 days.
From Washburn et al. (1).

Gambar 2.1 Tabel Penilaian Aktivitas Fisik dengan kuesioner PASE



PASE Activity	PASE Score	PASE Weight	Contribution to Total PASE Score
Muscle strength/endurance*	0.05 h/d	30	1.50
Strenuous sports*	0.04 h/d	23	0.92
Moderate sports*	0.10 h/d	23	2.30
Light sports*	0.06 h/d	21	1.26
Job involving standing or walking*	0.57 h/d	21	11.97
Walking*	0.55 h/d	20	11.00
Lawn work or yard care†	1	36	36
Caring for another person†	0	35	0
Home repairs†	1	30	30
Heavy housework†	0	25	0
Light housework†	1	25	25
Outdoor-gardening†	1	20	20
PASE total			139.95

* Determine average number of hours/day over a 7-d period.
† Scored as 1 = engaged in activity during the previous 7 d or 0 = did not engage in activity during the previous 7 d.

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Gambar 2.2 Tabel Penilaian Aktivitas Fisik dengan kuesioner PASE

2.3 Kesehatan Mental Lansia di Masa Pandemi

2.3.1 Konsep Kesehatan Mental

Menurut *World Health Organization* (WHO) kesehatan mental adalah seseorang yang tidak mengalami stres dan kecemasan. Sekalipun kenyataannya kejam, menerima kekecewaan sebagai pelajaran untuk kedepannya serta dapat

secara konstruktif beradaptasi dengan kenyataan. Dapat menjalin kontak dengan orang lain dan membantu memenuhi kebutuhan, merasa lebih memuaskan jika memberi daripada menerima (Ibid, 2015). Kesehatan mental adalah kondisi seseorang yang memungkinkan berkembangnya semua aspek baik fisik, intelektual dan emosional yang optimal serta sesuai dengan berkembangan yang terjadi pada orang lain, sehingga mampu berinteraksi dengan lingkungan sekitarnya (Fakhriyani, 2017). Kondisi mental yang sehat pada tiap individu tidaklah dapat disamaratakan. Kondisi inilah yang semakin membuat urgensi pembahasan kesehatan mental yang mengarah pada bagaimana memberdayakan individu, keluarga, maupun komunitas untuk mampu menemukan, menjaga, dan mengoptimalkan kondisi sehat mentalnya dalam menghadapi kehidupan sehari-hari (Dewi, 2012).

2.3.2 Permasalahan Psikologis Lansia di Masa Pandemi

Pandemi COVID-19 yang menyerang sikstem pernafasan menyebabkan berbagai gangguan masalah kesehatan terutama jika terjadi pada lansia yang memiliki penyakit degenerative seperti hipertensi, diabetes, gagal ginjal kronis dan masih banyak lagi lainnya, selain permasalahan fisik yang mengancam selain masalah kesehatan secara fisik terdapat juga permasalahan terkait psikologis yang dapat dialami lansia selama pandemi adalah sebagai berikut: Kecemasan, Stress, Insomnia dan Depresi (Callow e. a., 2020).

2.3.3 Faktor-Faktor yang Mempengaruhi Kesehatan Mental

Terdapat beberapa faktor yang berpengaruh dalam tingkat kesehatan mental seorang individu meliputi:

1. Fisiologis

   Para ahli telah melakukan banyak penelitian tentang hubungan antara fisiologis dan kesehatan mental. Penelitian yang telah dilakukan mencapai kesimpulan yang menunjukan bahwa faktor fisiologis memiliki pengaruh yang besar bagi kesehatan mental. Oleh karena itu, kesehatan manusia khususnya kesehatan mental tidak terpisahkan dari tataran fisiologis. Hal ini akan menjelaskan hubungan tersebut, terutama aspek fisiologis yang secara langsung mempengaruhi kesehatan mental, antara lain: otak, sistem endokrin, genetika, dan sensori berikut uraiannya.

   a. Otak

      Otak merupakan organ yang secara fisiologis memiliki bagian yang kompleks, tetapi otak memiliki fungsi yang sangat penting untuk semua aktivitas manusia. Perbedaan dan keunikan pada diri manusia pada dasarnya tidak dapat dipisahkan dari otak manusia. Keunikan manusia terjadi justru karena otak manusia memiliki keunikan dalam mengungkapkan segala hal yang terjadi dalam hidupnya. Jika digabungkan dengan perspektif psikologis, jelas terlihat adanya hubungan antara perkembangan fisik otak dan perkembangan intelektual. Fungsi otak berkaitan dengan pemikiran manusia, seperti motorik, kecerdasan, emosional, dan afeksi berhubungan dengan mentalitas manusia.

   b. Sistem Endokrin (Hormon)

Sistem endokrin terdiri dari kumpulan kelenjar-kelenjar, yang biasanya terhubung dengan sistem saraf otonom. Sistem ini menyediakan fungsi penting yang berkaitan dengan berbagai bagian tubuh. Tetapi perbedaan antara keduanya adalah bahwa sistem saraf menggunakan informasi kimiawi dan elektronik, sedangkan sistem endokrin memproses bahan kimia yang disebut hormon. Setiap kelenjar endokrin mengeluarkan hormon tertentu yang langsung diedarkan ke dalam darah, dan hormon ini membawa zat kimia ini ke seluruh tubuh. Sistem endokrin berhubungan dengan kesehatan mental seseorang. Gangguan mental yang disebabkan oleh sistem endokrin dapat mempengaruhi pemikiran manusia secara negatif. Misalnya, kerusakan kelenjar adrenal dapat memengaruhi kesehatan mental, yaitu penghancuran "emosi" dan perasaan, dan tidak mungkin mengatasi stress.

c. Genetik

Faktor genetik dipercaya memiliki pengaruh yang besar terhadap pemikiran manusia. Kecenderungan psikosis, yaitu skizofrenia dan depresi, merupakan masalah kesehatan mental yang diturunkan dari orang tuanya. Penyakit lain yang diperkirakan sebagai faktor genetic yaitu termasuk ketergantungan alkohol, obat-obatan, sindrom Alzheimer, asam ketoneuric, dan sindrom Huntington. Gangguan mental juga bisa terjadi karena jumlah dan struktur kromosom yang tidak normal. Jumlah kromosom yang berlebihan atau berkurang dapat menyebabkan gangguan mental pada individu.

d. Sensori

Sensori atau indera adalah aspek penting manusia. Sensori adalah alat yang menangkap semua rangsangan dari luar. Sensori meliputi: pendengaran, penglihatan, peraba, pengecapan dan penciuman. Gangguan fungsi sensori individu menyebabkan kerusakan fungsi kognitif dan emosional individu. Misalnya, seorang penyandang tunarungu akan berdampak pada perkembangan emosi sehingga ia cenderung menjadi paranoid, yaitu kehancuran emosi atau afeksi yang ditandai dengan kecurigaan berlebihan terhadap orang lain yang sebenarnya meragukan itu salah.

e. Aktivitas Fisik

Dari beberapa penelitian yang dilakukan, menunjukan bahwa aktivitas fisik memiliki pengaruh yang cukup kuat terhadap kesehatan mental seseorang, seseorang yang hanya berdiam diri tanpa melakukan kegiatan apapun cenderung memiliki resiko yang lebih besar mengalami ansietas atau bahkan depresi.

2. Sosial Budaya

Lingkungan sosial sangat berpengaruh terhadap kesehatan mental individu. Lingkungan sosial tertentu dapat menjadi dasar kuat tidaknya kesehatan mental individu sehingga apabila lingkungan postif akan membentuk kesehatan mental yang positif, tetapi pada aspek lain kehidupan sosial itu dapat pula menjadi *stressor* yang dapat mengganggu kesehatan mental.

Dibawah ini akan dijelaskan beberapa lingkungan sosial yang berpengaruh terhadap kesehatan mental adalah sebagai berikut:

a. Stratifikasi Sosial

   Merupakan pengelompokan masyarakat ke menjadi berbagai kalangan sesuai dengan status sosialnya hal ini dapat mempengaruhi kesehatan mental individu, karena apabila sekelompok orang minoritas berada di lingkungan yang tidak bisa menerima perbedaan maka akan memiliki kecenderungan yang lebih besar untuk mengalami masalah kesehatan mental.

b. Perubahan Sosial

   Terdapat beberapa hal yang menjadi akibat dari perubahan sosial, pertama perubahan sosial yang positif dapat menimbulkan kepuasan bagi masyarakat karena sesuai dengan keinginan banyak orang dan dapat meningkatkan keharmonisan masyarakat sekaligus meningkatkan kesehatan mental dari masyarakat tersebut. Selanjutnya perubahan sosial yang dilakukan dapat mengalami kegagalan hal tersebut secara negative dapat mengakibatkan tidak terpenuhinya tuntutan politik suatu kelompok dan masyarakat dapat melakukan tindakan pengerusakan hal tersbut berdampak negative terhadap kesehatan mental masyarakat.

c. Sosial Budaya

Sosial budaya memiliki makna yang sangat luas terhadap kesehatan mental. Namun dalam konteks ini budaya lebih dikhususkan pada aspek nilai, norma, dan religiusitas. Dalam konteks ini, kebudayaan yang ada di masyarakat selalu mengatur bagaimana seseorang harus bersikap, bagaimana seharusnya melakukan sesuatu, termasuk didalamnya bagaimana sikap yang ditunjukkan seseorang ketika sedang sakit, cara membagi jenis kesakitan, serta adanya sejumlah kesakitan yang sangat spesifik ada pada budaya tertentu, termasuk pula adanya masalah kesehatan mental yang sering kali mendapatkan tanggapan negatif. Kebudayaan pada dasarnya sebagai norma atau aturan terhadap anggota masyarakatnya untuk bertindak yang seharusnya dilakukan dan meninggalkan tindakan tertentu yang menurut budaya itu tidak seharunya dilakukan. Tindakan yang tidak sesuai dengan sistem nilai atau budaya setempat akan dipandang sebagi penyimpangan, dan bahkan dapat menimbulkan gangguan mental. Hubungan kebudayaan dan kesehatan mental meliputi tiga hal yaitu:

1. kebudayaan mendukung dan menghambat kesehatan mental,
2. kebudayaan memberi peran tertentu terhadap penderita gangguan mental,
3. berbagai bentuk gangguan mental karena faktor kultural,
4. upaya peningkatan dan pencegahan gangguan mental dalam telaah budaya.

3. Psikologis

Menurut Notosoedirjo dan latipun (2005) dalam (Tambunan, 2010) mengatakan bahwa aspek psikologi manusia merupakan satu kesatuan dengan dengan sistem fisiologis. Sebagai subsistem dari manusia, maka aspek psikologi selalu berinteraksi dengan keseluruhan aspek kemanusiaan. Karena itulah aspek psikologi tidak dapat dipisahkan dari aspek yang lain dalam kehidupan manusia. Termasuk beberapa hal berikut yang menjelaskan hubungan antara kesehatan mental dengan aspek psikologis individu yaitu:

a. Pengalaman

   Pengalaman awal adalah sesuatu hal yang baru terjadi pada individu, pengalaman awal biasanya terjadi di masa lalu. Pengalaman awal dianggap sebagai bagian yang penting, bahkan memiliki pengaruh yang sangat menentukan terhadap kondisi psikologis pribadi di masa yang akan datang.

b. Proses Pembelajaran

   Perilaku manusia yang ditunjukan saat ini sebagian besar merupakan proses belajar, yaitu hasil pelatihan dan pengalaman. Manusia belajar secara langsung sejak pada masa bayi terhadap lingkungannya. Karena itu faktor lingkungan sangat menentukan mental individu.

c. Kebutuhan

Pemenuhan kebutuhan dapat meningkatkan kesehatan mental individu. Kebutuhan disini dapat berupa kebutuhan aktualisasi yaitu seseorang yang mengeksploitasi dan mewujudkan berbagai macam kemampuan, bakat, keterampilannya secara penuh akan mencapai pada tingkatan yang disebut dengan tingkat pengalaman puncak (*peak experience*). Maslow mengatakan bahwa ketidakmampuan dalam mengenali dan memenuhi kebutuhan diri suatu individu merupakan penyebab awal dari gangguan mental individu.

d. Interaksi Sosial

Interaksi sosial banyak diteliti karena kaitannya dengan gangguan mental. Terdapat dua sudut pandang terkait dengan hubungan interaksi sosial dengan gangguan mental. Pertama teori psikodinamik menyatakan bahwa orang yang mengalami gangguan emosional dapat berakibat kepada berkurangnya interaksi sosial individu tersebut, hal ini dapat diketahui dari perilaku regresi sebagai akibat dari adanya masalah kesehatan mental. Kedua adalah bahwa rendahnya interaksi sosial individu hal itulah yang menimbulkan adanya gangguan mental.

e. Keluarga

Keluarga merupakan unit terkecil dalam masyarat, tempat bersosialisasi pertama bagi seorang individu. Keluarga yang lengkap dan fungsional serta mampu membentuk keseimbangan sehingga dapat meningkatkan kesehatan mental para anggota keluaganya, dan kemungkinan dapat

meningkatkan ketahanan para anggota keluarganya dari masalah gangguan mental dan ketidakseimbangan emosi para anggotanya

f. Stressor Psikososial lainnya

Situasi dan kondisi peran sosial yang ada di masyarakat setiap hari dapat menyebabkan masalah atau sesuatu yang tidak dikehendaki, oleh sebab itu situasi dan kondisi tersebut dapat berfungsi sebagai stressor sosial kontribusi ini terhadap kesehatan mental bisa kuat atau lemah. Stressor psikososial secara umum dapat menimbulkan efek negatif bagi individu yang mengalaminya. Manum demikian tentang variasi stressor psikososial ini berbeda untuk setiap masyarakat, bergantung kepada kondisi sosial masyarakatnya.

4. Lingkungan

Interaksi individu dengan lingkungan tempatnya berada berkaitan erat dengan kesehatannya. Kondisi lingkungan yang sehat akan memberikan efek positif dan mendukung kesehatan manusia itu sendiri, dan sebaliknya kondisi lingkungan yang tidak sehat akan memberikan efek negative sehingga dapat mengganggu kesehatan individu termasuk mengganggu.

2.3.4 Cara Mengatasi Masalah Kesehatan Mental

Kesehatan mental merupakan masalah yang dapat menyerang siapa saja terutama lansia yang dari segi perkembangan psikologis pun sudah mengalami perubahan. Walaupun demikian terdapat beberapa strategi yang dapat dilakukan bagi lansia untuk mengatasi beberapa permasalahan kesehatan mental, berikut:

a. Bertemu dengan orang lain

Bertemu dengan orang lain seperti teman, rekan kerja, dan saudara memiliki efek yang baik bagi kesehatan mental terutama lansia. berdasarkan penelitian oleh para ahli bertemu dengan orang lain akan menghasilkan hormon kebahagiaan yaitu oxytocin (Kotwal, et al., 2020).

b. Berbagi Cerita dengan Orang Lain

Ketika sesorang merasa cemas atau mengalami masalah berbagi cerita memang merupakan salah satu cara untuk mendapatkan ketenangan dan solusi. Selain itu dengan memiliki teman bercerita seseorang dapat bertukar pikiran dan pendapat (Kotwal, et al., 2020).

c. Melakukan Aktivitas Fisik

Selama pandemi dengan adanya pembatasan akibat isolasi sosial yang dilakukan pemerintah, banyak pula lansia yang tidak keluar rumah dan mengakibatkan berkurangnya aktivitas fisik yang dilakukan lansia. padahal dengan beraktivitas fisik seseorang dapat merasa lebih bahagia. Hal tersebut dibuktikan dengan beberapa penelitian yang dilakukan di Spanyol, bahwa aktivitas fisik akan berpengaruh positif terhadap kesehatan mental (Callow, et al., 2020)

2.3.5 Pengukuran Kesehatan Mental

Kesehatan mental merupakan permasalahan yang sering dihadapi oleh siapa saja beberapa permasalah kesehatan mental yang sering dijumpai yaitu depresi, kecemasan, kesepian dan stress oleh karena itu terdapat beberapa instrument

pengukuran kesehatan mental yang dapat digunakan untuk mengetahui tingkat kesehatan mental seseorang berikut penjelasannya:

a. CD-RISC

   connor-davidson resillience scale (CD-RISC) merupakan istrumen yang spesifik untuk mengukur tentang kecemasan dan depresi yang merupakan permasalah kesehatan mental yang biasa dialami oleh seseorang (Connor & Davidson, 2020).

b. *Beck Anxiety Inventory* (BAI)

   Merupakan instrument yang digunakan untuk mengukur tingkat kecemasan yang dialami seseorang

c. *Beck Depression Inventory* (BDI)

   Merupakan istrumen yang digunakan untuk mengukur tingkat depresi lansia selama masa pandemi ini (Ozdemir, et al., 2020)

d. Hamilton Anxiety Scale (HAS)

   Merupakan istrumen yang dapat mengukur skala kecemasan

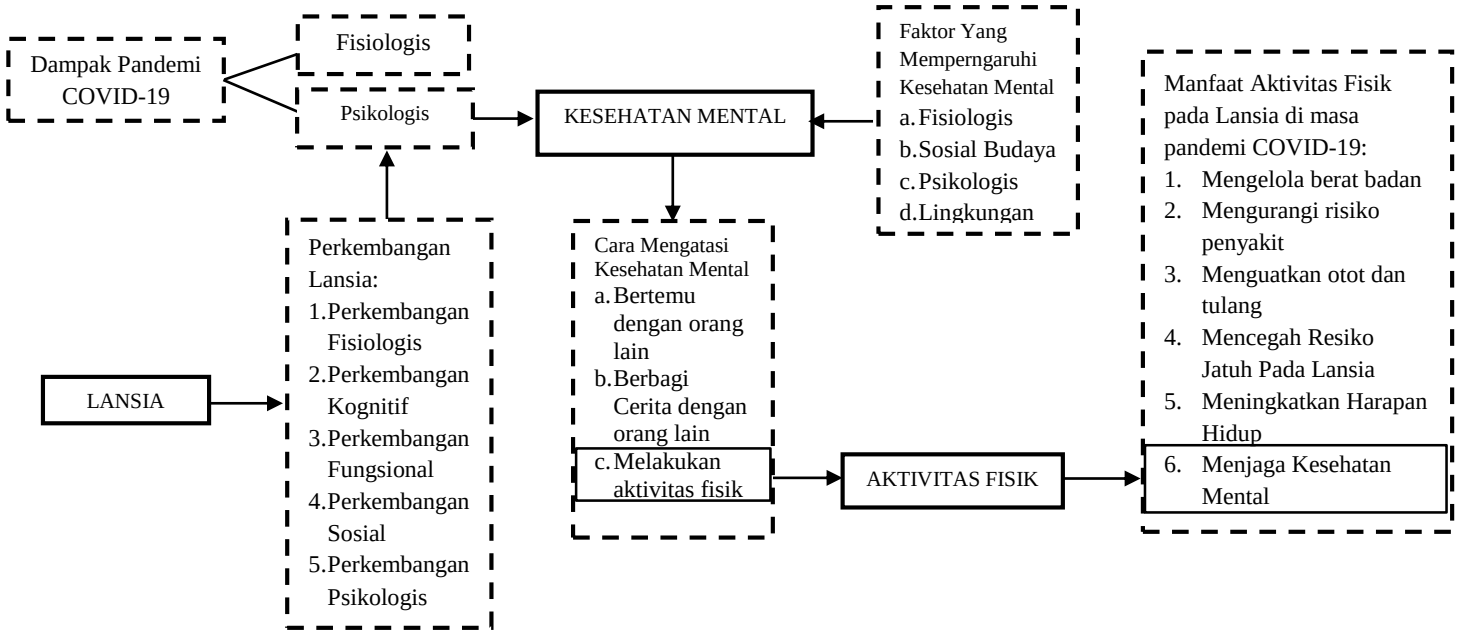
e. Acute Stress Disorder Inventory (ASDI)

   Merupakan instrument yang mengukur masalah stress akut yang dihadapi seseorang

f. Loneliness Scale UCLA

   Skala kesepian UCLA merupakan instrumen yang dapat digunakan dalam mengetahui tingkat kesepian seseorang

2.5 Kerangka Teori



Gambar 2.3 Kerangka Teori Hubungan Aktivitas Fisik dan Kesehatan Mental Lansia Selama Pandemi COVID-19

BAB III

METODE PENELITIAN

3.1 Strategi Pencarian Literature

3.1.1 Protokol dan Registrasi

Dalam protokol dan registrasi terdapat keseluruhan rangkuman dari *literature review* mengenai Aktivitas Fisik dan Kesehatan Mental Lansia Selama Pandemi COVID-19. Metodelogi yang diguanakan merupakan *literature review* dari studi kuantitatif menggunakan sintesis naratif (Pearson, et al., 2015). PICOS digunakan sebagai protokol dan evaluasi untuk identifikasi pertanyaan penelitian yang dilakukan menentukan artikel sesuai dengan tujuan studi yang dilakukan, dalam upaya menentukan pemilihan studi dari beberapa literatur yang telah ditemukan dan disesuaikan dengan tujuan dari *literature review* penelitian ini. Kemudian penelitian ini juga menggunakan PRISMA Flow Diagram sebagai protokol untuk menjelaskan alur informasi serta menggunakan *critical appraisal* sebagai penilaian kualitas *literature review* yang dilakukan. PRISMA Flow Diagram juga menjelaskan terkait pemetaan data yang diidentifikasi, disertakan atau dikecualikan dan terkait alasan pengecualiannya (Maryland University, 2021). Rencana analisis dari penelitian literatur ini yaitu menjelaskan hasil pencarian secara tinjaun deskriptif dan menjelaskan analisis jurnal melalui sebuah tabel. Selanjutnya mendeskripsikan bagaimana karakteristik responden dalam artikel-artikel yang sudah ditentukan dan memaparkan terkait hasil temuan dari artikel tersebut.

3.1.2 Database Pencarian

Pencarian *literature* dilakukan pada bulan Agustus 2020 sampai Juni 2021. Dalam penelitain ini data yang digunakan merupakan data sekunder atau data yang diperoleh tidak dari pengamatan langsung tetapi dari penelitian yang pernah dilakukan oleh peneliti-peneliti sebelumnya (Nursalam, 2020).

Sumber data sekunder yang digunakan berupa artikel atau jurnal nasional dan jurnal internasional yang berhubungan dengan topik yang diteliti: Aktivitas Fisik dan Kesehatan Mental Lansia Selama Pandemi COVID-19. Pencarian sumber dalam *literature review* ini menggunakan dua *database* dengan kriteria kualitas jurnal sedang hingga tinggi yaitu *Google Scholar dan Science Direct.*

3.1.3 Kata Kunci

Penelusuran informasi yang dilakukan perlu memperhatikan terkait tajuk subjek dalam hal ini merupakan kata atau frase yang digunakan untuk mewakili sebuah informasi. Dalam penelitian ini frase yang digunakan sudah menyesuaikan dengan *Medical Subject Headings (MeSH)*. Kemudian dalam pencarian data digunakan strategi penelusuran dengan menggunakan *Boolean Operator* (AND, OR, dan NOT) untuk memperluas jangkauan informasi terkait jurnal dan artikel yang ingin didapatkan dalam studi ini menggunakan *Boolean Operator* OR karena akan menghasilkan informasi yang mengandung salah satu atau kedua kata kunci sehingga dapat memperluas hasil penelusuran dan *Boolean Operator* AND digunakan untuk mempersempit hasil pencarian antar variabel sehingga setiap kata kunci yang dimasukkan memiliki keterkaitan satu sama lain sesuai dengan artikel

atau jurnal studi *literature review* yang diinginkan (Usman, 2017) berikut uraiannya:

Tabel 3.1 Kata Kunci Pencarian Literature Aktivitas Fisik dan Kesehatan Mental Lansia Selama Pandemi COVID-19 Tahun 2021

Kata Kunci						
Physical Activity	*AND*	*Mental Health*	*AND*	*Elderly*	*AND*	*Coronavirus Disease 2019*
OR		*OR*		*OR*		*OR*
Physical Exercise	*AND*	*Psychological Well-being*	*AND*	*Older Adult*	*AND*	*Pandemi COVID-19*
		OR				*OR*
	AND	*Mental Well-being*			*AND*	*2019-nCOV*
		OR				
	AND	*Mental Disorder*				

3.2 Kriteria Inklusi dan Eksklusi

Strategi yang digunakan dalam mencari artikel menggunakan PICOS *framework*, yaitu terdiri dari :

1) *Population/Problem* merupakan populasi atau masalah yang akan dianalisis sesuai dengan tema yang sudah ditentukan dalam *literature review;*
2) *Intervention* merupakan tindakan penatalaksanaan terhadap kasus baik individu atau kelompok masyarakat serta pemaparan tentang penatalaksanaan studi sesuai dengan tema yang sudah ditentukan dalam *literature review;*
3) *Comparation* merupakan penatalaksanaan atau intervensi lainnya yang digunakan sebagai pembanding, namun jika tidak ada bisa menggunakan kelompok control pada artikel yang dipakai;
4) *Outcome* merupakan hasil atau luaran yang diperoleh pada studi

terdahulu yang sesuai dengan tema yang sudah ditentukan dalam *literature review*;

5) *Study design* merupakan desain penelitian yang digunakan dalam artikel-artikel yang akan di review.

Table 3.2 Format PICOS pada *Literature Review* Aktivitas Fisik dan Kesehatan Mental Lansia selama Pandemi COVID-19

Kriteria	**Inklusi**	**Eksklusi**
Population/problem	Kriteria populasi dalam penelitian ini merupakan kelompok lansia	Kelompok selain lansia
Intervention	Studi yang meneliti tentang aktivitas fisik atau studi yang meneliti tentang kegiatan di rumah maupun luar rumah yang dilakukan oleh lansia selama pandemi dan studi yang menjelaskan kesehatan mental lansia	Studi yang meneliti selain tentang aktivitas fisik dan kesehatan mental
Comparation	Tidak ada pembanding	Terdapat pembanding
Outcomes	Studi yang menjelaskan tentang aktivitas fisik dan kesehatan mental lansia selama pandemi COVID-19	Studi yang tidak menjelaskan aktivitas fisik dan kesehatan mental lansia selama pandemi COVID-19
Study Design	*Cross Sectional* dan *Cohort Study*	Eksperimen dan Kualitatif
Publication years	2020-2021	Sebelum 2019
Language	Bahasa Inggris	Bahasa Indonesia

3.3 Seleksi Studi dan Penilaian Kualitas

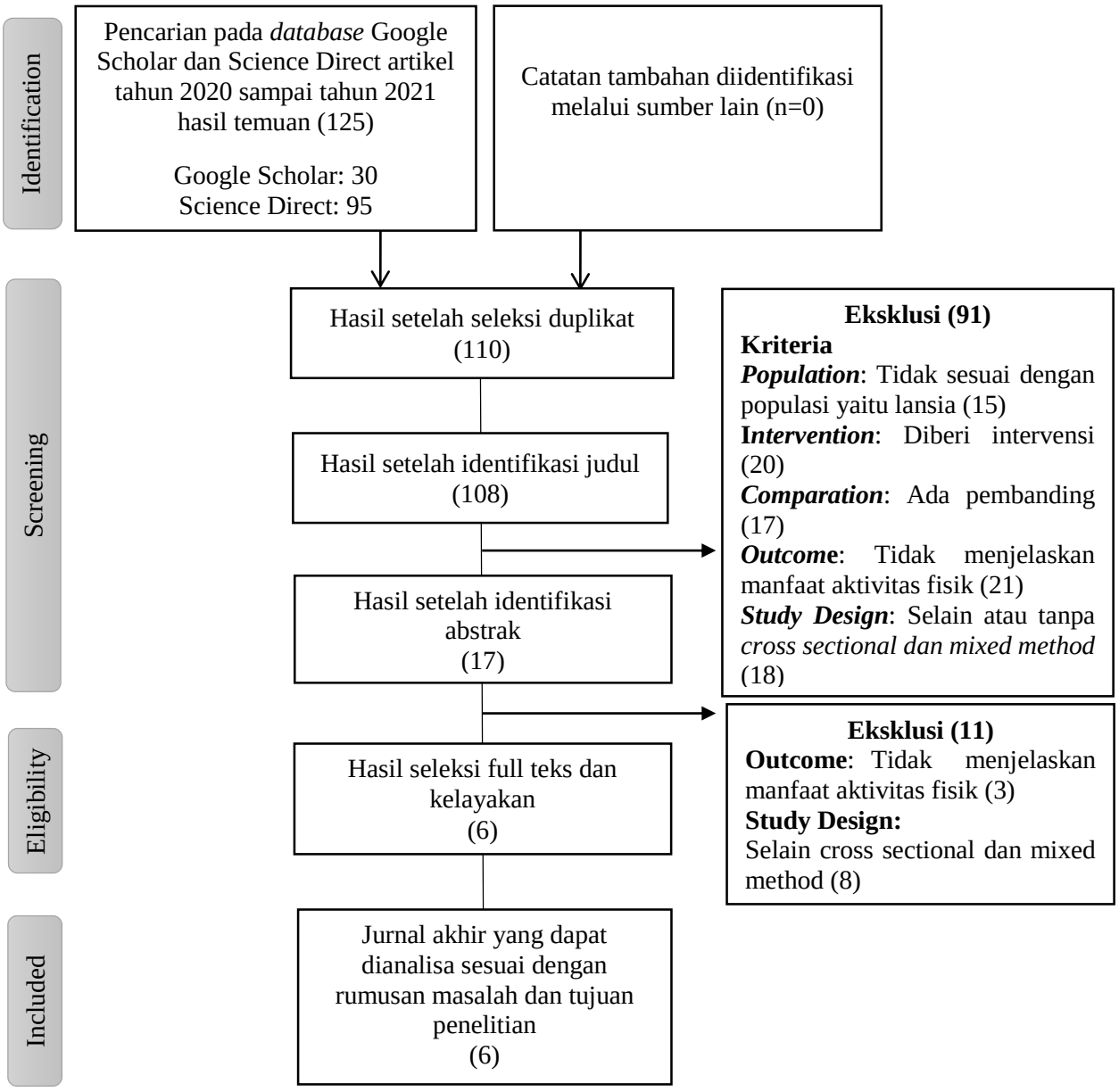
Analisis kualitas dari setiap artikel (n= 6) dengan *Checklist* daftar penilaian dengan beberapa pertanyaan untuk menilai kualitas dari study. Penilaian kriteria diberi nilai ‘ya’, ‘tidak’, ‘tidak jelas’ atau ’tidak berlaku’ kemudian setiap kriteria dengan skor ‘ya’ diberi satu point dan nilai lainnya adalah nol. Setiap skor dari masing-masing artikel kemudian dihitung dan dijumlahkan. *Critical appraisal* digunakan untuk menilai studi yang memenuhi syarat dilakukan oleh para peneliti. Jika skor penelitian setidaknya 50% memenuhi kriteria *critical appraisal* dengan nilai titik *cut-off* yang telah disepakati oleh peneliti, studi dimasukkan ke dalam kriteria inklusi. Peneliti mengecualikan studi yang berkualitas rendah untuk menghindari bias dalam validitas hasil dan rekomendasi ulasan. Dalam skrining terakhir 6 artikel mencapai skor lebih tinggi dari 50% dan siap untuk melakukan sintesis. Risiko bias dalam *literature review* ini menggunakan *asesmen* pada metode penelitian masing-masing studi, yang terdiri dari (Nursalam, 2020):

a. Teori: teori yang tidak sesuai, sudah kadaluarsa, dan kredibilitas yang kurang
b. Desain: desain kurang sesuai dengan tujuan penelitian
c. Sample: ada empat hal yang harus diperhatikan yaitu populasi, sampel, sampling, dan besar sampel yang tidak sesuai dengan kaidah pengambilan sampel
d. Variabel: variabel yang ditetapkan kurang sesuai dari segi jumlah, pengontrolan variable perancu, dan variable lainnya

e. Instrument: instrumen yang digunakan tidak memiliki sesitivitas, spesivikasi dan validas-reabilitas
f. Analisis Data: analisis data tidak sesuai dengan kaidah analisis yang sesuai dengan standar.

3.3.1 Hasil Pencarian dan Seleksi Studi

Hasil keseluruhan artikel penelitian ini menggunakan data sekunder atau data yang diperoleh tidak dari pengamatan langsung. Pencarian *literature* dilakukan pada bulan Agustus 2020 sampai dengan Juni 2021 dengan kata kunci yang sudah disesuaikan dengan MeSH. Hasil dari pencarian ditemukan 125 artikel menggunakan *database Google Scholar* dan *Science Direct.* Artikel yang sudah ditemukan kemudian dilakukan seleksi menggunakan PICOS dan PRISMA *flow diagram* kemudian dilakukan penilaian *critical appraisal* memenuhi kriteria diatas 50% dan disesuaikan dengan tema *literature review*. Artikel dilakukan seleksi duplikat dan didapatkan hasil 110 artikel lalu setelah identifikasi judul didapatkan hasil 108 artikel, kemudian diekslusikan dengan total 91 artikel yang dan tersisa 17 artikel. Hasil pencarian dilakukan seleksi terkait duplikat, judul dan mengidentifikasi abstrak tersisa 17 arikel, kemudian dilakukan uji elektibilitas seleksi full teks dan kelayakan dieksklusikan 11 artikel. *Assessment* yang dilakukan berdasarkan kelayakan terhadap kriteri inklusi dan eksklusi didapatkan sebanyak 6 artikel yang bisa dipergunakan dalam *literature review*. Hasil seleksi artikel studi dapat digambarkan dalam PRISMA *flow diagram*.



Gambar 3.1 PRISMA Flow Diagram Aktivitas Fisik dan Kesehatan Mental Lansia selama Pandemi COVID-19

BAB IV

HASIL DAN ANALISIS

4.1 Hasil

4.1.1 Hasil Pencarian Literatur

Tabel 4.1 Hasil Temuan Artikel

No	Peneliti, Tahun Terbit	Judul Artikel	Metode Penelitian (Desain, Populasi, Sample,Sampling Tempat Waktu, Variable, Instrumen, Analisis Data)	Sumber Artikel (Nama Jurnal, No. Jurnal)	Tujuan Penelitian	Hasil Penelitian
1	Alejandro Carriedo, Ph.D., Jose A. Cecchini, Ph.D., Javier Fernandez-Rio, Ph.D., Antonio Mendez-Gimenez, Ph.D. (17Agustus2020)	COVID-19, Psychological Well-being and Physical Activity Levels in Older Adults During the Nationwide Lockdown in Spain	Desain Penelitian *Cross Sectional Study* Populasi 483 warga yang usianya berkisar antara 60 hingga 92 tahun Sample Sampel terdiri dari 483 lansia 237 pria dan 246 wanita. Yang berusia antara 60-92 tahun Teknik Sampling Teknik *snow ball sampling* Tempat & Waktu Penelitian Untuk tempat penelitian dilaksanakan Spanyol dengan menyebarkan kuesioner online misalnya melalui email, WhatsApp, YouTubue,	American Journal of Geriatric and Psychiatry 28:11 (2020) halaman 1146-1155	Tujuan penelitian ini adalah untuk mengkaji kesejahteraan psikologis lansia selama pandemi COVID-19 dan mengkaji terkait aktivitas fisik lansia untuk kesehatan yang dikaitkan dengan kemampuan bertahan dan gejala depresi sesuai anjuran WHO	Hasil penelitian menunjukkan bahwa orang dewasa yang lebih tua yang secara teratur terlibat dalam aktivitas fisik yang kuat (VPA) dan sedang-kuat (MVPA) selama karantina melaporkan skor yang lebih tinggi dalam ketahanan (Locus, Self-efikasi, dan Optimisme), pengaruh positif, dan gejala depresi yang lebih rendah. Kesimpulan: Penemuan ini

	Twitter, Instagram dan Facebook dan waktunya tidak dijelaskan secara rinci Variable Penelitian Psychological Well-being (VI) dan Physical Activity Levels (VD) Instrumen Pengumpulan Data 2. Connor-Davidson CD-RISC resilience scale (Ketahanan) 3. The Positive and Negative Affect Schedule (pengaruh positif dan negatif) 4. Self-report scale of Depressive Symptoms (kemampuan menghadapi kesulitan) 5. The international Physical Activity Questionnaire. (aktivitas fisik) Analisis Data - Semua data dianalisis menggunakan SPSS versi 24.0 (IBM Co. LTD,Chicago, IL) - Uji Kolmogorov-Smirnov menunjukkan bahwa semua variabel tidak berdistribusi normal - Uji Mann-Whitney U dan uji chi-square (x2) digunakan untuk menilai perbedaan antar kelompok.		adalah bukti kuantitatif pertama yang menunjukkan hubungan antara keterlibatan dalam VPA dan / atau MVPA dan ketahanan, pengaruh positif, dan gejala depresi dalam pembatasan COVID-19 di Spanyol. Mengakui asosiasi ini mungkin penting dalam mengembangkan program promosi kesehatan untuk orang lanjut usia selama sisa masa tahanan atau masa depan.

2	Daniel D. Callow, Naomi A. Arnold-Nedimala, Leslie S. Jordan, M.S., Gabriel S. Pena, M.S., Junyeon Won, M.A., John L. Woodard, Ph.D., J. Carson Smith, Ph.D. (24 Juni 2020)	The Mental Health Benefits of Physical Activity in Older Adults Survive the COVID-19 Pandemi	Desain Penelitian Design penelitian yang digunakan yaitu studi cross-sectional deskriptif Populasi Sekitar 1.046 orang dewasa yang lebih tua di atas usia 50 tahun yang tinggal di Amerika Utara. Sample Lansia di atas usia 50, antara 9 April dan 30 April 2020, selama pandemi COVD-19 Teknik Sampling Tidak dijelaskan secara detail tentang teknik sampling Tempat & Waktu Penelitian Tempat penelitian dilakukan di Amerika Utara (Amerika Serikat dan Kanada) dilakukan antara tanggal 9 April dan 30 April Variable Penelitian Aktivitas Fisik (VI) dan Kesehatan Mental (VD) Instrumen Pengumpulan Data Instrumen yang digunakan dalam penelitian ini adalah. 1. Instrument aktivitas fisik: Physical Activity Scale for the Elderly (PASE) 2. Instrumen Depresi: Geriatric Depression Scale (GDS)	American Journal of Geriatric Psychiatry 28:10 (2020) Halaman 1046−1057	Penelitian ini bertujuan untuk mengetahui hubungan antara jumlah dan intensitas aktivitas fisik yang dilakukan oleh lansia di Amerika Utara (Amerika Serikat dan Kanada) dengan gejala depresi dan kecemasan mereka saat ini berdasarkan pedoman jarak sosial (SDG) untuk pandemi COVID-19.	Hasil ini menunjukkan bahwa melakukan aktivitas fisik ringan selama pandemi COVID-19 dapat membantu meringankan beberapa dampak kesehatan mental negatif yang mungkin dialami orang dewasa yang lebih tua saat diisolasi dan berpegang pada SDG selama pandemi COVID-19

			3. Instrumen kecemasan: Geriatric Anxiety Scale (GAS). Analisis Data Analisis yang digunakan yaitu Analisis regresi linier berganda digunakan untuk mengetahui pengaruh independen dari tingkat aktivitas fisik total terhadap depresi total dan gejala kecemasan			
3	Ana Lage Susana Carrapatoso Elzier Sampaio de Queiroz Neto Sérgio Gomes Luísa Soares-Miranda and Lucimere Bohn 7 Juni 2021	Associations Between Depressive Symptoms and Physical Activity Intensity in an Older Adult Population During COVID-19 Lockdown	Desain Penelitian Cross Sectional Study Populasi Lansia yang berada di Brasil Sample Sampel terdiri dari 1123 lansia. 91% lansia wanita Teknik Sampling Tidak dijelaskan dengan detail Tempat & Waktu Penelitian Penelitian dilakukan secara online dengan menyebar kuesioner melalui telepon Variable Penelitian Depressive (VI) dan Physical Activity Intensity (VD) Instrumen Pengumpulan Data 1. GDS (depressi) 2. The international Physical Activity Questionnaire. (aktivitas fisik) Analisis Data	Frontiers in Psychology Journal	Penelitian ini bertujuan untuk mengetahui hubungan antara intensitas aktivitas fisik dan perilaku menetap dengan tingkat depresi pada lansia yang sebelumnya aktif selama penguncian COVID-19	Hasilnya memberikan saran empiris yang mendukung aktivitas fisik sedang hingga berat sebagai cara untuk mengurangi tingkat depresi di antara orang dewasa yang lebih tua selama kurungan COVID19. Program latihan berbasis rumah yang diawasi, yang dirancang khusus untuk orang dewasa yang lebih tua, mungkin merupakan strategi penting untuk mempertahankan dan meningkatkan kesehatan mental orang dewasa yang lebih tua.

			Statistik deskriptif (rata-rata, frekuensi), perbandingan antar kelompok (t-tes dan chi-square), dan analisis regresi hierarkis digunakan.			
4	Bailey L, Ward M, DiCosimo A, Baunta S, Cunningham C, Romero-Ortuno R, Kenny RA, Purcell R, Lannon R, McCarroll K, Nee R, Robinson D, Lavan A, Briggs R. 20 Januari 2021	Physical and Mental Health of Older People while Cocooning during the COVID-19 Pandemi.	Desain Penelitian Cross Sectional Deskriptif Populasi Lansia yang melakukan pengobatan di rumah sakit selama pandemi yang berada di Irlandia Sample Sampel terdiri dari 150 pasien lansia. 55% lansia wanita Teknik Sampling Tidak dijelaskan dengan detail Tempat & Waktu Penelitian Penelitian dilakukan secara online dengan menyebar kuesioner melalui telepon Variable Penelitian Depressive (VI) dan Physical Activity Intensity (VD) Instrumen Pengumpulan Data 1. Kesepian: Kuesioner kesepian 2. The international Physical Activity Questionnaire. (aktivitas fisik) Analisis Data Data survei disajikan secara deskriptif sebagai sarana dengan interval kepercayaan 95% dan persentase. Uji chi-square digunakan untuk menguji	QJM. 20:hcab015.doi: 10.1093/qjmed/ hcab015. Epub ahead of print. PMID: 33471128; PMCID: PMC7928635	Tujuan dari penelitian ini adalah untuk mengetahui kesehatan fisik dan mental lansia selama menjalani isolasi sosial di pandemi COVID-19 serta bagaimana akses kesehatan selama pandemi covid berlangsung	Hampir 40% (59/150) melaporkan bahwa kesehatan mental mereka 'lebih buruk' atau 'jauh lebih buruk' saat kepompong, sementara lebih dari 40% (63/150) melaporkan penurunan kesehatan fisik mereka. Hampir 70% (104/150) melaporkan berolahraga lebih jarang atau tidak berolahraga sama sekali. Lebih dari 57% (86/150) peserta melaporkan kesepian dengan 1 dari 8 (19/150) melaporkan bahwa mereka kesepian 'sangat sering'. Setengah dari peserta (75/150) melaporkan penurunan kualitas hidup mereka. Lebih dari 60% (91/150) setuju dengan saran pemerintah selama 70 tahun tersebut tetapi lebih dari 40% (61/150)

			perbedaan antara variabel kategori.			melaporkan bahwa mereka tidak menyukai istilah 'kepompong'.
5	Byron Creese, Zunera Khan, William Henley, Siobhan O'Dwyer, Anne Corbett, Miguel Vasconcelos Da Silva Kathryn Mills, Natalie Wright, Ingelin Testad, Dag Aarsland, and Clive Ballard 17 desember 2020	Loneliness, physical activity, and mental health during COVID-19: a longitudinal analysis of depression and anxiety in adults over the age of 50 between 2015 and 2020	Desain Penelitian Observational Cohort Study Populasi Lansia berusia diatas 50 tahun di Inggris Sample Sampel terdiri dari 3.281 orang menyelesaikan kuesioner kesehatan mental COVID-19, Teknik Sampling Tidak dijelaskan dengan detail Tempat & Waktu Penelitian Penelitian dilakukan secara online lansia bergabung ke PROTECT Variable Penelitian Kesepian, aktivitas fisik dan kesehatan mental (VI) dan Pandemi COVID-19(VD) Instrumen Pengumpulan Data 1. UCLA loneliness scale (kesepian) 2. The international Physical Activity Questionnaire. (aktivitas fisik) Analisis Data Uji Chi square	International Psychogeriatrics Journal	bertujuan untuk mengidentifikasi apakah kesepian dan aktivitas fisik dikaitkan dengan kesehatan mental yang lebih buruk selama periode jarak sosial wajib di Inggris.	Pada tahun 2020, skor PHQ-9 untuk kesepian, disesuaikan dengan kovariat, adalah 3,23 (95% CI: 3,01-3,44), meningkat sekitar 1 poin pada semua tahun sebelumnya dalam kelompok ini dan 2 poin lebih tinggi dari orang yang tidak dinilai. kesepian, yang skornya tidak berubah pada tahun 2020 (1,22, 95% CI: 1,12-1.32). PHQ-9 adalah 2,60 (95% CI: 2,43-2,78) pada orang dengan penurunan aktivitas fisik, meningkat 0,5 pada tahun-tahun sebelumnya. Sebaliknya, PHQ-9 pada tahun 2020 untuk orang yang aktivitas fisiknya tidak menurun adalah 1,66, 95% CI: 1,56-1,75, sama dengan tahun-tahun sebelumnya. Hubungan serupa diamati untuk GAD-7 meskipun

						beban gejala mutlak lebih rendah.
6	Sima Zach*, Aviva Zeev, Miki Ophir and Sigal Eilat-Adar 1 Maret 2021	Physical activity, resilience, emotions, moods, and weight control of older adults during the COVID-19 global crisis	Desain Penelitian Cross Sectional Study Populasi Lansia yang berada di Brasil Sample Sampel terdiri dari 1202 lansia. 381 laki-laki dan 821 perempuan Teknik Sampling *Non Probability Snowball sampling* Tempat & Waktu Penelitian Penelitian dilakukan secara online dengan Kuesioner disebarkan melalui email, WhatsApp, Twitter, dan Facebook Variable Penelitian Ketahanan, emosi suasana hati (VI) dan Physical Activity (VD) Instrumen Pengumpulan Data 1. The international Physical Activity Questionnaire IPAQ (aktivitas fisik) 2. Positive and Negative Affect Schedule – PANAS (afek positif dam negatif) 3. The Connor and Davidson Resilience Scale (ketahanan) 4. A questionnaire for measuring depressive moods dengan 6 item pertanyaan Analisis Data	European Review of Aging and Physical Activity	Tujuan penelitian ini adalah untuk mengetahui aktivitas fisik dan kesehatan mental lansia selama pandemi COVID-19 serta untuk menguji perbedaan antara orang dewasa pada kelompok usia 70+ dan dua kelompok usia lainnya (45-59 dan 60-69), tentang pola hidup sehat dan aktif.	Ketahanan dan perasaan negatif dan gejala depresi lebih tinggi pada kelompok usia 45 tahun-59 dibandingkan dengan peserta berusia 70+ tahun, dan skor gejala depresi juga lebih tinggi di antara peserta berusia 45 tahun-59 dibandingkan dengan usia 60-69. Aktivitas fisik dikaitkan dengan ketahanan yang lebih tinggi, gejala depresi yang lebih sedikit, dan emosi negatif yang lebih sedikit. Mengenai variabel gender dan psikologis, tidak ada perbedaan yang ditemukan. Selama masa penguncian, perubahan berat badan tidak lazim dan jam tidur meningkat.

Uji Chi Square

4.1.2 Karakteristik Studi

Enam artikel yang telah diperoleh melalui pencarian sesuai dengan protokol dan registrasi memenuhi kriteria inklusi yang sudah ditetapkan yaitu berdasarkan kriteria populasi dalam penelitian ini merupakan seluruh kelompok lansia yang berada di komunitas, intervensi yang inklusikan dalam penelitian ini yaitu artikel yang meneliti tentang aktivitas fisik atau studi yang meneliti tentang kegiatan di rumah maupun luar rumah yang dilakukan oleh lansia selama pandemi dan artikel yang meneliti tentang kesehatan mental lansia selama pandemi. Selanjutnya tidak terdapat pembanding dikarenakan pada penelitian ini hanya ingin mengetahui terkait aktivitas fisik dan kesehatan mental lansia. Luaran yang diinginkan yaitu artikel yang menjelaskan tentang aktivitas fisik dan kesehatan mental lansia selama pandemi COVID-19. Berdasarkan topik *literature review* yaitu tentang aktivitas fisik dan kesehatan mental lansia selama pandemi COVID-19. Diketahui sebagian 5 artikel menggunakan studi desain *cross sectional* dan 1 artikel menggunakan studi desain *cohort study*. keseluruhan penelitian dilakukan melalui survei berbasis telepon dan menggunakan sosial media seperti facebook, twitter dan whats app. Jumlah rata-rata peserta dari setiap penelitian lebih dari seratus orang. Populasi dari artikel merupakan lansia yang sedang menjalankan isolasi sosial selama pandemi COVID-19. Pengambilan data hampir keseluruhan dilakukan dengan cara online yaitu menyebar kuesioner dari media sosial, youtube maupun website. Waktu publikasi artikel yang diinklusikan dalam penelitian ini adalah artikel yang diterbitkan pada tahun 2020 sampai 2021. Dari enam artikel tersebut waktu penelitian dilakukan pada awal masa pandemi yaitu sekitar bulan maret tahun 2020

4.1.3 Karakteristik Responden Studi

Karakteristik responden dari penelitian ini adalah lansia yang melakukan aktivitas fisik selama pandemi dan lansia yang mengalami masalah kesehatan mental selama pandemi COVID-19 dari berbagai negara. Dalam studi telah disebutkan faktor yang berkaitan dengan masalah kesehatan mental adalah lansia yang tinggal sendiri dan lansia yang sudah pensiun dari pekerjaannya serta mengahadapi masa awal pandemi dengan melakukan isolasi sosial, mayoritas responden dari setiap artikel berjumlah lebih dari 100 orang. Responden dalam penelitian ini rata-rata berusia diatas 60 tahun. Karakteristik *gender* pada responden hampir sama antara laki-laki dan perempuan dikarenakan studi bersifat menyeluruh terhadap lansia yang menjalankan isolasi sosial dan berada di komunitas.

4.2 Analisis

4.2.1 Aktivitas Fisik Lansia selama Pandemi COVID-19

Hasil *review* dari 6 artikel yang membahas tentang aktivitas fisik lansia selama pandemi COVID-19 dapat dilihat dari tabel berikut:

Tabel 4.2 Aktivitas Fisik Lansia Selama Pandemi COVID-19

No	Artikel	Hasil temuan
1	COVID-19, Psychological Well-being and Physical Activity Levels in Older Adults During the Nationwide Lockdown in Spain (Carriedo A. , et al., 2020)	Aktivitas fisik lansia selama pandemi COVID-19 diukur menggunakan IPAQ. Terdapat 3 tingkatan aktivitas fisik yang pertama VPA Vigorous physical activity (kuat) yang dilakukan selama 150 menit, MPA Moderate physical activity (sedang) dilakukan selama 75 menit dan MVPA Moderate vigorous physical activity (gabungan) dilakukan antara 75-150 menit. Hasil penelitian menunjukkan bahwa orang dewasa yang lebih tua yang secara teratur terlibat dalam aktivitas fisik yang kuat (VPA) dan sedang-kuat (MVPA) selama karantina
2	The Mental Health Benefits of	Aktivitas fisik lansia selama pandemi COVID-19 dengan kuesioner PASE yang ditujukan untuk lansia. peserta diminta memberikan informasi

	Physical Activity in Older Adults Survive the COVID-19 Pandemi (Callow, et al., 2020)	tentang frekuensi (hari / minggu) dan durasi (jam / hari) kuesioner tersebut meliputi kegiatan seperti berjalan di luar, aerobik rekreasi (ringan, sedang, dan kuat) dan latihan kekuatan, pekerjaan halaman, berkebun, perbaikan rumah, dan merawat orang lain saat pandemi. Didapatkan hasil bahwa sebagian besar lansia melakukan aktivitas fisik tingkat kuat.
3	Associations Between Depressive Symptoms and Physical Activity Intensity in an Older Adult Population During COVID-19 Lockdown (Lage, et al., 2021)	Akrtivitas fisik lansia selama isolasi sosial diukur menggunakan IPAQ dengan versi singkat lansia dianjurkan untuk melaporkan frekuensi aktivitas fisik (hari per minggu) dan durasi (jam atau menit per hari) yang mereka habiskan untuk berjalan, serta aktivitas fisik sedang dan berat. IPAQ-SV juga menyertakan pertanyaan tentang waktu duduk (waktu per hari dalam posisi duduk). Durasi harian dari setiap intensitas aktivitas fisik (sedang dan kuat) dan berjalan (yaitu, aktivitas fisik ringan) dihitung dengan mengalikan jumlah hari per minggu dengan waktu per hari di setiap intensitas. Setelah itu, hasil untuk setiap intensitas aktivitas fisik dan jalan kaki dibagi 7 untuk mendapatkan nilai rata-rata per hari (yaitu aktivitas fisik ringan/hari, aktivitas fisik sedang/hari, dan aktivitas fisik berat/hari). Selain itu, aktivitas fisik sedang dan berat per hari dijumlahkan untuk mendapatkan aktivitas fisik sedang hingga berat. Lansia melaporkan penurunan aktivitas fisik dan peningkatan duduk selama pandemi
4	Physical and Mental Health of Older People while Cocooning during the COVID-19 Pandemi. (Bailey, et al., 2021)	Aktivitas fisik lansia selama pandemi COVID-19 lansia melaporkan bahwa mobilitas fisik mereka jauh lebih buruk dari sebelum pandemi. Sebagian besar melaporkan bahwa kebugaran fisik lansia menurun hamper setengah dari sebelum pandemi
5	Loneliness, physical activity, and mental health during COVID-19: a longitudinal analysis of depression and anxiety in adults over the age of 50 between 2015 and 2020 (Creese, et al., 2020)	Aktivitas fisik lansia pada masa pandemi dilaporkan melalui kuesioner aktivitas aktivitas fisik, hasilnya diketahui bahwa sebagian besar responden mengalami penurunan aktivitas fisik dan juga sebagian besar tidak melakukan aktivitas fisik lagi selama pandemi
6	Physical activity, resilience, emotions,	Aktivitas fisik lansia, dalam penelitian ini memperhatikan usia lansia dalam melakukan aktivitas fisik, untuk kuesioner yang digunakan

	moods, and weight control of older adult during the COVID-19 global crisis (Zach, et al., 2021)	dalam penelitian ini adalah IPAQ versi singkat yang dilakukan selama seminggu dengan memperhatikan frekuensi, durasi dan intensitas aktivitas fisik. Didapatkan hasil bahwa aktivitas fisik lansia selama pandemi sebagian mengalami peningkatan dan sebagian mengalami penurunan. Aktivitas fisik dengan intensitas berat meningkat pada lansia berusia 70+

Berdasarkan tabel 4.2 dari 6 artikel terdapat 3 artikel yang menunjukkan terjadinya peningkatan aktivitas fisik selama isolasi sosial yang berlangsung saat pandemi COVID-19 diketahui bahwa sebagian besar lansia rutin melakukan aktivitas fisik dengan intensitas sedang hingga berat. Selain itu pada penelitian lain menunjukan lansia mengalami peningkatan aktivitas fisik, kemudian penilaian aktivitas fisik dengan kuesioner PASE membagi aktivitas fisik lansia menjadi (ringan, sedang, dan berat) seperti melakukan pekerjaan rumah, berkebun, perbaikan rumah, serta merawat orang lain didapatkan hasil sebagian besar lansia hanya melakukan aktivitas fisik dengan intensitas jauh lebih besar. Sedangkan 2 artikel menunjukkan responden lansia mengalami penurunan aktivitas fisik, diketahui bahwa sebagian besar lansia jarang berolahraga, artikel selanjutnya yang melakukan penelitian dengan *cohort study* menyatakan bahwa lansia mengalami penurunan aktivitas fisik dan lansia tidak melakukan aktivitas fisik selama pandemi menjadi.

4.2.2 Kesehatan Mental Lansia selama Pandemi COVID-19

Hasil *review* dari 6 artikel tentang kesehatan mental lansia selama pandemi COVID-19 dapat dilihat dari tabel berikut:

Tabel 4.3 Kesehatan Mental Lansia Selama Pandemi COVID-19

No	Artikel	Hasil temuan
1	COVID-19, Psychological Well-being and Physical Activity Levels in Older Adults During the Nationwide Lockdown in Spain (Carriedo A. , et al., 2020)	Kesehatan mental selama pandemi COVID-19, diketahui bahwa sebagian besar mengalami masalah kesehatan mental depresi yang diakibatkan karena adanya isolasi sosial yang dilakukan oleh pemerintah, selain itu faktor psikologis lain seperti ketahanan dan pengaruh positif dan negative juga dinilai dalam penelitian ini
2	The Mental Health Benefits of Physical Activity in Older Adults Survive the COVID-19 Pandemi (Callow, et al., 2020)	Kesehatan mental lansia selama pandemi COVID-19 diketahui bahwa masalah kesehatan mental yang sering terjadi pada lansia adalah depresi dan kecemasan, untuk angka kejadian yang tinggi terjadi pada kecemasan lansia
3	Associations Between Depressive Symptoms and Physical Activity Intensity in an Older Adult Population During COVID-19 Lockdown (Lage, et al., 2021)	Kesehatan mental lansia selama pandemi COVID-19 Diketahui bahwa sebagian besar lansia mengalami depresi yang disebabkan oleh adanya pemberlakuan isolasi sosial
4	Physical and Mental Health of Older People while Cocooning during the COVID-19 Pandemi. (Bailey, et al., 2021)	Kesehatan mental lansia selama pandemi COVID-19. Masalah kesehatan mental yang dialami oleh lansia adalah kesepian, suasana hati buruk, kekhawatiran dan kecemasan. Kemudian diketahui sebagian lansia melaporkan kesehatan mental yang buruk dengan angka kejadian paling besar terjadi pada kecemasan dan gangguan suasana hati yang buruk
5	Loneliness, physical activity, and mental health during COVID-19: a longitudinal	Kesehatan mental lansia selama pandemi COVID-19 mengalami masalah yaitu kesepian dan depresi, dan masalah kesehatan mental yang paling sering terjadi pada lansia adalah depresi

	analysis of depression and anxiety in adults over the age of 50 between 2015 and 2020 (Creese, et al., 2020)	
6	Physical activity, resilience, emotions, moods, and weight control of older adult during the COVID-19 global crisis (Zach, et al., 2021)	Kesehatan mental lansia selama pandemi COVID-19 pada penelitian ini meneliti beberapa permasalahan kesehatan mental yang terjadi pada lansia yaitu depresi, perasaan negatif dan ketahanan diketahui depresi terbesar terjadi pada lansia berusia 45-59 tahun

Berdasarkan tabel 4.3 hasil dari 6 artikel menunjukkan adanya masalah kesehatan mental yang disebabkan oleh adanya isolasi sosial yang dilakukan lansia. terdapat 2 artikel yang melakukan penelitian terkait masalah kesehatan mental depresi. Sedangkan 4 artikel lainnya menyebutkan ada beberapa masalah kesehatan mental yang mungkin terjadi pada lansia yaitu depresi, kesepian, kecemasan, perasaan negative dan ketahanan. Dari 4 penelitian itu menunjukan bahwa masalah kesehatan mental depresi memiliki angka kejadian paling besar. Dari beberapa artikel disebutkan bahwa angka kejadian masalah kesehatan mental paling tinggi adalah depresi selain itu masalah kesehatan mental yang didapatkan melalui analisa artikel yaitu gangguan mood buruk, selain itu beberapa lansia juga mengalami masalah kesehatan mental kesepian.

4.2.3 Hubungan Aktivitas Fisik dengan Kesehatan Mental Lansia selama Pandemi COVID-19

Hasil *review* dari 6 artikel tentang kesehatan mental lansia selama pandemi COVID-19 dapat dilihat dari tabel berikut:

Tabel 4.4 Kesehatan Mental Lansia Selama Pandemi COVID-19

No	Artikel	Hasil temuan
1	COVID-19, Psychological Well-being and Physical Activity Levels in Older Adults During the Nationwide Lockdown in Spain (Carriedo A. , et al., 2020)	Berdasarkan penelitian terdapat 3 tingkatan aktivitas fisik sebagian besar lansia menunjukkan bahwa lansia secara teratur terlibat dalam aktivitas fisik yang kuat (VPA) dan sedang-kuat (MVPA) fisik yang dilakukan lansia terbukti memiliki hubungan dengan kesehatan mental lansia hal tersebut disebabkan lansia yang melakukan aktivitas fisik yang rutin akan memiliki emosi yang lebih positif
2	The Mental Health Benefits of Physical Activity in Older Adults Survive the COVID-19 Pandemi (Callow, et al., 2020)	Berdasarkan penelitian diketahui aktivitas fisik lansia diukur menggunakan kuesioner PASE yang mengukur aktivitas fisik lansia berdasarkan beberapa kegiatan meliputi berjalan di luar, aerobik rekreasi (ringan, sedang, dan kuat) dan latihan kekuatan, pekerjaan halaman, berkebun, perbaikan rumah, dan merawat orang lain. Aktivitas fisik yang dilakukan lansia pada isolasi sosial memiliki hubungan dengan kesehatan mental hal tersebut karena aktivitas fisik diyakini memilki efek anxiolytic yaitu menghilangkan perasaan tegang, ansietas dan panik
3	Associations Between Depressive Symptoms and Physical Activity Intensity in an Older Adult Population During COVID-19 Lockdown (Lage, et al., 2021)	Berdasarkan penelitian lansia melaporkan penurunan aktivitas fisik dan hal tersebut menyebabkan terjadinya masalah kesehatan mental selain itu variabilitas depresi setelah disesuaikan dengan usia, jenis kelamin, tingkat pendidikan, indeks massa tubuh, dan polifarmasi. Tetapi waktu berjalan dan duduk setiap hari tidak terkait dengan skor depresi
4	Physical and Mental Health of Older People while Cocooning during	Berdasarkan penelitian diketahui lansia jarang melakukan olahraga selama isolasi sosial. Lansia juga melaporkan terkait masalah kesehatan mental yang dialami yaitu depresi, kesepian, suasana hati yang

	the COVID-19 Pandemi. (Bailey, et al., 2021)	buruk kekhawatiran dan kecemasan hal tersebut disebabkan karena depresi merupakan masalah kesehatan mental dengan kesehatan fisik, kecacatan, kehilangan fungsi dan kematian. Hal tersebut menunjukkan bahwa terdapat hubungan antara aktivitas fisik yang dilakukan lansia dengan kejadian masalah kesehatan mental
5	Loneliness, physical activity, and mental health during COVID-19: a longitudinal analysis of depression and anxiety in adults over the age of 50 between 2015 and 2020 (Creese, et al., 2020)	Berdasarkan penelitian diketahui bahwa lansia memang mengalami perubahan secara psikologis tetapi aktivitas fisik merupakan salah satu factor yang dapat menyebabkan masalah kesehatan mental, penurunan aktivitas fisik merupakan faktor risiko memburuknya kesehatan mental selama pandemi.
6	Physical activity, resilience, emotions, moods, and weight control of older adult during the COVID-19 global crisis (Zach, et al., 2021)	Berdasarkan penelitian didapatkan hasil adanya peningkatan aktivitas fisik diketahui bahwa lansia yang rutin melakukan aktivitas fisik dengan intesitas aktivitas fisik kuat akan berpengaruh positif terhadap kesehatan mental. Pada penelitian ini didapatkan kesimpulan bahwa aktivitas fisik dikaitkan dengan skor ketahanan lansia dalam menghadapi masalah

Berdasarkan hasil *review* dari 6 artikel tersebut diketahui bahwa aktivitas fisik yang dilakukan lansia akan mempengaruhi kesehatan mental. Lansia yang rutin melakukan aktivitas fisik akan memiliki kesehatan mental yang baik. Hal tersebut terlihat dari nilai aktivitas fisik yang dilakukan lansia, pada beberapa artikel menyatakan bahwa aktivitas fisik menurun, lalu pada status kesehatan mental respondennya terbukti mengalami berbagai permasalahan seperti terjadinya peningkatan depresi, suasana hati yang buruk, merasa kesepian dan mengalami kecemasan.

BAB V

PEMBAHASAN

5.1 Aktivias Fisik Lansia Selama Pandemi COVID-19

Hasil *literature review* dari enam artikel, beberapa artikel menunjukkan adanya peningkatan aktivitas fisik selama pandemi COVID-19. Artikel yang menunjukkan terjadinya peningkatan aktivitas fisik selama isolasi sosial yang berlangsung saat pandemi COVID-19 yaitu dilihat dari sebagian besar lansia rutin melakukan aktivitas fisik dengan intensitas sedang hingga berat, diketahui juga intensitas aktivitas fisik pada lansia perempuan dan laki-laki hampir sama sebagian besar lansia memenuhi rekomendasi untuk melakukan aktivitas fisik dengan intensitas sedang hingga kuat yaitu beraktivitas selama 75-150 menit dan intensitas kuat yaitu selama 150 menit.aktivitas fisik yang dilakukan lansia laki-laki lebih berat dari pada lansia perempuan (Carriedo A. , et al., 2020). Selanjutnya menyatakan bahwa lansia mengalami peningkatan aktivitas fisik, penelitian ini membagi aktivitas fisik lansia menjadi (ringan, sedang, dan berat) seperti melakukan pekerjaan rumah, berkebun, perbaikan rumah, serta merawat orang lain. Lansia melakukan aktivitas fisik dengan rincian saat pandemi berlangsung aktivitas fisik aktivitas fisik lansia diketahui sebagian besar peserta mematuhi saran untuk melakukan aktivitas fisik saat ini yaitu dengan intensitas sedang atau melakukannya secara ketat (Callow, et al., 2020). Selanjutnya artikel yang menyatakan adanya peningkatan aktivitas fisik diketahui bahwa lansia yang rutin melakukan aktivitas fisik dengan intesitas aktivitas fisik kuat untuk lansia 70 tahun keatas, kemudian sisanya rutin melakukan aktivitas fisik dengan intesitas sedang (Zach, et al., 2021).

Terdapat 3 artikel yang menunjukkan responden lansia mengalami penurunan aktivitas fisik dari artikel pertama melaporkan sebagian besar lansia aktivitas fisik lansia menurun, kemudian lansia juga melakukan aktivitas fisik tetap seperti biasanya dan sebagian kecil lansia melporkan tingkat aktivitas fisiknya bertambah (Lage, et al., 2021). Kemudian artikel selanjutnya didapatkan diketahui lebih dari setengah dari jumlah responden lansia jarang berolahraga (Bailey, et al., 2021). Dan artikel selanjutnya menyatakan bahwa lansia mengalami penurunan aktivitas fisik dan lansia tidak melakukan aktivitas fisik selama pandemi menjadi. Penelitian ini dilakukan secara longitudinal dengan memperhatikan hasil penelitian pada tahun sebelumnya (Creese, et al., 2020).

Aktivitas fisik yang dilakukan lansia selama pandemi mengalami peningkatan dan penurunan. Lansia bergabung sebagai responden penelitian dan rutin melakukan aktivitas fisik melaporkan bahwa dengan melakukan aktivitas fisik selama isolasi sosial saat pandemi COVID-19 memiliki manfaat yang sangat baik. Hal tersebut sesuai dengan penelitian yang dilakukan di Brasil pada tahun 2018 tentang aktivitas fisik lansia menyatakan bahwa manfaat aktivitas fisik secara teratur pada lansia dapat meminimalkan efek fisiologis dari proses penuaan, meningkatkan angka harapan hidup, membatasi perkembangan dan progress dari penyakit tidak menular (PTM) yang banyak dialami lansia dan mengurangi resiko masalah penyakit psikologis lansia (Lira, et al., 2018). Aktivitas fisik juga menjadi salah satu upaya dalam menjaga kesehatan terutama bagi lansia, ketika seseorang melakukan aktivitas fisik peradaran darah di tubuhnya akan mengalami peningkatan sehingga distribusi oksigen ke dalam sel menjadi optimal, hal tersebut

juga mengakibatkan terproduksinya hormone kebahagiaan yaitu endorphin yang bisa didapatkan ketika seseorang melakukan aktivitas fisik. Hormone endorphin ini diproduksi sebagai respon tubuh ketika seseorang mengahadapi stress atau ketidaknyamanan selain itu hormone ini juga bertanggung jawab untuk menciptakan keadaan euforia (Cheney Clinic, 2020). Pada penelitian yang dilakukan oleh 6 peneliti di atas 5 diantaranya menggunakan kuesioner IPAQ intrumen ini berisi tentang pertanyaan terkait jenis aktivitas fisik, durasi, dan berapa hari selama seminggu menjalankan aktvitas fisik. Dalam instrument tersebut membagi aktivitas fisik menjadi 3 tingkatan sebagai berikut. Penilaian dilakukan dengan skor MET (aktivitas fisik setiap minggunya) terdapat 3 tingkatan skor untuk MET yaitu:

a. Tinggi skor MET=1500
b. Sedang skor = 600
c. Rendah jika skor kurang dari 600

Aktivitas fisik yang dapat dilakukan yaitu berjalan (ringan) skor = 3,3 Aktivitas fisik sedang seperti bersepeda skor = 4 aktivitas fisik berat seperti berlari atau olahraga kardio skor = 8 Hasil dari pertanyaan tersebut kemudian dikalkulasikan dengan rumus:

skor aktivitas fisik × durasi lama aktivitas fisik × berapa hari dalam seminggu melakukan aktivitas fisik = hasil dikategorikan skor MET

contoh: seorang lansia berjalan kaki maka skor = 3,3. Berjalan kaki selama 30 menit 5 hari dalam seminggu maka total menit MET untuk aktivitas fisik itu adalah 3,3×30×5 = 495 (Forde, 2020). Dapat disimpulkan bahwa semakin tinggi nilai IPAQ atau beraktivitas fisik dengan intensitas *vigorous intensity* yang dilakukan

setiap minggu maka aktivitas fisik yang dilakukan lansia semakin baik namun perlu menjadi perhatian terkait kemampuan fisik lansia, perlu menjadi perhatian terkait IPAQ versi singkat terkait lama waktu duduk yang dilakukan lansia, ternyata lansia yang memiliki waktu duduk yang tinggi akan mengalami penurunan pada intensitas aktivitas fisik (Ainsworth, B. E., et al, 2021). Instrumen selanjutnya yang digunakan adalah PASE pada kuesioner ini menetapkan lima jenis aktivitas fisik yaitu latihan kekuatan, pekerjaan halaman, berkebun, perbaikan rumah, dan merawat orang lain yang dilakukan oleh lansia selama periode satu minggu, berdasarkan penelitian ini juga dapat diketahui bahwa lansia dalam melakukan aktivitas fisik tidak harus selalu melakukan olahraga yang berat, dengan melakukan kegiatan ringan juga dapat membuat tubuh seseorang menjadi lebih sehat, pada penggunaan kuesioner ini lansia memiliki tangka aktivitas fisik yang lebih tinggi karena jenis kegiatan yang dikategorikan menjadi aktivitas fisik sangat luas pada penelitian ini(Siordia, 2012).

Berdasarkan review yang telah dilakukan pada artikel mengenai aktivitas fisik lansia selama pandemi COVID-19. Menurut peneliti aktivitas fisik yang dilakukan lansia selama pandemi antara terjadi peningkatan dan penurunan. Peneliti mendapatkan hasil yaitu aktivitas fisik yang dilakukan lansia dikategorikan menjadi beberapa tingkatan aktivitas fisik. Selanjutnya perlu menjadi perhatian terkait keterbatasan lansia dalam melakukan aktivitas fisik, berdasarkan *review* hanya terdapat satu artikel yang menggunakan kuesioner yang spesifik yaitu PASE, artikel lainnya hanya melakukan penelitian terhadap aktivitas fisik tanpa memperhatikan kebutuhan dan keterbatasan dari lansia.

5.2 Kesehatan Mental Lansia Selama Pandemi COVID-19

Hasil *review* dari artikel yang membahas mengenai kesehatan mental lansia selama pandemi COVID-19. Menunjukkan adanya masalah kesehatan mental yang disebabkan oleh adanya isolasi sosial yang dilakukan lansia. terdapat 2 artikel yang melakukan penelitian terkait masalah kesehatan mental depresi, penelitian ini menyebutkan bahwa sebagian besar depresi terjadi pada lansia (Carriedo A. , et al., 2020). Masalah kesehatan mental depresi juga dialami oleh hampir setengah dari jumlah responden lansia (Lage, et al., 2021). Sedangkan 4 artikel lainnya menyebutkan ada beberapa masalah kesehatan mental yang mungkin terjadi pada lansia yaitu depresi, kesepian, kecemasan, perasaan negative dan ketahanan. Dari 4 penelitian itu menunjukan bahwa masalah kesehatan mental depresi memiliki angka kejadian paling besar. Artikel pertama menyebutkan bahwa sebagian besar lansia mengalami depresi dan kecemasan tingkat sedang (Callow, et al., 2020). Penelitian lain menyebutkan lansia mengalami masalah kesehatan mental yang didapatkan melalui penelitian ini adalah gangguan mood buruk (Bailey, et al., 2021). Pada artikel ini diketahui bahwa setengah dari jumlah responden lansia mengalami masalah kesehatan mental depresi dan sebagian mengalami masalah kesehatan mental kesepian (Creese, et al., 2020). Selanjutnya pada artikel terakhir menyebutkan bahwa masalah kesehatan mental yang sering terjadi adalah depresi, perasaan negative, serta ketahanan dan gejala depresi lebih tinggi terjadi pada lansia berusia 45-59 tahun (Zach, et al., 2021).

Keadaan kesehatan mental lansia yang memburuk karena pandemi COVID-19 hal tersebut berkaitan dengan depresi dan kesepian yang dialami lansia. Masalah

kesehatan mental kesepian pada lansia yang bermula saat adanya pembatasan akibat COVID-19 sebagian besar dialami oleh lansia yang tinggal sendiri ditambah lagi faktor lain seperti lansia yang mengalami masalah pada kesehatannya hal tersebut semakin meningkatkan masalah kesepian yang dialami lansia (Kotwal, et al., 2020). Berdasarkan penelitian yang dilakukan di Spanyol diketahui bahwa sebagian besar kelompok lansia lebih dari 60 tahun menunjukkan masalah depresi lebih rendah dibandingkan dengan kelompok lansia kurang dari 60 tahun, kemudian skor HAS untuk mengetahui kecemasan pada lansia juga menunjukkan hasil bahwa sebagian besar lansia dengan usia lebih dari 60 tahun memiliki kesehatan mental yang lebih baik dibandingkan dengan usia kurang dari 60 tahun. Variabel yang diteliti untuk mengetahui tingkat kesehatan mental lansia, semua menunjukkan hasil bahwa lansia yang berusia kurang dari 60 tahun mengalami masalah kesehatan mental yang lebih tinggi seperti kecemasan, depresi dan stress. Lansia menunjukkan tekanan emosional yang lebih sedikit, tanpa memperhatikan perbedaan antara pria dan wanita. Peneliti di Vietnam menyatakan bahwa orang yang berusia 60 tahun ke atas memiliki kemungkinan lebih tinggi untuk mengalami depresi dan penurunan kualitas hidup terkait kesehatan yang buruk selama pandemi terutama mereka yang mencurigai diri mereka mengalami gejala COVID-19 (Nguyen, et al., 2020). Temuan lainnya yaitu lansia mengalami peningkatan depresi secara konsisten selama pandemi COVID-19 terutama masalah kecemasan dan kesepian yang disebabkan adanya upaya isolasi sosial yang dilakukan pemerintah untuk menghindari peningkatan angka terjadinya COVID-19 di masyarakat. Isolasi sosial yang dilakukan secara berkepanjangan akan meningkatkan masalah kesehatan

mental dan terputusnya interaksi sosial yang dilakukan lansia (Killgore, Cloonen, Taylor , & Dailey, 2020).

Pandemi COVID-19 mengakibatkan berbagai permasalahan terutama permasalahan psikologis, lansia yang merupakan kelompok rentan sangat beresiko untuk terinfeksi virus COVID-19. Dengan adanya kebijakan untuk lansia selalu tetap di rumah dan menjalankan isolasi sosial secara mandiri terbukti dapat meningkatkan masalah kesehatan mental lansia. status kesehatan mental lansia berdasarkan 6 artikel sebagian besar permasalahan kesehatan mental yang terjadi pada lansia adalah depresi dan kecemasan, hal tersebut dialami oleh lansia yang berusia dibawah 60 tahun. Lansia berusaha di atas 60 tahun lebih stabil kesehatan mentalnya dikarenakan kemampuan mereka dalam beradaptasi dan pengalaman hidup yang mereka rasakan mampu membuat status kesehatan mental lansia di atas 60 tahun lebih stabil. Selama pandemi COVID-19 banyak lansia yang mengalami masalah pada kesehatan mental hal tersebut menunjukkan bahwa ada dampak yang signifikan terhadap kesehatan mental dengan isolasi sosial yang dilakukan oleh lansia. peneliti melaporkan depresi yang lebih tinggi dan kesepian yang lebih besar timbul setelah adanya pandemi COVID-19.

5.3 Hubungan Aktivitas fisik dan Kesehatan Mental Lansia Selama Pandemi COVID-19

Berdasarkan 6 artikel yang sudah dilakukan *review* diketahui semua artikel memiliki hubungan antara aktivitas fisik dan kesehatan mental lansia. pada artikel yang pertama diketahui terdapat 3 tingkatan aktivitas fisik sebagian besar lansia menunjukkan bahwa lansia secara teratur terlibat dalam aktivitas fisik yang kuat

(VPA) dan sedang-kuat (MVPA) fisik yang dilakukan lansia terbukti memiliki hubungan dengan kesehatan mental lansia hal tersebut disebabkan lansia yang melakukan aktivitas fisik yang rutin akan memiliki emosi yang lebih positif (Carriedo A. , et al., 2020). Selanjutnya aktivitas fisik lansia diukur menggunakan kuesioner PASE yang mengukur aktivitas fisik lansia berdasarkan beberapa kegiatan meliputi berjalan di luar, aerobik rekreasi (ringan, sedang, dan kuat) dan latihan kekuatan, pekerjaan halaman, berkebun, perbaikan rumah, dan merawat orang lain. Aktivitas fisik yang dilakukan lansia pada isolasi sosial memiliki hubungan dengan kesehatan mental hal tersebut karena aktivitas fisik diyakini memilki efek anxiolytic yaitu menghilangkan perasaan tegang, ansietas dan panik (Callow, et al., 2020). Artikel selanjutnya diketahui lansia melaporkan penurunan aktivitas fisik Berdasarkan penelitian lansia melaporkan penurunan aktivitas fisik dan hal tersebut menyebabkan terjadinya masalah kesehatan mental selain itu variabilitas depresi setelah disesuaikan dengan usia, jenis kelamin, tingkat pendidikan, indeks massa tubuh, dan polifarmasi. Tetapi waktu berjalan dan duduk setiap hari tidak terkait dengan skor depresi (Lage, et al., 2021). Selanjutnya berdasarkan penelitian diketahui lansia jarang melakukan olahraga selama isolasi sosial. Lansia juga melaporkan terkait masalah kesehatan mental yang dialami yaitu depresi, kesepian, suasana hati yang buruk kekhawatiran dan kecemasan hal tersebut disebabkan karena depresi merupakan masalah kesehatan mental dengan kesehatan fisik, kecacatan, kehilangan fungsi dan kematian. Hal tersebut menunjukkan bahwa terdapat hubungan antara aktivitas fisik yang dilakukan lansia dengan kejadian masalah kesehatan mental (Bailey, et al., 2021). Berdasarkan

penelitian diketahui bahwa lansia memang mengalami perubahan secara psikologis tetapi aktivitas fisik merupakan salah satu factor yang dapat menyebabkan masalah kesehatan mental, penurunan aktivitas fisik merupakan faktor risiko memburuknya kesehatan mental selama pandemi. (Creese, et al., 2020). Selanjutnya didapatkan hasil adanya peningkatan aktivitas fisik diketahui bahwa lansia yang rutin melakukan aktivitas fisik dengan intesitas aktivitas fisik kuat akan berpengaruh positif terhadap kesehatan mental. Pada penelitian ini didapatkan kesimpulan bahwa aktivitas fisik dikaitkan dengan skor ketahanan lansia dalam menghadapi masalah (Zach, et al., 2021).

Lansia yang memenuhi rekomendasi untuk tetap melakukan aktivitas fisik dengan intesitas yang sudah disesuaikan dengan kondisi fisologisnya akan memiliki pengaruh positif dan mengalami gejala depresi yang lebih rendah (Liao Y, 2015). Menurut penelitian yang dilakukan Amerika pandemi yang dapat mengakibatkan peningkatan stressor pengurangan aktivitas fisik kemungkinan akan menambah efek psikologis pandemi yang sudah bermasalah. Sebagian orang dewasa diperkirakan memiliki penyakit mental pada tahun 2020 (Substance Abuse and Mental Health Services Administration, 2021). Aktivitas fisik yang dilakukan oleh lansia selama terjadi akan berpengaruh postif terhadap masalah kesehatan mental (Mayer, et al., 2020). Lansia yang melakukan aktivitas fisik dengan intensitas sedang hingga berat mendapatkan memperoleh skor depresi yang rendah, perasaan lebih postif menjadi lebih bahagia dibandingkan dengan mereka yang tidak melakukan aktivitas fisis, hal tersebut disebabkan oleh efek anxiolytic pada aktivitas fisik yang menghilangkan perasaan tegang, ansietas dan panic yang

dialami seseorang (Wolf, et al., 2021). Ketika seseorang melakukan aktivitas fisik maka tubuhnya akan bergerak secara aktif. Pergerakan secara aktif ini dapat memicu terproduksinya hormone endorphin yang diaktifkan melaui kelenjar hipofisis yang ada pada system saraf pusat, hormone endorphin yang dikenal sebagai morfin alami tubuh ini memiliki efek yang dapat memicu perasaan senang, tenang dan bahagia sehingga hal tersebut dapat mengurangi berbagai macam gejala dari masalah kesehatan mental (Yoshikawa E, 2016).

Berdasarkan hasil review dari 6 artikel dapat disimpulkan bahwa seluruh penelitian menunjukan hubungan antara aktivitas fisik yang dilakukan lansia selama pandemi dengan kesehatan mental lansia. lansia yang menghabiskan waktunya selama pandemi dengan melakukan aktivitas fisik memiliki ketahanan yang baik mengahadapi pandemi, lansia juga melaporkan menjadi lebih bahagia saat melakukan aktivitas fisik hal tersebut sejalan dengan teori bahwa ketika seseorang melakukan aktivitas fisik maka di dalam tubuhnya akan memproduksi hormone kebahagiaan, hormone tersebut akan melepaskan stress yang dapat mengakibatkan masalah kesehatan mental. Dalam penelitian juga terlihat bahwa terjadi peningkatan dan penurunan aktivitas fisik. Hal tersebut juga sejalan dengan status kesehatan mental yang terjadi pada lansia selain itu masalah kesehatan mental juga dipengaruhi oleh masalah sosiodemografi seperti apakah lansia bekerja, apakah lansia masih memiliki pasangan dan lainnya.

BAB VI

KESIMPULAN DAN SARAN

6.1 Kesimpulan

Berdasarkan analisis dari beberapa artikel mengenai aktivitas fisik dan kesehatan mental lansia selama pandemi COVID-19 dapat disimpulkan**:**

6.1.1 Aktivitas Fisik Lansia

Aktivitas fisik yang dilakukan lansia selama pandemi sebagian mengalami peningkatan dan sebagian lagi mengalami penurunan. Peneliti menyimpulkan yaitu aktivitas fisik yang dilakukan lansia dikategorikan menjadi beberapa tingkatan aktivitas fisik. Lansia memiliki keterbatasan dalam melakukan aktivitas fisik, berdasarkan *review* hanya terdapat satu artikel yang menggunakan kuesioner yang spesifik yaitu PASE, artikel lainnya hanya melakukan penelitian terhadap aktivitas fisik tanpa memperhatikan kebutuhan dan keterbatasan dari lansia.

6.1.2 Kesehatan Mental Lansia

Hasil analisa 6 artikel menyatakan selama pandemi COVID-19 banyak lansia yang mengalami masalah pada kesehatan mental hal tersebut menunjukkan bahwa ada dampak yang signifikan terhadap kesehatan mental dengan isolasi sosial yang dilakukan oleh lansia. Peneliti melaporkan depresi yang lebih tinggi dan kesepian yang lebih besar timbul setelah adanya pandemi COVID-19.

6.1.3 Hubungan Aktivitas Fisik dan Kesehatan Mental Lansia

Terdapat hubungan antara aktivitas fisik dan kesehatan mental lansia hal tersebut terlihat dari peningkatan dan penurunan aktivitas fisik yang berbanding lurus dengan status kesehatan mental yang terjadi pada lansia selain itu masalah kesehatan mental juga dipengaruhi oleh masalah sosiodemografi.

6.2 SARAN

6.2.1 Saran Teoritis

Penelitian ini dapat dijadikan referensi atau sumber bacaan bagi lansia dan keluarga lansia. Khususnya dalam memahami aktivitas fisik dan masalah kesehatan mental lansia.

6.2.2 Saran Praktis

Peneliti selanjutnya diharapkan dapat memperhatikan terkait keterbatasan yang dialami lansia, perlu diperhatikan terkait istrumen pengambilan data yang menyeluruh terkait aktivitas fisik lansia. Selanjutnya perlu diperhatikan jenis aktivitas fisik, durasi aktivitas fisik setiap harinya serta intensitas aktivitas fisik dapat berbeda pada tiap lansia. Kemudian terkait masalah kesehatan mental diharapkan peneliti selanjutnya untuk memperluas berbagai faktor yang dapat mempengaruhi kesehatan mental lansia perhatikan terkait faktor sosiodemografi setiap responden.

DAFTAR PUSTAKA

Ainsworth, B. E., et al. (2021, Juli 11). *The IPAQ*. Retrieved from IPAQ international physical activity questionnaire 2005: www.ipaq.ki.se

Aseem Mehra, e. a. (2020). A crisis for elderly with mental disorders: Relapse of symptoms due to COVID-19. *Asian Journal of Psychiatry 51*.

Badan Pusat Statistik (BPS). (2019). *Statistik Penduduk Lanjut Usia 2019.* Jakarta.

Bailey, L., Ward, M., DiCosimo, A., Baunta, S., Cunningham, C., Romero-Ortuno, R., . . . Briggs, R. (2021, Januari 1). Physical and Mental Health of Older People while Cocooning during the COVID-19 Pandemi. *QJM: An International Journal of Medicine, 0*(0), 1-6. doi:doi: 10.1093/qjmed/hcab015

BBC. (2020, Maret 15). *Coronavirus: Isolation for over-70s 'within weeks'*. Retrieved Desember 8, 2020, from BBC: https://www.bbc.com/news/uk-51895873

Budi, R. S. (2016). *gambaran aktivitas fisik dengan kualitas tidur lansia.* Yogyakarta: UNY.

Bullard, J., Dust, K., Funk, D., Strong, J. E., Alexander, D., Garnett, L., . . . Poliquin, G. (2020, May 2). Predicting infectious SARS-CoV-2 from diagnostic samples. *Oxford University Press Public Health Emergency Collection*. doi:doi: 10.1093/cid/ciaa638

Callow, D. D., Arnold Nedimala, N. A., Jordan, L. S., Jordan, M., Pena , G., Junyeon, M., . . . Smith, C. J. (2020). The Mental Benefit of Physical Activity in Older adult survive the COVID-19 Pandemi. *American Journal of Geriatric Psychiatry*, 1046-1057.

Callow, e. a. (2020). The Mental Health Benefits of Physical Activity in Older Adults Survive the COVID-19 Pandemi. *American Journal of Geriatric 28*, 1046-1057.

Carrascosa, J. M., Morillas, V., Bielsa, I., & Munera-Campos , M. (2020, August). Cutaneous Manifestations in the Context of SARS-CoV-2 Infection (COVID-19). *ACTAS Dermo-Sifiliograficas*, 734-741. Retrieved from http://creativecommons.org/licenses/by-nc-nd/4.0/

Carriedo , A., Cecchini, J., Javier, Fernandez Rio , Gimenez, & Antonio-Mendez . (2020, Agustus 17). COVID-19 Psychological Well-Being and Physical Activity Levels in Older Adults During the Nationwide Lockdown in Spain. *American Journal of Geriatric and Psychiatric, 28:11*, 1146-1155.

Carriedo, A., Cecchini, J. A., Fernandez-Rio, J., Mendez, A., Gimenez, Rio, & Carriedo. (2020). COVID-19 Psychological Well-being and Physical

Activity Levels in Older Adults During the Nationwide Lockdown in Spain. *American Journal of Geriatric and Psychiatry*, 1146-1155.

Cassaniti, I., Novazzi, F., Giardina, F., Salinaro, F., Sachs, M., Perlini, S., . . . Baldanti, F. (2020, April 8). Performance of VivaDiag COVID-19 IgM/IgG Rapid Test is inadequate for diagnosis of COVID-19 in acute patients referring to emergency room department. *Journal of Medical Virology*, 1724-1727. doi:DOI: 10.1002/jmv.25800

CDC. (2020). *"2019 Novel Coronavirus (2019-nCoV) Situation Summary"*. United States Centers for Disease Control and Prevention (CDC). Retrieved Desember 15, 2020, from https://www.cdc.gov/coronavirus/2019-nCoV/hcp/infection-control.html

CDC. (2020, December 7). Considerations for Wearing Masks. *Coronavirus Disease*. Retrieved December 15, 2020, from https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover-guidance.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fprevent-getting-sick%2Fcloth-face-cover.html

CDC. (2020). *Interim Guidelines for Collecting, Handling, and Testing Clinical Specimens from Persons for Coronavirus Disease 2019 (COVID-19).* Centers for Disease Control and Prevention.

CDC. (2020). *Physical Activity.* Centers for Disease Control and Prevention. doi:https://www.cdc.gov/physicalactivity/basics/pa-health

Cheney Clinic. (2020, November 7). *Endorphins and Exercise: Their Excellent Mental Health Benefits*. Retrieved Juli 23, 2021, from Cheney Clinic: https://www.cheneyclinic.com/endorphins-and-exercise/

Chorcuelo, J., & Ulloa, F. C. (2020, Agustus 27). Oral manifestations in a patient with a history of asymptomatic. *International Journal of Infectious Diseases,* 154-157. doi:https://doi.org/10.1016/j.ijid.2020.08.071

Connor, & Davidson. (2020). The Connor-Davidson Resilience Scale. *CD RISC*. Retrieved April 1, 2021, from http://connordavidson-resiliencescale.com/about.php

Creese, B., Khan, Z., Henley, W., O'Dwyer, S., Corbett, A., Silva, M. D., . . . Ballard, C. (2020, Desember 17). Loneliness, physical activity, and mental health during COVID-19: a longitudinal analysis of depression and anxiety in adults over the age of 50 between 2015 and 2020. *International Psychogeriatric Association*, 505-514. doi:doi:10.1017/S1041610220004135

Dahroni et al . (2019). *Buku Ajar Keperawatan Lanjut Usia.* Yogyakarta: Graha Ilmu.

Dewi, K. S. (2012). *Buku Ajar Kesehatan Mental.* Semarang: UPT UNDIP Press Semarang.

Eliopolous. (2010). *Batasan Usia lansia.*

Fakhriyani, D. V. (2017). *Kesehatan Mental.* (D. M. Thoha, Ed.) Pamekasan: Duta Media.

Forde, D. (2020). Exercise prescription for the prevention and treatment of disease. *Trinity College Dublin*, 1-4. Retrieved April 1, 2021, from www.ipaq.ki.se

Gambin G, M. A. (2015, September 1). Quality of Life of Older Adults in Rural Southern Brazil. *Rural and Remote Health, 15*(3). Retrieved oktober 2, 2020, from https://www.rrh.org.au/journal/article/3300

Gandhi , R. T., Lynch, J. B., & Del , R. C. (2020). Mild or Moderete COVID-19. *The New England Journal of Medicine, 383*(18), 1757-1766. doi:doi:10.1056/NEJMcp2009249

Garcia-Fernandez, L., Romero-Ferreiro, V., Lopez-Roldan, P., David, Lopez-Roldan , D., Padilla, S., & Rodriguez-Jimenez, R. (2020, May 26). Mental Health in Elderly Spanish People in Times of COVID-19 Outbreak. *The American Journal of Geriatric and Psychiatry 28*, 1040-1045.

Gerst-Emerson, K. J. (2015). Loneliness as Public Health Issue : The impact of loneliness on health care ultilization among older adults. *American Journal Public Health* , 1013-1019.

Hayek, S. E., Cheaito, M. A., Nofal, M., Abdelrahman, D., Adra, A., Shalim, S. A., . . . Al. (2020, April 9). Geriatric Mental Health and COVID-. *American Journal of Geriatric Psychiatry, 28*(10), 1058-1069. doi:https://doi.org/10.1016/j.jagp.2020.05.009

Herlinda, E. F. (2020). Pengaruh Terapi Tertawa Terhadap Tingkat Depresi Pada Lanjut Usia. *Jurnal STIKES dr Soebandi*.

Ibid, H. (2015). *Islam dan Kesehatan Mental* .

Jin, Y., Yang, H., Ji, W., Wu, W., Chen, S., Zhang, W., & Duan, G. (2020). Virology, Epidemiology, Pathogenesis, and Control of COVID-19. *Viruses, 12*(372). doi:https://doi.org/10.3390/v12040372

Kartono. (1989). *Kesehatan Mental* .

Kemenkes RI. (2019). *Kementerian Kesehatan Republik Indonesia: Analisis Lansia di Indonesia.* Pusat Data dan Informasi. Jakarta Selatan: KEMENKES RI.

KEMENKES RI. (2020). Peraturan Menteri Kesehatan Republik Indonesia Nomor 9 Tahun 2020. In *Pedoman Pembatasan Sosial Berskala Besar Dalam Rangka Percepatan Penanganan COVID 19.* Jakarta: Kemenkes RI.

Kementrian Kesehatan Republik Indonesia . (2020). *Hindari Lansia Dari Covid 19.* Jakarta: http://www.padk.kemkes.go.id/.

Kholifah, S. N. (2016). *Modul Bahan Ajar Keperawatan Gerontik Konsep Lanjut Usia dan Proses Penuaan.* Jakarta: kemenkes pusat pendidikan sumber daya manusia kesehatan.

Killgore, W. D., Cloonen, S. A., Taylor , E. C., & Dailey, N. S. (2020, May 20). Loneliness: A Signature Mental Health Concern in the Era of. *Psychiatry Research*. doi:doi: https://doi.org/10.1016/j.psychres.2020.113117

King, A. C. (2018). *Physical Activity Guidelines Advisory Committee Scientific Report.* Retrieved December 26, 2020, from https://health.gov/sites/default/files/2019-09/15_F-9_Older_Adults.pdf

Klein, E. M., Zenger, M., Tibubos, A., Ernest, M., Reiner, I., Schmalbach, B., . . . Beutel, M. E. (2021, February 14). Loneliness and its relation to mental health in the general population: validation and norm values of brief measure. *Journal of Affective Disorder Report*. doi:https://doi.org/10.1016/j.jadr.2021.100120

Kotwal, A. A., Holt-Lunstad, J., Newmark, R. L., Cenzer, I., Smith , A. K., Covinsky, K. E., . . . Perissinotto, C. M. (2020). Social Isolation and Loneliness Among San Francisco Bay Area Older Adults During. *Journal of the American Geriatrics Society*.

Krendl, A. C., & Perry, B. L. (2020). The Impact of Sheltering in Place During the COVID-19. *Journals of Gerontology: Psychological Sciences*, e53–e58.

Lage, A., Carrapatoso, S., Neto, E. S., Gomes , S., Soares-Miranda, L., & Bohn, L. (2021, Juni 7). Associations Between Depressive symptoms and Physical Activity Intensity in an Older Adult Population During COVID-19 Lockdown. *Frontiers in Psychology, 12*, 1-9. doi:doi: 10.3389/fpsyg.2021.644106

Laporan Hasil Riset Kesehatan Dasar Nasional (Riskesdas) Indonesia. (2013). Jakarta: Departemen Kesehatan RI.

Lira, C. B., Taveira, H. V., Rufo-Tavares, W., Amorim, A. d., Ferreira, L. M., Andrade, M. S., & Vancini, R. L. (2018). Engagement in a Community Physical Activity Program and Its Effects Upon the Health-Related Quality of Life of ElderlyPeople: A Cross-Sectional Study. *Value in health regional issues 17*, 183-188.

Margo, C., Mulvey, J. J., Berlin, D., Nuovo, G., Salvatore , S., & Harp, J. (2020, June). Complement associated microvascular injuryand thrombosis in the pathogenesis of severe COVID-19 infection. *National Library of Medicine, 220*, 1-13. doi:10.1016/j.trsl.2020.04.007

Maryam. (2008). teori proses penuaan.

Maryland University. (2021, Juni 4). *University Libraries*. (University Maryland) Retrieved Juni 2021, 18, from Research Guides of Systematic Review: https://lib.guides.umd.edu/SR

Mayer, J., McDowell, C., Lansing, J., Brower, C., Smith, L., Tully, M., & Herring, M. (2020, September 5). 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*. doi:doi:10.3390/ijerph17186469

Mehra, M. R., Desai, S. S., Kuy, S., Henry, T. D., & Patel, A. N. (2020, June 18). Cardiovascular Disease, Drug Therapy, and Mortality in Covid-19. *New England Journal of Medicine, 102*(382). doi:DOI: 10.1056/NEJMoa2007621

Nguyen, H. C., Nguyen, M. H., Do , B. N., Tran , C. Q., Nguyen, T. T., Pham, K. M., . . . Tran, T. V. (2020). People with Suspected COVID-19 Symptoms Were More Likely Depressed and Had Lower Health-Related Quality of Life: The Potential Benefit of Health Literacy. *Journal of Clinical Medicine*.

NHS inform. (2020, February 14). *NHS inform*. Retrieved Desember 15, 2020, from CT Scan: https://www.nhsinform.scot/tests-and-treatments/scans-and-x-rays/ct-scan

Nugroho. (2008). *Batasan Usia Lansia.*

Nursalam. (2020). *Metodelogi Penelitian Ilmu Keperawatan* . Jakarta : Selemba Medika .

Ozdemir, F., Cansel, N., Kizilay, F., Guldogan, E., Ucuz, I., Sinanogl , B., . . . Cumurcu, H. B. (2020). The Role of physical activity on mental health and quality of lifw during COVID-19. *European Journal of Integrative Medicine*, 101248.

Pavon, D. J., Baeza, A. C., & Lavie, C. J. (2020, May). Physical exercise as therapy to fight against the mental and physical consequences of COVID-19 quarantine: Special focus in older people. *PMC, 63*(3), 386-388. doi:doi: 10.1016/j.pcad.2020.03.009

Pearson, A., White, H., Bath-Hextall, F., Salmond, S., Apostolo, J., & Kirkpatrick, P. (2015, Maret 3). A mixed-methods approach to systematic reviews.

International Journal Evidance Based Healthc, 121-131. doi:doi:10.1097/XEB.0000000000000052

Philip, J. (2020, June). Impact of COVID-19 on mental health of the elderly. *International Journal of Community Medicine and Public Health, 7*(6).

Putri, D. A. (2019). *Status Psikososial Lansia di PSTW Abiyoso Pakem Sleman Yogyakarta* . Yogyakarta: poltekkes jogja .

Ratnawati. (2017). *Asuhan Keperawatan Gerontik.* Yogyakarta: Pustaka Baru Press.

Rindayanti. (2020). *Gambaran Kejadian dan Tingkat Kecemasan pada Lanjut Usia* . Surabaya : Jurnal Kesehatan Vokasional .

Riskesdas . (2013). Jakarta : KEMENKES RI .

Riskesdas, D. R. (2018). *Laporan Hasil Riset Kesehatan Dasar Nasional (Riskesdas) Indonesia.* Jakarta: Departemen Kesehatan RI.

Ritika Girdhar dkk. (2020, august). Managing mental health issues among elderly during COVID-19 pandemi. *Journal of Geriatric Care and Research, 7*(1).

Rohmah, M. R. (2016). Upaya Lansia dalam Meningkatkan Kesehatan Mental Melalui Paguyuban Sepeda Onthel Pertigaam Tambaksogra (Pasopatra). *Jurnal IAIN Purwokerto*.

Salehi, S., Abedi, A., Balakrishnan, S., Gholamrezanezhad, A., SS, AA, & BS. (2020, July). Coronavirus Disease 2019 (COVID-19): A Systematic Review of Imaging Findings in 919 Patients. *American Journal of Roentgenology, 215*(1), 87-93. Retrieved December 15, 2020, from https://www.ajronline.org/doi/10.2214/AJR.20.23034

Santini, Z. J. (2020). Social disconnectedness, perceived isolation, and symptoms of depression and anxiety among older Americans (NSHAP): a longitudinal mediation analysis . *Lancet Public Health 5*, 62-70.

Savage , R. D., Wu, W., Li, J., Lawson, A., Bronskill, S. E., Chamberlain, S. A., . . . Rochon, P. (2020). Loneliness among older adults in the. *Brithish Medical Journal*.

Savage, R. D., Wu, W., Li, J., Lawson, A., Bronskill, S. E., Chamberlain, S. A., . . . Rochon, P. A. (2020). Loneliness among older adults in the community during COVID-19 : cross sectional survey in Canada. *British Medicine Journal BMJ Open 2021*.

Schuch, F. B., Vancampfort, D., Firth, J., Rosenbaum, S., Ward, P. B., Silva, E. S., . . . Stubbs, B. (2018, April 25). Physical Activity and Incident Depression: A Meta-Analysis of Prospective Cohort Studies. *The American Journal of Psychiatry*. doi:https://doi.org/10.1176/appi.ajp.2018.17111194

Scohy, A., Anantharajah, A., Bodeus, M., Kabamba-Mukadi, B., Verroken, A., & Rodriguez-Villalobos, H. (2020, May 21). Low performance of rapid antigen detection test as frontline testing for COVID-19 diagnosis. *Journal of Clinical Virology : the Official Publication of the Pan American Society for Clinical Virology*. doi:DOI: 10.1016/j.jcv.2020.104455

Sen-crowe B, M. M. (2020). Social distancing during the COVID-19 Pandemi : Staying at home save lives. *Am J Emergency Med*, 1-5.

Shahid, Z., Kalayanamitra, R., McClafferty, B., Kepko, D., Ramgobin, D., Patel, R., . . . Jain, R. (2020, April 7). COVID-19 and Older Adults: What We Know. *Journal of the American Geriatrics Society, 68*(5). doi:https://doi.org/10.1111/jgs.16472

Siordia, C. (2012). Alternative scoring for Physical Activity Scale for the Elderly (PASE). *72*(4), 379-382. doi:https://doi.org/10.1016/j.maturitas.2012.05.009

Smith, L., Jacob, L., Yakkundi, A., McDermott, D., Armstrong, N. C., Barnett, Y., . . . Tully, M. A. (2020, September). Correlates of symptoms of anxiety and depression and mental wellbeing associated with COVID-19: A cross-crosssectional study of UK-based respondents. *Psychiatry Research, 291*. doi:https://doi.org/10.1016/j.psychres.2020.113138

Substance Abuse and Mental Health Services Administration. (2021, Juli 21). *Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration: Rockville*. Retrieved from Key Substance Use and Mental Health Indicators in the United States: Results from the 2018 National Survey on Drug Use and Health (HHS Publication No. PEP19-5068, NSDUH Series H-54);: https://www.samhsa.gov/data/

Sunaryo, dkk. (2016). *Teori Proses Penuaan.* Retrieved from http://eprints.umm.ac.id/41485/3/BAB%20II.pdf

Sutikno, E. (2015). factors associated with mental health disorder in the elderly. *Jurnal Wiyata*.

Tambunan, D. (2010). *Perbedaan Kesehatan Mental pada Gay Ditinjau dari Perilaku Religius* . Medan.

Theis, N., Campbell, N., Leeuw, J. D., Owen, M., & Schenke, K. (2021). The effect of COVID-19 restrictions on physical activity and mental health of children and young adults with physical and/or intellectual disabilities. *Disability and Health Journal*.

Usman, A. F. (2017). *Dasar Penelusuran Online*. Retrieved februari 17, 2021, from Perpustakaan Universitas Gajah Mada: http://lib.ugm.ac.id/ind/?page_id=410

WHO. (2018). *Elderly People.* Jenewa, Swiss.

WHO. (2020, November 26). Retrieved december 26, 2020, from who international Physical activity: https://www.who.int/en/news-room/fact-sheets/detail/physical-activity

WHO. (2020). *"Coronavirus disease (COVID-19) technical guidance: Laboratory testing for 2019-nCoV in humans"*. Retrieved from https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance-publications

Wolf, S., Seiffer, B., Xeibig, J.-M., Melkerling, J., Brokmeier, L., Atrott, B., . . . Schuch, F. B. (2021, April 22). Is Physical Activity Associated with Less Depression and Anxiety During the COVID-19 Pandemi? A Rapid Systematic Review. *Sports Medicine*. doi:https://doi.org/10.1007/s40279-021-01468-z

World Federation for Mental Health (WFMH). (2020, May 15). Mental Health and Covid 19.

World Health Organization (WHO). (2017). *Mental Health.* https://ourworldindata.org/mental-health.

Zach, S., Zeev, A., Ophir, M., Adar, S., Eilat, & Sigal. (2021). Physical activity, resilience, emotions, moods, and weight control of older adults during the COVID-19 global crisis. *European Review of Aging and Physical Activity*. doi:doi 10.1186s11556-021-00258

LAMPIRAN

Lampiran 1 Penyusunan Skripsi

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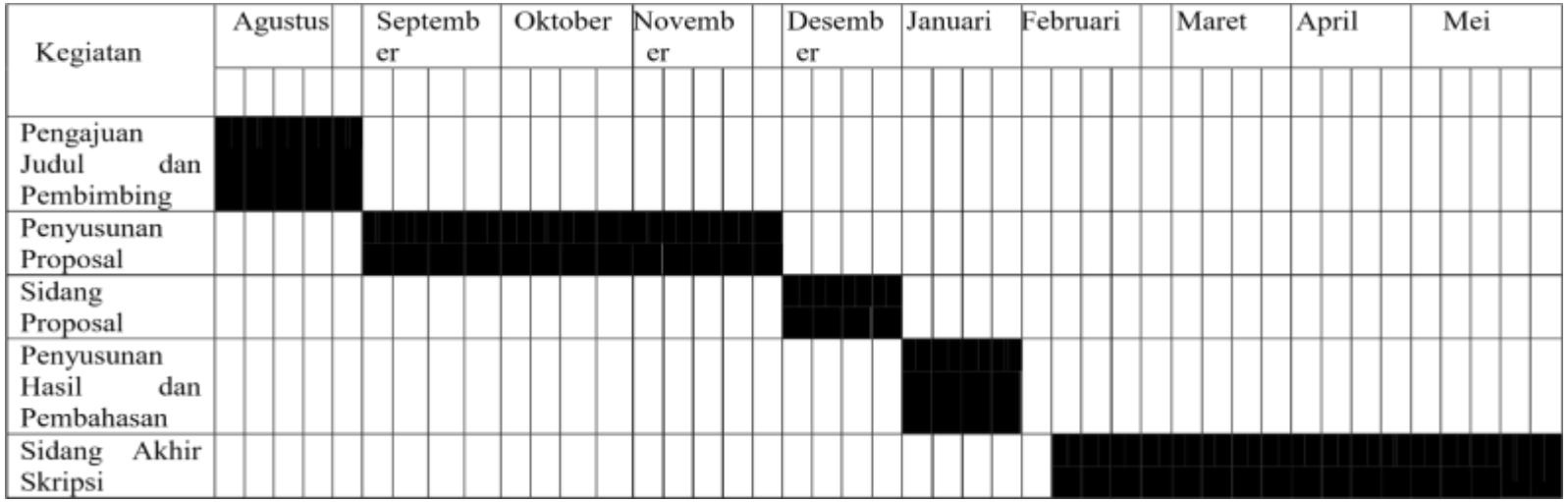

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Special Issue Article

COVID-19, Psychological Well-being and Physical Activity Levels in Older Adults During the Nationwide Lockdown in Spain

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ABSTRACT

Objective: *The novel coronavirus disease (COVID-19) has forced nationwide lockdowns in many countries. As a result, most of the Spanish population had to self-isolate at home. The physical and psychological consequences of this unexpected scenario could be particularly worrisome for people older than 60 years. This study is aimed to examine the psychological well-being of older adults during the home isolation due to the COVID-19 pandemic and to investigate whether meeting the World Health Organization's global recommendations on physical activity (PA) for health is associated with their resilience, affect, and depressive symptoms.* ***Design, setting, and participants:*** *In this cross-sectional study, a total of 483 citizens whose ages ranged from 60 to 92 years (overall sample:* M = *65.49,* SD = *5.14) were recruited via a snowball sampling strategy to answer to an online questionnaire.* ***Measurements:*** *The four instruments used were* The Connor-Davidson CD-RISC resilience scale, The Positive and Negative Affect Schedule, *the six-item self-report scale of* Depressive Symptoms, *and* The international Physical Activity Questionnaire. ***Results:*** *Results showed that older adults who regularly engaged in vigorous (VPA) and moderate-vigorous physical activity (MVPA) during the quarantine reported higher scores in resilience (Locus, Self-efficacy, and Optimism), positive affect, and lower in depressive symptoms.* ***Conclusion:*** *These finding are the first quantitative evidence pointing toward a link between engagement in VPA and/or MVPA and resilience, positive affect, and depressive symptoms within the COVID-19 restrictions in Spain. Acknowledging these associations may be important in developing health promotion programs for older people during the remaining period of confinement or future ones.* (Am J Geriatr Psychiatry 2020; 28:1146–1155)

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INTRODUCTION

The first case of coronavirus (COVID-19) was reported in Wuhan, China, in December 2019 and the new disease began to sharply increase in Asia and Europe. On March 11, 2020, the World Health Organization (WHO) declared the outbreak of a pandemic. Since the first confirmed case, the world has seen more than 20.3 million COVID-19 infections, and more than 741.723 people have died (as of August 12, 2020).[1] The risk of severe disease following infection from this virus is particularly worrisome for people older than 60 years, who represent more than 95% of deaths in the European Region.[2] Consequently, the WHO has emphasized the need to protect, care and support older populations.

Epidemiological experts agree that quarantine can be a protective measure to fight the sharp rise in coronavirus infections. On May, 2020, more than 1/3 of humanity was under some form of lockdown, and specifically, the population in Spain self-isolated at home for six weeks. The shelter-in-place order implies a radical change in the lifestyle of the population and could have a considerable psychological impact.[3,4]

Since the outbreak of the COVID-19 situation, authors have drawn attention to different mental health indicators such as anxiety, depression, and stress.[5–7] Poor mental health and well-being is a significant cause of disease, with depression considered a principal contributor.[8] The negative psychological effects of being confined during a quarantine have been recently reviewed,[3] including post-traumatic stress symptoms, confusion, anger, emotional disturbance, depression, stress, low mood, irritability, insomnia, anxiety, and irritability. In this context, special attention should be given to the elderly population because older individuals are at a significantly increased risk of severe disease.[2] In this regard, a recent study has found that people aged 60 years or above had a higher likelihood of depression and poor health-related quality of life during the ongoing pandemic, especially those who had suspected COVID-19 symptoms.[6]

Resilience is a term positively related to mental health[9] that could be of special relevance during the COVID-19 pandemic.[10] It has been defined as "the interactive and dynamic process of adapting, managing, and negotiating adversity."[11] Recent cross-sectional studies on COVID-19 have revealed a prevalence of mental health disturbances in health professionals[12,13] and other populations.[14,15] In this regard, theory suggests that resilient individuals would be more likely to bounce back from negative experiences quicker and effectively.[16] Related research has shown that resilience is negatively associated with anxiety and depressive symptoms,[17] positively associated with more positive emotions in stressful situations,[16] and also with more emotional flexibility in response to a changing stressful psychological task.[7]

With the aim of dealing better with the potential psychological problems of older people involved in the COVID-19 epidemic restrictions, new questions have raised. For example, is the elder population facing properly this confinement? What strategies could help them to maximize physical and psychological well-being? In this context, physical activity (PA) might provide older people with an advantage for overcoming this situation. On the one hand, accumulated evidence has shown that PA is relevant to all healthy adults and that it is an effective therapy for most of the chronic diseases with direct effects on physical and mental health.[4,18] On the other hand, it has been indicated that PA impacts positively on mood[19] and affect.[20] It may also have beneficial effects on depressive symptoms[21,22] and may prevent depression promoting social support or resilience.[23] Unfortunately, the optimal type (e.g., aerobic, strength) and dose (e.g., duration, frequency, intensity and/or volume) remains uncertain.[24] In this regard, the WHO[18] recommends that people over 60 years should participate in 150 min/week of moderate-intensity (MPA), or 75 min/week of vigorous-intensity (VPA), or an equivalent combination of both (MVPA) for health enhancement and prevention of noncommunicable diseases. However, the shelter-in-place order could have led to restrictions in the PA behavior of older adults.

So far, the literature reviewed during the COVID-19 pandemic suggests that PA is linked to individuals' mental health.[25–27] However, to date, the associations between resilience, affect, depressive symptoms, and PA during the quarantine in the elder population is unknown. Hence, it seems important to understand how the preventive measures against the outbreak of the COVID-19 may affect psychological well-being of older people that are home isolated during the ongoing pandemic. Based on the aforementioned, this

study aimed to asses resilience, affect, depressive symptoms, and PA levels during the COVID-19 pandemic in Spanish older adults; and to evaluate the relationship between their psychological well-being and meeting the WHO'S[18] recommendations on VPA, MVPA, and MVPA.

METHODS

Participants

The sample comprised 483 older adults from Spain (237 males and 246 females) whose ages ranged from 60 to 92 years (overall sample: $M = 65.49$, $SD = 5.14$; males: 66.03, $SD = 5.54$; females: 64.98, $SD = 4.67$).

Procedure

Firstly, the researchers' State Ethics Committee approved the study. Then, an online questionnaire was developed by the research team. The questionnaire was distributed through the press, television, and different social networks (e.g., e-mail, WhatsApp, YouTube, Twitter, Instagram, and Facebook) via a nonprobability snowball sampling strategy focused on recruiting people aged 60 or above living in Spain during the COVID-19 outbreak. It has been shown that online snowball surveys are very effective to contact participants from different places and that the response rate is higher than in other strategies.[28] Participants were informed that their responses would be kept anonymous and that they had the right to withdraw from the study at any time because participation was voluntary. Thus, informed consent was obtained from all participants. All survey responses were collected during the three first weeks of the mandatory confinement. The total reach of the study is unknown. The snowball sampling and the media coverage cannot provide this kind of information, which could have been useful to better understand the sample characteristics. In order to reduce the attrition rate, the survey was developed to be completed between 5 and 8 minutes.

Instruments and Measures

Resilience was assessed using *The Connor-Davidson CD-RISC resilience scale*[29] adapted to Spanish.[30] This self-report questionnaire includes 15 items related to the ability to face adversity grouped in three factors: Locus of Control (e.g., "I am in control of my life"), challenge of behavior orientated towards action and Self-efficacy (e.g., I am not easily discouraged by failure"), and Optimism (e.g., "I can stay focused under pressure"). Participants responded to the stem "Indicate to what extent you feel right now" in a Likert Scale ranged from 1 (*completely disagree*) to 4 (*completely agree*). This instrument has shown adequate psychometric properties in general population.[29] In this study, Cronbach alpha were 0.79 (Locus), 0.90 (Self-efficacy), and 0.82 (Optimism).

The Positive and Negative Affect Schedule[31] is a 20-item scale divided in two subscales: Positive Affect (10 items, e.g., enthusiastic, inspired, proud…), and Negative Affect (10 items, e.g., irritable, upset, afraid…). The Spanish validated version by López-Gómez et al.[32] was used. Both subscales were rated on a 5 point Likert scaler anchored by 1 (*not at all*) and 5 (*strongly*). In this study, Cronbach alpha were 0.89 (Positive Affect), and 0.82 (Negative Affect).

Depressive symptoms were assessed using an adaptation of the six-item self-report scale developed by Kandel and Davies[33] that measures depressive symptoms during the past 12 months.[34] In this investigation, participants responded to the preface "During the last week, how often have you…?" They had to indicate whether the situation (e.g., "…felt nervous or tense") occurred "*never*" (1), "*rarely*" (2), "*sometimes*" (3), or "*often*" (4). Participants' scores were increased in 10 points to produce a range between 16 and 34 points. A score of 29 or greater was considered as showing notable depressive symptoms.[33] Cronbach's alpha for the entire scale was 0.83.

Physical activity and sedentary behavior: The international Physical Activity Questionnaire (IPAQ)[35] was developed for cross-national monitoring of PA and inactivity. In the present study, the Spanish adaptation of the short form, 7-day recall,[36] was used (obtained at www.ipaq.ki.se). This is an appropriate outcome measure for clinical and research use with acceptable measurement properties for monitoring PA levels in different populations.[35] This version provides information about the time spent involved in three PA intensity levels: (a) walking, (b) moderate, and (c) vigorous. It also includes the time spent performing sedentary activities. On the one hand, moderate (MPA), vigorous (VPA) and moderate-vigorous

(MVPA) physical activity levels were analyzed to find out whether older adults met the WHO[18] recommendations on PA. On the other hand, walking (identified as Light PA [LPA]) and sedentary behavior were also analyzed to detect whether older adults met the recommendations for health proposed in several reviews.[37,38]

Other measures included in the analyses were age; sex; and participant's body mass index (BMI) = weight (kg)/[height (m)],[2] considering the categories underweight (<18.5), normal weight (18.5–24.9), overweight (25.0–29.9), and obese (≥30.0).

Data Analysis

All data were analyzed using SPSS version 24.0 (IBM Co. LTD, Chicago, IL). Lilliefors-corrected Kolmogorov-Smirnov test showed that all variables were non-normally distributed. Three groups were created according to global recommendations on PA for health in older adults:[18] a) whether or not individuals meet the recommended levels of 75 minutes of VPA throughout the week; b) whether or not individuals meet the recommended levels of 150 minutes of MPA throughout the week; c) whether or not individuals meet the recommended levels of 150 minutes of MVPA throughout the week. The extent to which LPA contributes to health in older adults is unknown.[39] Likewise, no quantitative guidelines exist for sedentary behavior.[37] Since the WHO did not set any quantitative recommendation on LPA and sedentary behavior that should be met for global health, the scientific literature on this topic has been reviewed to analyze LPA and sedentary behavior. Thus, two groups were also established based on: a) whether or not individuals meet the recommendations on LPA for health in older adults described by Loprinzi et al.[37] (i.e., 300 minutes/week); e) whether or not individuals meet the recommendations of less than 8 hours per day of sedentary activity described by Chau et al.[38]

The Mann-Whitney U test and the chi-square test (x^2) were used to assess between-group differences. Descriptive statistics included size (n) and frequency (%) for categorical variables. Results were considered significant at $p < 0.05$. The effect size estimates were calculated following the recommendations described by the American Statistical Association.[40] Thus, the effect size for the Mann-Whitney U test was calculated as the r proposed by Cohen.[41] Cohen's conventional criteria for r are: small effect = 0.1, medium effect = 0.3, and a large effect = 0.5. Additionally, Cramer's V was used to show the effect size in the chi-squared test. Cohen's[41] guidelines indicated that the magnitude of effect sizes depends on the df. Thus, with one df the effect size is considered small ($r = 0.10$), medium ($r = 0.30$), and large ($r = 0.50$). Likewise, when there are three df the magnitude of effect size are small ($r = 0.06$), medium ($r = 0.17$), and large ($r = 0.29$). Additionally, different logistic regression models were constructed. The dependent variable was whether or not older adults met the recommended levels of PA (MPA, VPA, and MVPA); and those variables that were significant in the previous analyses were introduced as predictor variables. Logit link function was used for the logistic regression. To build the logistic regression model, all the factors and covariates were incorporated until no additional improvement of the model was obtained.

RESULTS

Between-Group Differences

Table 1 shows differences according to the WHO recommendations on VPA, MVPA, and MVPA (whether or not they were met), and sex, age, BMI, Depressive symptoms, Resilience (Locus, Self-efficacy, Optimism), and Affect (positive and negative). The results showed no differences in personal variables (i.e., age [Mann-Whitney U test]), sex, and BMI [x^2]). However, group differences were detected in the indicators of psychological well-being (See Table 1; i.e., resilience, affect, and depressive symptoms [Mann-Whitney U test]). The effect size was small in all variables. It was slightly higher in the three variables that measured resilience in those individuals who followed the VPA recommendations.

Older adults who met the MVPA health guidelines showed similar outcomes. However, the effect size was smaller in all resilience factors and higher in positive affect. Finally, meeting the MPA recommendations showed lower associations with psychological well-being in older adults (only with positive affect, whose effect size was small).

GLM for binary response analyses showed that the only variable that showed a predictive value for VPA

TABLE 1. Differences According to Whether Older Adults Meet the WHO's Global Recommendations on Physical Activity for Health

	VPA				MPA				MVPA			
	No	Yes	p	ES	No	Yes	p	ES	No	Yes	p	ES
Sex *n* (%) x^2												
Female	203 (52.6)	40 (43.0)	0.097	0.08	174 (51.3)	72 (50.0)	0.790	0.01	149 (51.79	94 (49.2)	0.589	0.02
Male	183 (47.4)	53 (57.0)			165 (48.7)	72 (50.0)			139 (48.3)	97 (50.8)		
Age *M*(*SD*) *U*	65.53 (5.51)	65.49 (4.91)	0.800	0.01	65.40 (5.33)	65.71 (4.68)	0.134	0.07	65.40 (5.33)	65.71 (4.87)	0.153	0.07
BMI *n* (%) x^2			0.680	0.04			0.247	0.07			0.088	0.08
Underweight	4 (1.1)	0 (0.0)			4 (1.2)	0 (0.0)			4 (1.4)	0 (0.0)		
Normal or healthy weight	168 (45.5)	43 (47.3)			143 (43.7)	71 (50.4)			115 (41.5)	96 (51.3)		
Overweight	141 (37.8)	36 (39.6)			125 (38.2)	53 (37.6)			112 (40.4)	65 (34.8)		
Obese	60 (16.1)	12 (13.2)			55 (16.8)	17 (12.1)			46 (16.6)	26 (13.9)		
Depressive symptoms *M*(DT) U	21.79 (4.12)	20.59 (3.66)	0.014	0.11	21.77 (4.18)	21.05 (3.70)	0.127	0.07	21.96 (4.23)	20.94 (3.71)	0.016	0.11
Resilience *M*(DT) *U*												
Locus	2.87 (0.64)	3.05 (0.71)	0.003	0.14	2.86 (0.65)	2.98 (0.65)	0.079	0.08	2.86 (0.64)	2.98 (0.78)	0.035	0.10
Self-efficacy	2.88 (0.57)	3.02 (0.69)	0.002	0.15	2.89 (0.59)	2.94 (0.58)	0.444	0.03	2.86 (0.57)	2.96 (0.63)	0.049	0.09
Optimism	2.86 (0.60)	3.04 (0.70)	0.001	0.15	2.88 (0.61)	2.93 (0.63)	0.417	0.04	2.84 (0.59)	2.96 (0.66)	0.036	0.10
Affect *M*(*DT*) *U*												
Positive	3.02 (0.73)	3.28 (0.91)	0.028	0.10	3.01 (0.77)	3.23 (0.72)	0.019	0.11	2.95 (0.74)	3.27 (0.80)	0.001	0.20
Negative	1.79 (0.60)	1.71 (0.68)	0.198	0.06	1.79 (0.60)	1.76 (0.62)	0.644	0.02	1.80 (0.62)	1.75 (0.61)	0.277	0.06

Note. BMI, body mass index; df, 1 in all cases except for BMI = 3; ES, effect size; MPA, moderate physical activity; MVPA, moderate-vigorous physical activity; *n*, sample size, (%), percentage; SD, estándar deviation; *U*, the Mann-Whitney *U* test; VPA, vigorous physical activity; x^2, chi-square test.

TABLE 2. Generalized Linear Models for the WHO's Global Recommendations on Physical Activity for Health

	Model 1 VPA		Model 2 MPA		Model 3 MVPA	
	OR (95%CI)	p	OR (95%CI)	p	OR (95%CI)	p
Depressive symptoms	0.774 (0.642–0.934)	0.014	–	–	–	–
Locus	–	–	–	–	–	–
Self-efficacy	–	–	–	–	–	–
Optimism	–	–	–	–	–	–
Positive affect	–	–	1.177 (1.008–1.373)	0.040	–1.287 (1.176–1505)	0.001

Note. MPA, moderate physical activity; MVPA, moderate-vigorous physical activity; OR, odds ratio; VPA, vigorous physical activity.

was depressive symptoms, and that positive affect was the only variable in MPA and MVPA (Table 2).

Table 3 shows the differences according to whether or not individuals met the recommendations on LPA and sedentary behavior. The results showed differences in sex (for LPA and sedentary behavior) and in BMI (for LPA). No significant differences were observed in the remaining variables.

DISCUSSION

The main goal of this study was to assess the psychological well-being of older adults during the home isolation due to the COVID-19 pandemic and to explore whether meeting the WHO's[18] global recommendations on PA for health was associated with their resilience, affect, and depressive symptoms. The results indicated that older adults who met the global recommendations on VPA and MVPA had higher levels of resilience (locus of control, self-efficacy, and optimism), higher positive affect, and lower depressive symptoms. Although both VPA and MVPA showed similar outcomes, the effect size detected was higher in all resilience factors for VPA and higher in positive affect for MVPA. In this regard, meeting the minimum MPA levels was associated only with positive affect. It should be noted that no significant difference in sex, age, or BMI was detected.

These results suggest that those older adults who met the WHO's recommendations on VPA and

TABLE 3. Differences According to Whether Older Adults Meet the Recommendations on Light Physical Activity and Sedentary Behavior

	LPA				Sedentary Behavior			
	No	Yes	p	ES	No	Yes	p	ES
Sex *n* (%) x^2								
Female	137 (44.5)	109 (52.6)	0.000	0.17	93 (65.6)	150 (44.9)	0.000	0.18
Male	171 (55.5)	65 (37.5)			51 (35.4)	184 (55.1)		
Age *M*(*SD*) *U*	65.58 (5.15)	65.36 (5.15)	0.541	0.03	65.83 (5.52)	65.40 (4.99)	0.573	0.03
BMI *n* (%) x^2			0.042	0.09			0.080	0.08
Underweight	3 (1.0)	1 (0.6)			1 (0.7)	3 (0.9)		
Normal or healthy weight	122 (40.9)	92 (54.4)			73 (52.1)	138 (42.7)		
Overweight	122 (40.9)	56 (33.1)			53 (37.9)	124 (38.4)		
Obese	51 (17.1)	20 (11.8)			13 (9.3)	58 (18.0)		
Depressive symptoms *M*(SD) U	21.39 (3.99)	21.84 (4.17)	0.273	0.05	21.64 (4.17)	21.51 (4.02)	0.801	0.01
Resilience *M*(*SD*) *U*								
Locus	2.88 (0.66)	2.96 (0.63)	0.365	0.04	2.94 (0.70)	2.90 (0.64)	0.404	0.04
Self-efficacy	2.89 (0.61)	2.92 (0.55)	0.904	0.01	2.90 (0.62)	2.91 (0.58)	0.829	0.01
Optimism	2.90 (0.64)	2.89 (0.57)	0.540	0.03	2.84 (0.66)	2.92 (0.61)	0.118	0.07
Affect *M*(*SD*) *U*								
Positive	3.04 (0.80)	3.13 (0.69)	0.325	0.04	2.84 (0.65)	2.92 (0.61)	0.587	0.03
Negative	1.78 (0.61)	1.78 (0.61)	0.988	0.00	1.80 (0.62)	1.76 (0.61)	0.453	0.04

Note. BMI, body mass index; df, 1 in all cases except for BMI = 3; ES, effect size; LPA, light physical activity; *n*, sample size; (%) = percentage; *SD*, standard deviation; x^2, chi-square test; *U*, the Mann-Whitney *U* test.

MVPA might cope better the demands of the shelter-in-place order. Moreover, the results indicated that they felt more optimistic about this situation. This is important because resilience has been linked to positive emotions in stressful situations,[16] overall well-being,[42] life satisfaction,[43] self-rated health[44] and better quality of life (physical and psychological) in older adults.[17] The importance of promoting resilience in the medical staff during the COVID-19 pandemic has been highlighted,[10] but also the general population should be resilient during these tough days. It has been suggested that regular PA could be a way of promoting resilience to stress in healthy adults.[45,46] In line with this idea, the results of the present study indicated that resilience was higher among participants who reached the minimum VPA and MVPA per week.

Older adults who met the VPA and MVPA recommendations also scored higher in positive affect and lower in depressive symptoms. It has been reported that performing PA has a beneficial effect on affect[20] and on positive mood,[19] and Yoshikawa et al.[23] suggested that PA practice may have effects similar to those of resilience. The scientific literature also showed that PA is effective to reduce depressive symptoms in different populations.[22,47] The results from the present study are also consistent with related research indicating that PA plays an important role in the relationship between resilience and depression in older adults.[9,23]

Perhaps the most important finding of the present study was that it was the VPA intensity which better predicted depressive symptoms, which is consistent with previous research[21] and with a very recent study that has assessed depression, anxiety and PA levels in North America under current social distancing guidelines during the COVID-19 pandemic.[25] Callow et al.[25] found that LPA and VPA levels were independent contributors towards depression symptoms in older adults. These results are consistent with the findings of this study, except for the nonsignificant association of LPA with depressive symptoms. This difference might be due to the different scales used or the different protective measures set in each country or the lack of consensus on the minimum recommendations on LPA for health in older adults.[37,39] Nevertheless, it looks like higher levels of PA (especially VPA) may help alleviate some of the negative mental health symptoms experienced by older adults while isolation guidelines are followed during the COVID-19 pandemic.[25] Moreover, VPA showed the highest effect sizes in all health outcomes, especially for all the resilience components. Additionally, positive, but not negative affect, has been linked to all PA intensities (with small effect sizes). This could be considered important, because a positive mood during the quarantine-related stress context may serve as a protective element, decreasing the possibilities of developing a disease[45] or depression,[48] Interestingly, MPA was associated with positive affect (small effect size), indicating that moderate intensities could be enough to experience a positive mood. However, the highest effect size was observed in the association between MPVA and positive affect. Subsequent analyses on LPA indicated that meeting the recommendations of 300 min/week of LPA[37] was not enough to experience positive mood. Likewise, the analyses of this PA intensity showed that meeting such recommendations were not associated with any resilience factor or depressive symptoms. As aforementioned, this outcome differs from a recent study conducted in North America.[25] The same results were observed when it comes to sedentary behavior recommendations of less than 8 hours.[38] However, these results should be interpreted cautiously, because it is unknown how much sedentary behavior is harmful to Health[38] or how much LPA contributes to global health.[37,39] Hence, in this study, the psychological variables only were associated with the minimum PA levels recommended by the WHO, especially for VPA. When it comes to resilience and depressive symptoms, vigorous intensities produced higher effect sizes. Although the effect sizes detected in this study were small, they are of theoretical interest because this is the first quantitative study that has analyzed these variables together in this context. Moreover, there is no other empirical study to compare and other factors (e.g., chronic diseases, context) could have influenced the participants' behavior.

CONCLUSIONS

This is the first investigation on the COVID-19 epidemic exploring whether meeting or not the WHO's[18] global recommendations on PA for health is associated with resilience, affect, and depressive symptoms. Our results revealed the connection of PA with older

adults' resilience, affect, and depressive symptoms. Therefore, engaging older people in minimum levels of VPA or MVPA per week could be a protective measure for their psychological well-being during confinement. Performing any PA could be especially important during quarantine. It is advisable that those not meeting the recommendations for VPA or MVPA during their confinement should increase duration, frequency and intensity of their PA in order to achieve psychological well-being benefits. Having high resilience and positive affect seems to be quite important during this stressful situation. Individuals with negative affect could be more exposed to develop psychological problems like depression.[49]

The results of this study are consistent with a large body of research that has shown that exercise is beneficial for mental health, reducing anxiety, depression, and negative mood.[48] To maintain physiological function of most of body organs could contribute to the fight against the severe mental and physical consequences of COVID-19.[4] It should be also considered that experts have warned that mandatory shelter-in-place orders like the ones issued in many different countries due to COVID-19 could be repeated in the future. Therefore, national authorities should consider these findings to develop guidelines and/or intervention programs that may enhance the psychological well-being of older people promoting PA while in confinement.

The present study must also acknowledge some limitations, which do not alter the significance of the results. The first one is that only involved citizens from one country and no exclusion criteria were considered (e.g., chronic diseases). Thus, future works might analyze the differences between older people from different countries and with chronic diseases. Secondly, PA levels and psychological well-being indicators were measured using a self-report questionnaire using a cross-sectional design. This study began during the pandemic. Therefore, other limitation is that there was no time to validate the scales and measures for their use with older adults in an online format. In this regard, due to the sampling strategy, representativeness of the sample is not guaranteed. Additionally, information about the attrition rate could have been useful to determine the total reach of the advertisement and the characteristics of the sample. Finally, given the cross-sectional design of this study, no causal relationships can be derived from the results and there was no correction for multiple comparisons which could have increased the Type I error rate. For instance, individuals with poor mental health symptoms and resilience could have been less prompted to exercise. Therefore, longitudinal data could provide evidence to assess the effect of PA on the mental well-being of older adults during home isolation. In this regard, it could have also been very interesting to ask participants if their PA levels changed during the lockdown. Unfortunately, we did not include this information, and it could be considered another limitation, because it is not possible to determine if the COVID-19 has led to changes in PA levels or mental health symptoms. This could be considered in similar works in the future. These limitations should be taken into consideration when considering the generalizability of our results and when designing future works, which could uphold or refuse the findings of the present study.

AUTHORS' CONTRIBUTIONS

AC made substantial contributions to conception and design of the study, was responsible for the acquisition and curation of data, and drafted the manuscript. ***JAC*** made substantial contributions to conception and design of the study, was responsible for the analysis and interpretation of data, critically reviewed and revised the initial draft, and approved the final version of the submitted manuscript. ***JF*** made substantial contributions to conception and design of the study, was responsible for the acquisition of data, critically reviewed and revised the initial draft, and approved the final version of the submitted manuscript. ***AM*** made substantial contributions to conception and design of the study, was responsible for the acquisition of data, critically reviewed and revised the initial draft, and approved the final version of the submitted manuscript.

DISCLOSURE

The authors report no conflicts with any product mentioned or concept discussed in this article.

References

1. Johns Hopkins University. *Coronavirus Resource Center*. [web site] August 12, 2020. Retrieved at https://coronavirus.jhu.edu/. Accessed August 12, 2020
2. World Health Organization: *Statement – Older People are at Highest Risk from COVID-19, but All Must Act to Prevent Community Spread*. WHO Regional Office for Europe, 2020. Available at: http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/statements/statement-older-people-are-at-highest-risk-from-covid-19,-but-all-must-act-to-prevent-community-spread. Accessed April 21, 2020
3. Brooks SK, Webster RK, Smith LE, et al: The psychological impact of quarantine and how to reduce it: rapid review of the evidence. Lancet 2020;doi:10.1016/S0140-6736(20)30460-8
4. Jiménez-Pavón D, Carbonell-Baeza A, Lavie CJ: Physical exercise as therapy to fight against the mental and physical consequences of COVID-19 quarantine: special focus in older people. Prog Cardiovasc Dis 2020;doi:10.1016/j.pcad.2020.03.009
5. Duan L, Zhu G: Psychological interventions for people affected by the COVID-19 epidemic. Lancet Psychiat 2020;doi:10.1016/S2215-0366(20)30073-0
6. Nguyen HC, Nguyen MH, Do BN, et al: People with suspected COVID-19 symptoms were more likely depressed and had lower health-related quality of life: the potential benefit of health literacy. J Clin Med 2020; 9:965
7. Waugh CE, Thompson RJ, Gotlib IH: Flexible emotional responsiveness in trait resilience. Emotion 2011; 11:1059–1067
8. Vigo D, Thornicroft G, Atun R: Estimating the true global burden of mental illness. Lancet Psychiat 2016; 3:171–178
9. Wermelinger MP, Corrêa JC, Lucchetti AL, et al: The role of physical activity in the association between resilience and mental health in older adults. J Aging PhysActiv 2018; 26:248–253; doi:10.1123/japa.2016-0332
10. Shaw SC: Hopelessness, helplessness and resilience: the importance of safeguarding our trainees' mental wellbeing during the COVID-19 pandemic. Nurse Educ Pract 2020; 44:102780; doi:10.1016/j.nepr.2020.102780
11. Goodman DJ, Saunders EC, Wolff KB: In their own words: a qualitative study of factors promoting resilience and recovery among postpartum women with opioid use disorders. BMC Pregnancy Childb 2020; 20:178
12. Kang L, Ma S, Chen M, et al: Impact on mental health and perceptions of psychological care among medical and nursing staff in Wuhan during the 2019 novelcoronavirus disease outbreak: a cross-sectional study. Brain Behav. Immun 2020; 87:11–17
13. Tan BYQ, Chew NWS, Lee GKH, et al: Psychological impact of the COVID-19 pandemic on health care workers in Singapore. Ann. Intern. Med 2020; 173:317–320
14. Cao W, Fang Z, Hou G, et al: The psychological impact of the COVID-19 epidemic on college students in China. Psychiatry Res 2020:112934
15. Wang C, Pan R, Wan X, et al: A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. Brain Behav Immun 2020; 87:40–48
16. Tugade MM, Fredrickson BL: Resilient individuals use positive emotions to bounce back from negative emotional experiences. J Pers Soc Psychol 2004; 86:320–333
17. Gerino E, Rollè L, Sechi C, et al: Loneliness, resilience, mental health, and quality of life in old age: a structural equation model. Front. Psychol 2017; 8:2003;doi:10.3389/fpsyg.2017.02003
18. World Health Organization: *Global Recommendations on Physical Activity for Health*. Suitzerland: WHO Press, 2010. Available at: http://apps.who.int/iris/bitstream/10665/44399/1/9789241599979_eng.pdf. Accessed April 22, 2020
19. Silverman MN, Deuster PA: Biological mechanisms underlying the role of physical fitness in health and resilience. Interface Focus 2014; 4:201400-40
20. Liao Y, Shonkoff ET, Dunton GF: The Acute relationships between affect, physical feeling states, and physical activity in daily life. A review of current evidence. Front Psychol 2015; 6:1975;doi:10.3389/fpsyg.2015.01975
21. Cecchini JA, Fernández-Río J, Méndez-Giménez A, et al: A self-determination approach to the understanding of the impact of physical activity on depressive symptoms. Stress Health 2017; 33:600–607
22. Cooney GM, Dwan K, Greig CA, et al: Exercise for depression. Cochrane Database Syst Revs 2013; 2(9):CD004366; doi:10.1002/14651858.CD004366.pub6
23. Yoshikawa E, Nishi D, Matsuoka YJ: Association between regular physical exercise and depressive symptoms mediated through social support and resilience in Japanese company workers: a cross-sectional study. BMC Public Health 2016; 16:553
24. Teychenne M, White RL, Richards J, et al: Do we need physical activity guidelines for mental health: what does the evidence tell us? Ment Health Phys Act 2020; 18:100315
25. Callow D D, Arnold-Nedimala NA, Jordan LS, et al: The mental health benefits of physical activity in older adults survive the COVID-19 pandemic. Am J Geriat Psychiat 2020. https://www.ajgponline.org/article/S1064-7481(20)304000/fulltext
26. Maugeri G, Castrogiovanni P, Battaglia G, et al: The impact of physical activity on psychological health during Covid-19 pandemic in Italy. Heliyon 2020: e04315
27. Zhang Y, Zhang H, MaX Di Q: Mental health problems during the COVID-19 pandemics and the mitigation effects of exercise: a longitudinal study of college students in China. Int J Env Resp Pub He 2020; 17:3722
28. Baltar F, Brunet I: Social research 2.0: virtual snowball sampling method using Facebook. Internet res 2012; 22:57–74
29. Connor KM, Davidson JR: Development of a new resilience scale: the connor–davidson resilience scale (CD–RISC). Depress Anxiety 2003; 18:76–82;doi:10.1002/da.10113
30. Olmo M, Olmedo E, Cepero M, et al: Validation of resilience scale (CD-RISC) in elite athletes through a structural equation model. Retos 2017; 32:96–100
31. Watson D, Clark LA, Tellegen A: Development and validation of brief measures of positive and negative affect: the PANAS scales. J Pers Soc Psychol 1988; 54:1063–1070;doi:10.1037//0022-3514.54.6.1063
32. López-Gómez I, Hervás G, Vázquez C: Adaptación de la "Escalas de afecto positivo y negativo" (PANAS) en una muestra general española. Psicol Conductual 2015; 23:529–548
33. Kandel DB, Davies M: Epidemiology of depressive mood in adolescents: an empirical study. Arch Gen Psychiatry 1982; 39:1205–1212;doi:10.1001/archpsyc.1982.04290100065011
34. Choi WS, Patten CA, Gillin JC, et al: Cigarette smoking predicts development of depressive symptoms among US adolescents. Ann Behav Med 1997; 19:42–50;doi:10.1007/BF02883426
35. Booth ML: Assessment of physical activity: an international perspective. Res Q Exerc Sport 2000; 71:114–120;doi:10.1080/02701367.2000.11082794
36. Craig CL, Marshall AL, Sjöström M, et al: The IPAQ consensus group and the IPAQ reliability and validity study group.

International physical activity questionnaire (IPAQ): 12-country reliability and validity. Med Sci Sports Exerc 2003; 35:1381–1395;doi:10.1249/01.MSS.0000078924.61453.FB

37. Loprinzi PD, Lee H, Cardinal BJ: Evidence to support including lifestyle light-intensity recommendations in physical activity guidelines for older adults. AM J Health Promot 2015; 29:277–284
38. Chau JY, Grunseit A, Chey T, et al: Daily sitting time and all-cause mortality: a meta-analysis. PLoS One 2013; 8:e80000
39. Buman MP, Hekler EB, Haskell WL, et al: Objective light intensity physical activity associations with rated health in older adults. Am J Epid 2010; 172:1155–1165;doi:10.1093/aje/kwq249
40. Wasserstein RL, Lazar NA: The ASA's statement on p-values: context, process, and purpose. Am Stat 2016; 70:129–133; doi:10.1080/00031305.2016.1154108
41. Cohen J: *Statistical Power Analysis for the Behavioral Sciences*. 2nd ed. Hillsdale: Lawrence Erlbaum, 1988
42. McGowan JA, Brown J, Lampe FC, et al: Resilience and physical and mental well-being in adults with and without HIV. AIDS Behav 2018; 22:1688–1698;doi:10.1007/s10461-017-1980-6
43. Hu T, Zhang D, Wang J: A meta-analysis of the trait resilience and mental health. Pers Individ Differ 2015; 76:18–27;doi:10.1016/j.paid.2014.11.039
44. Lau SYZ, Guerra RO, Barbosa JFdS, et al: Impact of resilience on health in older adults: a crosssectional analysis from the International Mobility in Aging Study (IMIAS). BMJ Open 2018; 8: e023779;doi:10.1136/bmjopen-2018023779
45. Childs E, de Wit H: Regular exercise is associated with emotional resilience to acute stress in healthy adults. Front Physiol 2014; 5:161;doi:10.3389/fphys.2014.00161
46. McEwen BS: Physiology and neurobiology of stress and adaptation: central role of the brain. Physiol. Rev 2007; 87:873–904; doi:10.1152/physrev.00041.2006
47. Brown JC, Huedo-Medina TB, Pescatello LS, et al: The efficacy of exercise in reducing depressive symptoms among cancer survivors: a meta-analysis. PLoS One 2012; 7:1–9
48. Callaghan P: Exercise: a neglected intervention in mental health care? J Psychiatr Ment Health Nurs 2004; 11:476–483
49. van Winkel M, Nicolson NA, Wichers, et al: Daily life stress reactivity in remitted versus non-remitted depressed individuals. Eur Psychiat 2015; 30:441–447;doi:10.1016/j.eurpsy.2015.02.011

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The Mental Health Benefits of Physical Activity in Older Adults Survive the COVID-19 Pandemic

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COVID-19

ABSTRACT

Objective: *To determine the relationship between the amount and intensity of physical activity performed by older adults in North America (United States and Canada) and their depression and anxiety symptoms while currently under social distancing guidelines (SDG) for the COVID-19 pandemic.* ***Design:*** *Descriptive cross-sectional study.* ***Setting:*** *Online survey conducted between April 9 and April 30, 2020, during the COVID-19 pandemic.* ***Participants:*** *About 1,046 older adults over the age of 50 who live in North America.* ***Measurements:*** *Participants were asked about their basic demographic information, current health status, and the impact of the current SDG on their subjective state of mental health. Participants completed the Physical Activity Scale for the Elderly, to determine the amount and intensity of physical activity performed, as well as both the Geriatric Depression Scale and Geriatric Anxiety Scale, to ascertain the extent of their depression and anxiety-like symptoms.* ***Results:*** *Ninety-seven percent of participants indicated that they adhered to current SDG "Most of the time" or "Strictly." Participants who performed greater levels of physical activity experienced lower levels of depression-like symptoms when age, sex, and education were accounted for; however, no relationship between physical activity and anxiety-like symptoms was found. A hierarchical regression analysis that incorporated the intensity of physical activity performed (light, moderate, and vigorous) in the model indicated that greater light and strenuous activity, but not moderate, predicted lower depression-like symptoms.* ***Conclusions:*** *These results suggest that performing even light physical activity during the COVID-19 pandemic may help alleviate some of the negative mental health impacts that older adults may be experiencing while isolated and adhering to SDG during the COVID-19 pandemic.* (Am J Geriatr Psychiatry 2020; 28:1046–1057)

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OBJECTIVE

The recent worldwide outbreak of a new type of coronavirus (SARS-CoV-2) has reached over 140 countries and has been declared a pandemic by the World Health Organization.[1] The most common clinical manifestation of SARS-CoV-2 includes severe life-threatening respiratory tract infections (COVID-19) to which older adults and those with comorbidities (e.g., hypertension, cardiovascular disease, diabetes, chronic respiratory diseases, and chronic kidney disease) are most susceptible.[2–4] As a result, the United States and Canada have issued social distancing guidelines (SDG), and in certain parts of each country, stay-at-home orders intended to combat the spread of the disease and protect fragile healthcare systems. Due to this increased mortality risk for older adults, the CDC has indicated that older individuals, in particular, should strictly adhere to SDG and stay-at-home as much as possible.[5] While these changes can reduce transmission, protect over-burdened healthcare systems, and save the lives of many in these high-risk groups, they also present a major public health concern given the well-established increased risk of mental health problems associated with social isolation in older adults.[3] Self-isolation will likely disproportionately affect older adults whose social contact often takes place outside of the home (i.e., community centers, places of worship, volunteering).[6]

Humans are social beings, and the quantity and quality of human social interactions can directly affect mental health, physical health, and morbidity risk.[7] Due to the probable increase in the incidence of serious health complications from SARS-CoV-2, older adults, particularly those with pre-existing conditions, are now undergoing physical and social isolation, which may increase the incidence and severity of anxiety and depression among this population.[6] Social isolation and perceived social isolation (i.e., loneliness) are significant risk factors for cognitive decline, anxiety, and depression,[8] and are associated with increased levels of all-cause mortality in older adults.[9] A recent report of over 3,000 older adults between the ages of 57–85 showed that increased social isolation was predictive of more severe depression and anxiety symptoms.[10] While not fully understood, health-related declines associated with social isolation and loneliness may be a consequence of dysregulated health behaviors such as social connectedness and physical activity.[11,12] Not surprisingly, sedentary behavior is a significant predictor of all-cause mortality,[13] has been shown to negatively affect mood and depressive symptomatology,[14] and is associated with cognitive decline in older adults.[15] Unfortunately, social isolation is generally linked with increased sedentary behavior and reduced physical activity in older adults[16] and recent reports suggest the COVID-19 pandemic may be leading many older adults to perform less physical activity.[17,18]

Among older adults, physical activity and aerobic exercise training appear to have anxiolytic and antidepressant effects.[14] Large epidemiological studies suggest that physical activity is associated with better mental health and resilience to psychological distress, such as depression and anxiety symptoms.[19,20] Of note, the benefits of physical activity for mental health may be dependent on the intensity of physical activity performed.[21] Recently, some data suggest that the positive relationship between physical activity and mental health extend to older adults, and that physical activity uniquely contributes to depression symptoms in this population.[22] Meanwhile, experimental data show that engagement in physical activity over time-frames similar to those of the current pandemic (i.e., 4–10 weeks) can lead to improvements in both anxiety and depressive symptomology in various populations, including older adults.[23–27]

COVID-19 has changed the way many older adults are currently living their lives, forcing many into isolation who may have previously been more social. Additionally, the COVID-19 pandemic and the increased mortality risk associated with the disease may cause older adults to experience greater anxiety and depression-like symptoms. It is, therefore, essential to determine safe ways for older adults to manage mental health-related symptoms that may be exacerbated during the pandemic. While recent reports have called for older adults to increase their levels of physical activity to improve their immune system, reduce obesity risk, and improve mental health, no empirical studies have looked at the relationship between physical activity levels and mental health symptoms in older adults during the COVID-19 pandemic. It remains to be seen whether the physical activity levels are associated with their depression and anxiety-like symptoms while adhering to the current SDG. Given previous work suggesting older

adults performing greater amounts of physical activity may experience fewer mental health problems, we hypothesized that total physical activity levels would be negatively associated with the anxiety and depression symptoms of older adults currently living under COVID-19-related SDG. To test this hypothesis, we surveyed 1,046 adults over the age of 50 who currently live in the United States and Canada under the COVID-19-related SDG, to examine associations between current physical activity levels and anxiety and depression-like symptoms.

METHODS

Study Design and Participants

The Mood and Activity Survey study during the COVID-19 pandemic is a descriptive cross-sectional study that drew from a sample of adults over the age of 50, between April 9 and April 30, 2020, during the COVD-19 pandemic.

Survey

An online Qualtrics survey of 136 questions (estimated to take approximately 15 minutes to complete) was used to collect data. The survey was approved by the University of Maryland Institutional Review Board, and written informed consent was obtained from all participants prior to proceeding with the survey (see Supplementary File 1 for a PDF version of the survey). The survey included questions regarding demographic information, geographical location (zip code), current health status, classification as a first responder, the impact of the current SDG on their subjective state of physical and social isolation, in addition to well-known and validated instruments such as the Physical Activity Scale for the Elderly (PASE), Geriatric Depression Scale (GDS), and Geriatric Anxiety Scale (GAS). Social media advertising was used as the primary method of recruitment to reach the targeted population (age 50+) living in the United States and Canada. Additionally, we leveraged our pre-existing social media and outreach infrastructure from our laboratory and website (https://E4BH.com) to recruit volunteers to complete the survey.

PASE Questionnaire

The PASE is a valid and widely used questionnaire to address physical activity among older adults over a 7-day period.[28,29] Briefly, participants were asked to provide information as to the frequency (days/week) and duration (hours/day) they participated in sedentary and active behaviors. Originally designed to quantify and account for the intensity and type of active behaviors common in older adults, the survey included activities such as walking outside, recreational aerobic (light, moderate, and vigorous) and strength exercise, yard work, gardening, house repairs, and caring for others. Each activity was scored based on the original Washburn et al scale in which the frequency and duration were used as anchors, the activity type was assigned an empirically derived weight, and the score for each activity type was the product of the 2.[29] Each activity type and their associated scores were then categorized into either leisure (walking outside and recreational exercise), or household (yard work, gardening, home repairs, and caring for others) physical activity, with the total PASE score representing the sum of these 2 categories.

GDS Questionnaire

The GDS is an established and well-validated measure of depressive symptoms among older adults.[30] The GDS includes 30 questions to which respondents answer "Yes" or "No." The GDS focuses on psychiatric symptoms vs. somatic symptoms by assessing an individual's level of enjoyment, interests, and social interactions in the 7 days leading to the day of testing. A point is given to each answer that indicates depression. A score of 0−9 is considered normal, 10−19 is considered an indicator of mild depression, and 20−30 suggests severe depression.[30]

GAS Questionnaire

The GAS is a 30-item self-report measure designed to assess cognitive, somatic, and affective anxiety symptoms in older adults.[31] Respondents are instructed to report the frequency that they experienced each anxiety symptom during the past week on a 4-point Likert scale from 0 (not at all) to 3 (all the time). A total anxiety score, with higher scores

indicating higher levels of anxiety, is calculated by summing the self-reported ratings on items 1–25. A score of 0–11 is an indicator of minimal anxiety symptoms, 12–21 is considered an indicator of mild anxiety symptoms, 22–27 is considered an indicator of moderate anxiety symptoms, and scores of 28 and higher are considered an indication of severe symptoms.[31] The last 5 items identify areas of concern.

Statistical Analysis

Multiple linear regression analyses were used to determine the independent effect of total physical activity levels on total depression and anxiety symptoms. Participants were able to skip individual questions and, due to missing data points, it was only possible to calculate 848 total GDS scores and 677 total GAS scores. A chi-square test of independence indicated that participants who completed the full GDS were found to be of similar age ($X^2(4) = 2.83$, $p = 0.59$), sex ($X^2(1) = 0.52$, $p = 0.47$), and had slightly education values ($X^2(5) = 12.11$, $p = 0.03$) than those who did not complete the full GDS. Additionally, an independent groups *t*-test indicated that individuals who completed the GDS had significantly higher total PASE scores ($t(280) = 5.75$, $p < 0.001$) than those who did not complete the GDS. Furthermore, participants who completed the GAS were of similar age ($X^2(4) = 4.54$, $p = 0.34$), had slightly higher education ($X^2(5) = 15.08$, $p = 0.01$), a greater percentage of female respondents ($X^2(1) = 5.34$, $p = 0.02$), and had higher total physical activity levels ($t(770) = 6.68$, $p < 0.001$). Both GDS and GAS scores were separately regressed on the PASE total score, adjusting for age, sex, and education. All multiple linear regression models were tested for data points with abnormal leverage (hat value >3 times average), influence (Cook's D >0.5), and discrepancy (studentized residuals greater >3). Based on an exclusionary criterion of violating more than one of these three heuristics, no data points had to be removed from any of the analyses. If a significant relationship between PASE total and GDS or GAS scores was found, a hierarchical regression was then performed by adding PASE intensity subscales (light, moderate, and strenuous) to a base model of age, sex, and education. The hierarchical regression was used to determine the unique contribution of each physical activity intensity for predicting mental health symptoms. All statistical analyses were performed with R version 3.6.[32]

RESULTS

Participants

Demographic, health, physical activity, depression, anxiety, and COVID-19-related data for all participants are provided in Table 1. Approximately 50,000 individuals were reached by the Facebook advertisement, 3,000 of whom engaged with the advertisement (reaching the informed consent page with the survey link), and 1,700 individuals started the survey. We received 1,369 completed responses and excluded 323 participants who either indicated they were younger than 50, or who did not provide an age in their response. Our study sample consisted of 1,046 older adults (ages ≥50) who currently reside in either the United States or Canada. Our respondents were predominantly white (86.5%) and female (80%), less than 0.2% of participants had tested positive for COVID-19, and approximately 3.5% indicated first responder status. Additionally, 97.7% of participants indicated adherence to current SDG "Most of the time" or "Strictly." Approximately 37.6% of participants indicated that they performed "Much less" or "Somewhat less" physical activity since the start of COVID-19 SDG, while 35.7% of participants indicated performing "About the same" compared to before the COVID-19 SDG. A visualization of where our sample resides was created using zip codes provided by 527 of our respondents (Fig. 1). Because providing a zip code was optional and only 527 usable zip code responses of the total sample of 1,046 were obtained, we were unable to conduct any country specific analysis of the data.

Of the participants with total GDS scores reported (n = 848), 25.5% would be categorized as having mild depression, 63.1% of respondents would be categorized as moderately depressed, and 11.4% of respondents would be categorized as severely depressed. Of the participants with recorded total GAS scores (n = 677), 28.1% of participants would be categorized as having minimal anxiety like symptoms, 64.1% of participants would be categorized as having mild anxiety symptoms, 6.9% would be categorized as having moderate

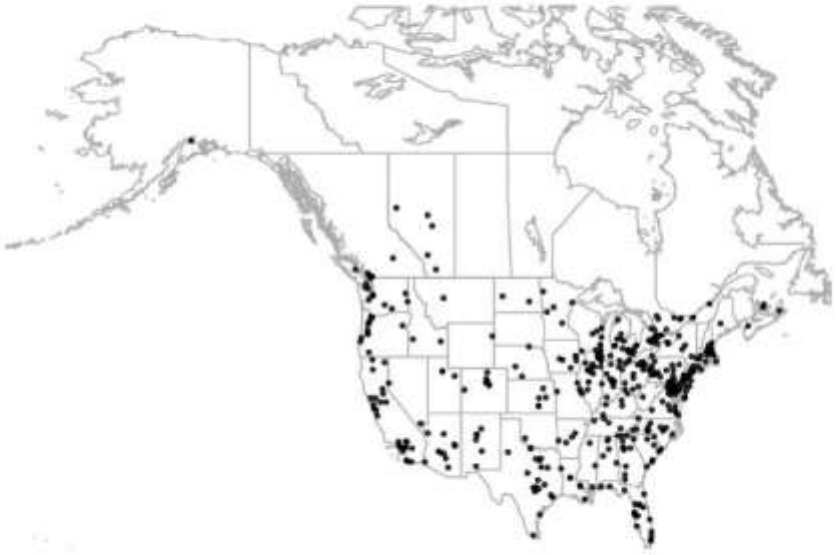
TABLE 1. Demographic Information of Survey Respondents

		Total Sample (n = 1,046) N (%)
Demographics	Age	
	50–59	292 (27.9%)
	60–69	424 (40.5%)
	70–79	257 (24.5%)
	80–89	67 (6.4%)
	>90	5 (0.4%)
	Sex	
	Male	212 (20%)
	Female	834 (80%)
	Education	
	<College	123 (11.8%)
	>College	923 (88.2%)
	History of chronic disease	
	Stroke[a] 102	29 (3.1%)
	Cardiovascular[a] 87	151 (13.7%)
	Pulmonary[a] 71	176 (18.1%)
	Diabetes[a] 72	158 (16.2%)
	Heart attack[a] 100	36 (3.85%)
	Race[a] 1	
	White	905 (86.5%)
	Black	14 (1.3%)
	Hispanic	18 (1.7%)
	Asian	54 (5.2%)
	American Indian/Alaskan/Native Hawaiian/Pacific Islander	6 (0.5%)
	More than one	26 (2.4%)
	Prefer not to say	12 (1%)
COVID-19 questionnaire	Tested positive for COVID-19[a] 111	2 (0.19%)
	Anyone in house test positive for COVID-19[a] 110	3 (0.28%)
	Adherence to the stay-at-home order[a] 24	
	Strictly	734 (71.8%)
	Most of the time	265 (25.9%)
	Sometimes	15 (1.4%)
	Seldom	3 (0.29%)
	Not at all	4 (0.39%)
	First responder status[a] 24	35 (3.4%)
Anxiety, depression and physical activity	GAS (Mean, SD)[a] 569	10.1 (6.8)
	Minimal	190 (28.1%)
	Mild	434 (64.1%)
	Moderate	47 (6.9%)
	Severe	6 (0.8%)
	GDS (Mean, SD)[a] 198	9.01 (7.16)
	Mild	216 (25.5%)
	Normal	535 (63.1%)
	Severe	97 (11.4%)
	PASE (Mean, SD)	
	Total	102.5 (63.8)
	Light activity	2.3 (8.5)
	Moderate activity	1.4 (6.5)
	Vigorous activity	2.5 (9.7)
	Change in physical activity after COVID-19[a] 26	
	Much lower	148 (14.2%)
	Somewhat lower	245 (23.4%)
	About the same	373 (35.7%)
	Somewhat greater	160 (15.3%)
	Much greater	94 (9.0%)

Notes: Demographic, health, and COVID-19-related questions are reported as count and percent of the total responses. Mean and standard deviations (SD) of the Geriatric Anxiety Scores (GAS), Geriatric depression scores (GDS), and Physical Activity Scale for the Elderly (PASE) total and subscale scores are reported.

[a] Indicates the number of missing data points.

FIGURE 1. A map of geographic locations of 527 participants over age 50 who completed the survey and provided a zip code or postal code.



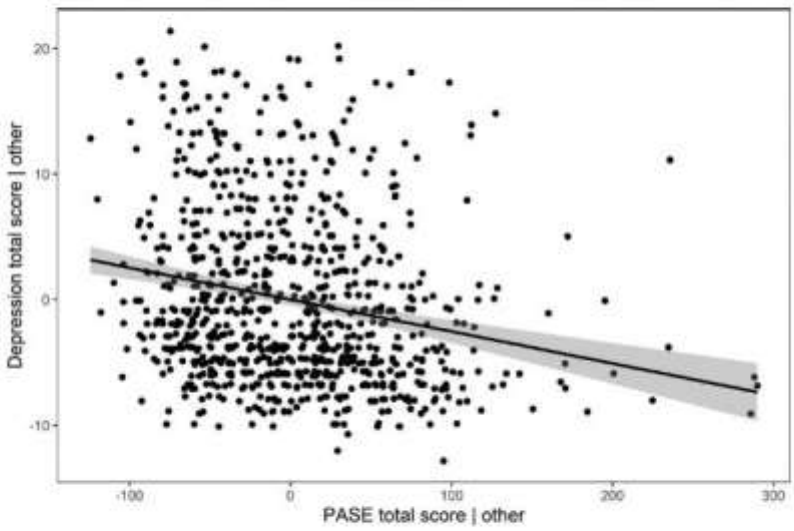
anxiety symptoms, while 0.8% of participants would be categorized as having severe anxiety symptoms.

Total Physical Activity and Symptoms of Anxiety and Depression

We examined the association between the total amount of physical activity performed and the extent of depression and anxiety-like symptoms of adults over the age of 50 currently under COVID-19-related SDG. First, total GAS scores were regressed on participants' total physical activity score, age, sex, and education. The overall multiple regression model was statistically significant (adjusted $R^2 = 0.02$, $F_{(11,\ 617)} = 2.85$, $p = 0.010$), accounting for 2% of the variance in anxiety scores. However, only sex was a significant predictor of total GAS scores with an unstandardized coefficient of $b = -2.44$ [$t(617) = -6.38$, $p < 0.001$, $\beta = -0.15$], after controlling for age, PASE total, and education. Total physical activity was not a significant predictor of anxiety symptoms, with an unstandardized coefficient of $b = -0.01$ [$t(617) = -0.48$, $p = 0.629$, $\beta = -0.02$], after controlling for age, sex, and education.

Next, total depression symptoms scores were regressed on total PASE, age, sex, and education. The overall multiple regression model was statistically significant (adjusted $R^2 = 0.072$, $F_{(11,839)} = 6.97$, $p < 0.001$). The model accounted for 7.2% of the variance in total depression scores. Specifically, total physical activity, sex, and age were significant predictors of total depression symptoms. The unstandardized regression coefficient for PASE total was $b = -0.03$ [$t(835) = -6.38$, $p < 0.001$, $\beta = -0.22$]. The standardized coefficient of $\beta = -0.22$ suggests that a one standard deviation increase in PASE total score would predict a 0.22 standard deviation decrease in a participant's expected GDS score when controlling for age, sex, and education. Males were predicted to have a

FIGURE 2. Residualized plot of total physical activity (PASE) scores on total depression scores after controlling for age, sex, and education.



GDS score 1.65 points lower than females ($b = -1.65$ [$t(835) = -2.77$, $p = 0.006$, $\beta = -0.09$]), controlling for total physical activity, age, and education. Additionally, compared to individuals who were 50–59 years old, individuals aged 70–79 and 80–89 years old were predicted to have depression scores 2.07 [$t(835) = -2.77$, $p = 0.002$, $\beta = -0.12$] and 3.32 [$t(835) = -2.77$, $p = 0.002$, $\beta = -0.11$] points lower, respectively, after controlling for total physical activity, sex, and education. Depression scores at each education level were not significantly different from the referent college educated group. The unstandardized regression coefficients (*b*) and standardized regression coefficients (β) for all variables in the multiple linear regression are reported in Table 2.

TABLE 2. Multiple Linear Regression Results for Total Physical Activity as a Predictor of Symptoms of Depression, Controlling for Age, Sex, and Education

Predictor Variables	*b (SE)*	*B*	p Value
PASE total	−0.03 (<0.01)	−0.22[b]	<0.001
Age			
60–69	−0.75 (0.58)	−0.03	0.45
70–79	−3.11 (0.67)	−0.12[b]	0.002
80–89	−3.16 (1.05)	−0.11[a]	0.002
90+	0.90 (3.13)	0.03	0.37
Sex	−2.77 (0.60)	−0.09[a]	0.006
Education			
Some HS	−1.52 (2.24)	−0.05	0.13
HS diploma/GED	1.64 (0.91)	0.06	0.10
Some college/vocation	−0.02 (0.64)	−0.01	0.99
Graduate	−1.53 (0.66)	−0.06	0.13
Doctorate	−0.34 (0.88)	−0.01	0.74
Model	Adj. R^2	*F (df)*	p value
Full model	0.072[b]	3.28 (11, 787)	<0.001

Notes: Nonstandardized (*b*) and standardized beta (β) coefficients, along with standard errors (SE) are reported.
Referent education is college degree. Referent age is 50–59.
[a] p <0.01.
[b] p <0.001.

Physical Activity Intensity and Symptoms of Depression

A hierarchical multiple regression analysis was further conducted to explore the unique contribution

TABLE 3. Hierarchical Linear Regression Results for Light (Model 2), Moderate (Model 3), and Vigorous (Model 4) Intensity Physical Activity as Predictors of Depression Symptoms After First Controlling for Age, Sex, and Education (Model 1)

	Model 1			Model2			Model 3			Model 4		
Predictor Variable	**b**	**SE b**	**β**	**b**	**SE b**	**β**	**b**	**SE b**	**β**	**b**	**SE b**	**β**
Sex (vs female)	−1.91	0.61	−0.11[b]	−1.78	0.60	−0.10[b]	−1.78	0.60	−0.10[b]	−1.59	0.60	−0.09[b]
Age (vs 50–59)												
60–69	−0.16	0.59	−0.01	−0.34	0.59	−0.02	−0.35	0.59	−0.02	−0.47	0.59	−0.03
70–79	−1.51	0.67	−0.08	−1.61	0.67	−0.10[a]	−1.63	0.67	−0.10[a]	−1.84	0.67	−0.11[b]
80–89	−2.04	1.06	−0.07	−2.59	1.05	−0.08[a]	−2.40	1.05	−0.08[a]	−2.62	1.05	−0.09[a]
90+	5.85	5.20	0.04	5.56	5.17	0.03	5.54	5.17	0.04	5.47	5.16	0.04
Education (vs college)												
Some HS	−5.12	2.29	−0.04	−5.36	2.27	−0.05	−5.35	2.27	−0.05	−5.34	2.26	−0.05
HS diploma/GED	1.80	0.92	0.07[a]	1.68	0.92	0.07[a]	1.67	0.92	0.06	1.81	0.92	0.07[a]
Some college/vocation	0.01	0.65	0.01	−0.01	0.64	−0.01	−0.01	0.65	−0.01	0.05	0.64	0.01
Graduate	−1.20	0.67	−0.07	−1.21	0.67	−0.07	−1.21	0.68	−0.07[a]	−1.13	0.67	−0.07
Doctorate	−0.09	0.90	−0.01	−0.18	0.89	−0.01	−0.18	0.89	−0.01	−0.10	0.89	−0.01
PASE subscales												
Light activity				−0.12	0.05	−0.14[c]	−0.11	0.05	−0.13[c]	−0.10	0.05	−0.12[c]
Moderate activity							−0.02	0.04	−0.02	−0.01	0.04	−0.01
Vigorous activity										−0.07	0.03	−0.09[a]
R^2		0.039			0.059			0.059			0.067	
F for change in R^2					17.36[c]			0.24			6.48[a]	

Notes: Nonstandardized and standardized beta coefficients are reported. Referent education is college degree. Referent age is 50–59.
[a] p <0.05.
[b] p <0.01.
[c] p <0.001.

of different intensities of physical activity for explaining variance in depression symptoms while controlling for age, sex, and education. Variables that explain variance in depression symptoms were entered in two steps. In step 1, total depression score was the dependent variable, and (a) age, (b) sex, and (c) education were the independent variables. In step 2, the subscales of the PASE (in order of light, moderate, and then vigorous intensity activity) were subsequently added to the step 1 model. Before performing the hierarchical multiple regression, the independent variables were examined for collinearity. Results of the variance inflation factor (all less than 1.5), and collinearity tolerance (all greater than 0.7) suggest the estimated β's are well supported.

The results of step 1 indicate that the variance accounted for (R^2) by the first model containing age, sex, and education equaled 0.039 (adjusted $R^2 = 0.028$), which was significant ($F_{(10,836)} = 3.43$, $p < 0.001$). Sex was the only significant predictor ($\beta = -0.15$, $p = 0.002$) of total depression score in step 1. In step 2, PASE subscales (light, moderate, and vigorous intensity) were hierarchically entered into the regression model. The change in proportion of variance accounted for by adding light-intensity physical activity to the original model was 0.02, which was significant ($F_{(1,834)} = 11.75$, $p < 0.001$), suggesting light-intensity physical activity explained an additional 2% of the variance in depression scores. The change in variance accounted for by then adding moderate-intensity physical activity was not significant ($R^2 < 0.001$, $F_{(1, 786)} = 0.240$, $p = 0.625$), while then adding strenuous physical activity to the model explained an additional 0.8% of the variance in depression scores, which was significant ($R^2\Delta = 0.008$, $F_{(1, 786)} = 6.48$, $p = 0.012$). The unstandardized regression coefficients (b), standard errors (SE b), standardized regression coefficients (β), additional variance explained ($R^2\Delta$), and associated F-values for the full hierarchical regression analysis can be found in Table 3. Both the light intensity and vigorous intensity subscales of the PASE contributed significantly to the explanation of depression symptoms, controlling for age, sex, and education. Although there were no issues of multicollinearity between the 3 physical activity intensity subscales, partial correlations were performed on the three intensity subscales, while controlling for age, sex, and education to determine the

extent of shared variance between the light and moderate and moderate and vigorous subscales. These partial correlations revealed substantial overlap between the light and moderate subscales ($r = 0.50$, $p < 0.001$), with less shared variance between the light and vigorous subscales ($r = 0.09$, $p = 0.007$) and moderate and vigorous subscales ($r = 0.13$, $p \leq 0.001$).

CONCLUSIONS

The results from this cross-sectional study indicate that the well-established associations between higher levels of total physical activity and reduced symptoms of depression in older adults survive the COVID-19 pandemic. Specifically, we found that after controlling for age, sex, and education, a greater total amount of physical activity was associated with lower depression symptoms, but not anxiety-like symptoms. Furthermore, we found that the amount of both light and vigorous intensity activity made significant, unique contributions to overall depression scores. This finding suggests that higher levels of physical activity ranging from as little as light to as much as strenuous may help further alleviate some of the negative mental health symptoms experienced by older adults while SDG are followed during the COVID-19 pandemic.

The role of physical activity in mitigating depression symptoms in this sample of older adults is in line with previous studies on depression and physical activity that were conducted before the COVID-19 pandemic. De Mello et al (2013) surveyed over 1,000 adults and found that those who did not engage in physical activity were twice as likely to exhibit symptoms of depression and anxiety than individuals who performed physical activity regularly. Though the efficacy of exercise interventions for treating depression in older adults is still up for debate,[14] observational studies indicate adults performing greater amounts of physical activity experience less anxiety and depression-like symptoms.[19,33] Furthermore, the benefits of physical activity for depression symptoms were recently shown in a cohort of older adults.[22] Of note, Mumba et al (2020) found that moderate and vigorous-intensity activity were significant and unique predictors of depression scores. Our findings add to this body of literature and suggest that both light and vigorous-intensity physical activity are significant and unique predictors of depression symptoms during the unique circumstance of a global pandemic. Under the constraints of SDG and stay-at-home orders, including the closures of gymnasiums and in person group exercise classes in many regions of the United States and Canada, opportunities for habitual activity may be compromised, whereas lighter intensity activity may be more accessible. The three physical activity intensity subscales did not show evidence of multicollinearity, but the light, moderate, and vigorous-intensity subscales were significantly associated with each other after controlling for covariates. The light and moderate-intensity subscales showed the highest correlation ($r = 0.50$), which was larger than the correlation between the light and vigorous ($r = 0.09$) and moderate and vigorous ($r = 0.13$) subscale scores. The strong association between light and moderate intensity subscales could potentially explain why light and strenuous, but not moderate-intensity activity, were related to depression symptoms. It is possible that individuals were not able to report differences between light and moderate-intensity physical activity accurately, or the scale did a poor job of distinguishing between light- and moderate-intensity physical activity. Because of the apparent shared variance between the light- and moderate-intensity scales in predicting depression symptoms, moderate intensity physical activity was unable to account for unique variance in depressive symptoms over and above light-intensity physical activity.

Interestingly, there was no significant relationship between physical activity levels and anxiety symptoms. Exercise and physical activity are believed to elicit anxiolytic benefits for adults,[34] with previous observational studies showing an inverse relationship between the amount of physical activity performed and an individual's anxiety score.[19,33] The discrepancy in these findings could be due to response bias in our sample, as 171 fewer participants had complete GAS scores than GDS scores due to missing/unanswered items on the scales. It is also possible that higher levels of physical activity do not attenuate symptoms of anxiety in older adults that are specific to the COVID-19 pandemic. Older adults are at greater risk for severe symptoms from COVID-19 and thus, fears associated with contracting the disease may be causing symptoms

of anxiety in this older adult population that do not respond to being more physically active. Future work is needed to understand the factors related to anxiety symptoms under a global pandemic.

An additional question that could be asked is how COVID-19 has affected the physical activity behavior of older adults. Previous reports suggest the pandemic may cause many older adults to perform less physical activity[17,18]; however, empirical evidence is lacking. Our participants had an average score of 102.5 with a standard deviation of 63.8 on the PASE scale. Although we do not have pre-COVID data to compare the reported results to, a previous sample of 297 similarly aged (60–88 years) community-dwelling older adults residing in Canada were found to have an average score of 155 with a standard deviation of 66.[35] Additionally, a previous study with 84 similarly aged older adults (55–87 years) who lived in the United States reported a mean PASE scale of 137.4 with a standard deviation of 55.7.[36] While it is not possible to directly compare these pre-COVID results to the results in the current manuscript, they do suggest that respondents in our survey were performing less physical activity, which may have been the result of the pandemic. The results of our question asking participants to provide a subjective indication of how their physical activity behaviors have changed since the pandemic appears to corroborate the idea that these individuals are performing less physical activity, as 37.3% of participants indicated performing less physical activity since the onset of COVID-related SDG.. Future studies will need to use more objective measures to determine how the pandemic effected physical activity levels among older adults.

Exercise and physical activity are beneficial for both the mental and physical health of older adults, and recent commentaries have called for programs to help increase physical activity and exercise to ameliorate the negative psychological and physical consequences of the COVID-19 quarantine.[18,37] Some of these commentaries have provided examples.[37,38] This descriptive cross-sectional study is the first study to look at the association between physical activity levels and mental health symptoms in older adults during the COVID-19 pandemic. The strengths of this study are its moderately large sample that includes individuals from nearly every state in the United States and many provinces of Canada, and the use of well-established measures of physical activity and symptoms of anxiety and depression validated for use in older adults. However, our study also has several limitations. Survey respondents were predominantly well-educated, female, and white, and thus, one should use caution when trying to generalize these results to the general population. Although, 37% of our respondents reported a decrease in physical activity after COVID-19, we did not assess the impact of change in physical activity on our findings; which should be a topic of future investigation as we follow-up with the participants. Additionally, the cross-sectional nature of the study makes it impossible to determine causation. It is not possible to distinguish whether individuals who perform more physical activity experienced less depression-like symptoms, or if people who have a higher incidence of depression-like symptoms are less likely to perform physical activity. Finally, although we utilized measures of anxiety, depression and physical activity that have ample evidence for their validity in our sample demographic, it is unknown how their administration in an online format may affect these outcomes.

Given the increased degree of isolation experienced by older adults during the current pandemic, these individuals are at particularly higher risk of mental health problems associated with social isolation. Moreover, due to the possibility that many older adults may need to maintain isolation even as regions of the countries begin to ease stay-at-home orders, it is crucial to determine safe and healthy means by which older adults can maintain their mental health. Although these results are a promising start, future work will need to implement more objective measures of physical activity and explore the longitudinal effects that physical activity and the COVID-19 pandemic have on the mental health of older adults.

AUTHOR CONTRIBUTION

D.C., N.A., J.C.S. conceived and planned the experiment. D.C., N.A., J.C.S, L.J., and G.P. helped develop and create the survey. D.C. analyzed the data with the help of J.W., J.C.S, and J.L.W. D.C wrote the manuscript with support from N.A., J.C.S., L.J., GP, J.W, and J.L.W.

DISCLOSURE

This work was supported by the Department of Kinesiology and School of Public Health at the University of Maryland.

None of the authors have conflict of interests to report.

SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found, in the online version, at https://doi.org/10.1016/j.jagp.2020.06.024.

References

1. Du RH, Liang LR, Yang CQ, et al: Predictors of mortality for patients with COVID-19 pneumonia caused by SARS-CoV-2: a prospective cohort study. Eur Respir J 2020; 55(5).
2. Zhai P, Ding Y, Wu X, et al: The epidemiology, diagnosis and treatment of COVID-19. Int J Antimicrob Agents 2020:105955.
3. Shahid Z, Kalayanamitra R, McClafferty B, et al: COVID-19 and older adults: what we know. J Am Geriatr Soc 2020; 68(5):926–929.
4. Wang L, He W, Yu X, et al: Coronavirus disease 2019 in elderly patients: characteristics and prognostic factors based on 4-week follow-up. J Infect 2020.
5. **CDC. "Older adults." 2020. [Online]. Available at:** https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/older-adults.html. **Accessed May 9, 2020.**
6. Armitage R, Nellums LB: COVID-19 and the consequences of isolating the elderly. Lancet Public Health 2020; 5(5):e256. Elsevier Ltd.
7. Umberson D, Karas Montez J: Social relationships and health: a flashpoint for health policy. J Health Soc Behav 2010; 51 (1_suppl):S54–S66.
8. Cacioppo JT, Hawkley LC: Perceived social isolation and cognition. Trends Cogn Sci 2009; 13(10):447–454.
9. Steptoe A, Shankar A, Demakakos P, et al: Social isolation, loneliness, and all-cause mortality in older men and women. Proc Natl Acad Sci U S A 2013; 110(15):5797–5801.
10. Santini ZI, Jose PE, Cornwell EY, et al: Social disconnectedness, perceived isolation, and symptoms of depression and anxiety among older Americans (NSHAP): a longitudinal mediation analysis. The Lancet Public Health 2020; 5(1):e62–e70.
11. Courtin E, Knapp M: Social isolation, loneliness and health in old age: a scoping review. Health Soc Care Community 2017; 25 (3):799–812. Blackwell Publishing Ltd.
12. Shankar A, McMunn A, Banks J, et al: Loneliness, social isolation, and behavioral and biological health indicators in older adults. Health Psychol 2011; 30(4):377–385.
13. Cardiovascular Health Study Collaborative Research Group, Fried LP, Kronmal RA, Newman AB, et al: Risk factors for 5-year mortality in older adults: the Cardiovascular Health Study. JAMA 1998; 279(8):585–592.
14. Mura G, Carta MG: Physical activity in depressed elderly. A systematic review. Clin Pract Epidemiol Ment Health 2013; 9 (1):125–135.
15. Woodard JL, Sugarman MA, Nielson KA, Smith JC, Seidenberg M, Durgerian S, Matthews MA, Rao SM: Lifestyle and genetic contributions to cognitive decline and hippocampal structure and function in healthy aging. Curr Alzheimer Res 2012; 9(4):436–446.
16. Schrempft S, Jackowska M, Hamer M, et al: Associations between social isolation, loneliness, and objective physical activity in older men and women. BMC Public Health 2019; 19(1):74.
17. Jakobsson J, Malm C, Furberg M, et al: Physical activity during the coronavirus (COVID-19) pandemic: prevention of a decline in metabolic and immunological functions. Front Sport Act Living 2020; 2:57.
18. Jiménez-Pavón D, Carbonell-Baeza A, Lavie CJ: Physical exercise as therapy to fight against the mental and physical consequences of COVID-19 quarantine: special focus in older people. Prog Cardiovasc Dis 2020. **Ahead of print** https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7118448/
19. Da Silva MA, et al: Bidirectional association between physical activity and symptoms of anxiety and depression: the Whitehall II study. Eur J Epidemiol 2012; 27(7):537–546.
20. Hamer M, Stamatakis E, Steptoe A: Dose-response relationship between physical activity and mental health: the Scottish health survey. Br J Sports Med 2009; 43(14):1111–1114.
21. Asztalos M, De Bourdeaudhuij I, Cardon G: The relationship between physical activity and mental health varies across activity intensity levels and dimensions of mental health among women and men. Public Health Nutr 2010; 13(8):1207–1214.
22. Mumba MN, Nazarrow AF, Cody S, et al: Intensity and type of physical activity predicts depression in older adults. Aging Ment Health 2020: 1–8.
23. Brenes GA, Williamson JD, Messier SP, et al: Treatment of minor depression in older adults: a pilot study comparing sertraline and exercise. Aging Ment Health 2007; 11(1):61–68.
24. Herring MP, Jacob ML, Suveg C, et al: Feasibility of exercise training for the short-term treatment of generalized anxiety disorder: a randomized controlled trial. Psychother Psychosom Med 2011; 81(1):21–28.
25. Mather AS, Rodriguez C, Guthrie MF, et al: Effects of exercise on depressive symptoms in older adults with poorly responsive depressive disorder. Br J Psychiatry 2002; 180:411–415.
26. Meyer D, et al: Promoting walking as an adjunct intervention to group cognitive behavioral therapy for anxiety disorders-a pilot group randomized trial. J Anxiety Disord 2008; 22(6):959–968.
27. Mota-Pereira J, Silveira J, Carvalho S, et al: Moderate exercise improves depression parameters in treatment-resistant patients with major depressive disorder. J Psychiatr Res 2011; 45(8):1005–1011.
28. Stordia C: Alternative scoring for physical activity scale for the elderly (PASE). Maturitas 2012; 72(4):379–382.
29. Washburn RA, Smith KW, Jette AM, et al: The physical activity scale for the elderly (PASE): development and evaluation. J Clin Epidemiol 1993; 46(2):153–162.
30. Yesavage JA, Brink TL, Rose TL, et al: Development and validation of a geriatric depression screening scale: a preliminary report. J Psychiatr Res 1982; 17(1):37–49.
31. Segal DL, June A, Payne M, et al: Development and initial validation of a self-report assessment tool for anxiety among older adults: the geriatric anxiety scale. J Anxiety Disord 2010; 24(7):709–714.
32. R Core Team: R: A Language and Environment for Statistical Computing. Vienna, Austria.
33. Teixeira CM, Vasconcelos-Raposo J, Fernandes HM: Physical activity, depression and anxiety among the elderly. Soc Indic Res 2013; 113(3):307–318.

34. Anderson EH, Shivakumar G. Effects of exercise and physical activity on anxiety. Front Psychiatr 2013; 4:27
35. Logan SL, Gottlieb BH, Maitl SB, et al. The physical activity scale for the elderly (PASE) questionnaire; does it predict physical health? Int J Environ Res Public Health 2013; 10(9):3967–3986
36. Sink KM, Espeland MA, Castro CM, et al. Effect of a 24-month physical activity intervention vs health education on cognitive outcomes in sedentary older adults: the LIFE randomized trial. JAMA 2015; 314(8):781–790
37. Chen P, Mao L, Nassis GP, et al. Wuhan coronavirus (2019-nCoV): the need to maintain regular physical activity while taking precautions. J Sport Health Sci 2020; 9(2):103–104. Elsevier B.V.
38. ACSM: Staying Active During the Coronavirus Pandemic. 2020

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Associations Between Depressive Symptoms and Physical Activity Intensity in an Older Adult Population During COVID-19 Lockdown

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Introduction: The COVID-19 pandemic led to the implementation of physical–social distancing measures–including self-isolation, home confinement, and quarantine around the world, with psychological consequences such as depression. Older adults are especially likely to develop depressive symptomatology. This study aims to investigate the association between physical activity intensities and sedentary behavior with depression levels among previously active older adults during the COVID-19 lockdown.

Methods: A total of 1,123 physically active older Brazilian adults (67.68 ± 5.91 years, 91.00% female) were interviewed by telephone in regard to sociodemographic, general health status, depression (GDS-15), and physical activity (IPAQ-SV) after being home-confined for 11.59 ± 2.42 weeks. Participants were also asked to self-report changes in their physical activity levels and time spent sitting. Descriptive statistics (mean, frequencies), between-groups comparisons (*t*-tests and chi-square), and hierarchical regression analysis were used.

Results: About 83.80% of older adults self-reported a decrease in daily physical activity levels and 73.90% increased sitting time. Overall, depressive symptoms were observed in 30.40, and 20.80% met physical activity recommendations. Daily moderate ($\beta = -0.174$; 95% CI = −0.026; -0.012) and moderate-to-vigorous ($\beta = -0.183$; 95% CI = −0.023; 0.011) physical activity intensities were negatively associated with depression score explaining 2.6 and 2.9% of depression variability, respectively, after adjusting for age, gender, education level, body mass index, and polypharmacy. Daily walking and sitting time were not associated with the depression score ($p > 0.05$).

Conclusion: The results provide empiric suggestion supporting moderate to vigorous physical activity as a way to reduce depressive levels among older adults during COVID-19 confinement. Supervised home-based exercise programs, specifically designed for older adults, might be an important strategy to maintain and improve older adults' mental health.

Keywords: depression, physical activity, pandemic, lockdown, association, intensity

INTRODUCTION

The world is facing the devastating effects of the COVID-19 outbreak, an infection caused by the virus SARS-CoV2 that rapidly propagated within communities. To contain the spread of the virus and to protect the most fragile groups, several countries have implemented strict measures of physical-social distancing, such as self-isolation, home confinement, and quarantine (Armitage and Nellums, 2020). These measures are indeed efficient to mitigate virus activity, with epidemiological data demonstrating an abrupt reduction in the number of new COVID-19 cases and consequently mortality (Shahid et al., 2020). Nevertheless, these measures are not free from psychological detrimental side effects, as augmented loneliness may have adverse effects in psychological distress among the general population (Banerjee and Rai, 2020), especially in the most vulnerable groups as older adults. Santini et al. (2020) have already demonstrated that the social isolation and consequent loneliness during the outbreak have increased depression symptoms such as persistent low mood, dysphoria, and impaired motivation in older adults. Considering that the prevalence of depression among older adults in Western countries is around 20% (Volkert et al., 2013), an important worsening of this health outcome as a result of this sanitary crisis can be expected (Armitage and Nellums, 2020).

Social isolation as a result of home confinement also affected daily physical activity levels and sedentariness behavior in older adults, since the possibilities to perform physical exercise were reduced, and activities in the sitting or reclined position (watching television, reading, crocheting, and knitting, etc.) were exponentially increased, as recent available evidence indicates (Schrempft et al., 2019; Jakobsson et al., 2020; Jiménez-Pavón et al., 2020).

The World Health Organization (WHO) has recognized that social distancing, along with an excessive time spent sitting and a lower level of physical activity, might enlarge depressive symptoms within populations (Bull et al., 2020). Both sedentary behavior and physical inactivity negatively affect mood and are also associated with depressive symptoms (Mura and Carta, 2013; Mumba et al., 2020). In this sense, it has been suggested that physical activity could have an important role in the mental health promotion (and preservation) due to its potential to buffer adverse effects of stress (Roux, 2007). Empirical evidence has reported that a greater amount of total physical activity was associated with lower depressive symptoms (Callow et al., 2020). Physical exercise, a subcategory of physical activity, protects older adults from depression due to its positive effects on biological and psychological processes (social support, self-esteem, and the social relations inherent to exercise participation) (Perez-Lopez et al., 2017; Kandola et al., 2019). Moreover, a poor functional fitness status is also one of the most important causes of late-life depressive symptoms (Blazer and Hybels, 2005), which could be reverted through the participation in well-designed individual-tailored exercise programs (Bull et al., 2020). To that extent, it is expected that older adults who participated in physical exercise programs might be more protected against depressive symptoms caused by more restrictive measures such as home confinement. However, to the best of our knowledge, studies exploring the association between physical activity levels and depressive symptoms during social isolation imposed by COVID-19 outbreak in a population of active older adults are scarce. Therefore, the aim of the present study is to determine the relationship between intensities of physical activity performed by physically active older Brazilian adults and their depressive symptoms during home confinement.

MATERIALS AND METHODS

Study Design

This is a cross-sectional observational study based in a non-probabilistic sample comprising 1,123 older Brazilian's adults enrolled in the exercise program "Fortaleza Cidade Amiga do Idoso." The exercise program is hosted at the "Núcleo de Produções Culturais e Esportivas" (NUPROCE), a non-governmental organization in Fortaleza, Ceará, Brazil. Eligibility criteria were physically active subjects aged ≥60 enrolled in the exercise program in the school year 2019–2020.

Participants and Procedures

"Fortaleza Cidade Amiga do Idoso" consists of an in-person social program that offers social, cultural, and sports activities. The latter include multicomponent training, hydro gymnastics, dance, and walking–running sessions. Older adults are free to choose the activities they want to enroll, as well as the weekly frequency. Each session lasted 60 min and, prior to the outbreak, used to take place in public facilities. All older adults attending any sports activity from the program in the school year 2019–2020 were contacted by telephone and invited to participate in the study during home confinement. In Fortaleza, the lockdown was initiated on March 19th, and the reopening phase, which finished with the duty of confinement, started on July 12th. Along this period, people from Fortaleza were only allowed to get out from their homes to perform essential activities such as acquisition of goods and services and health reasons. Data were collected during the month of June (1st–31st) via phone calls, when subjects were still under home confinement. Participants' contacts were provided by the NUPROCE secretariat after the study was approved by the ethics board.

Ethics Statement

The study was approved by the NUPROCE and the Secretaria de Direitos Humanos e Desenvolvimento Social of Fortaleza, Ceará, Brazil. All procedures followed the Helsinki Declaration. Each participant provided a verbal informed consent before starting to be interviewed. Participants could withdraw from the survey at any point in time without providing justification.

Data Collection

Twenty interviewers, who used to lead older adults' activities prior the confinement, were trained by three researchers to perform the interviews. The data were collected via telephone interviews, and answers were entered into a Google Form database. For each individual, there were up to six calling

attempts, performed in different days and hours. As soon as the interviewers introduced a set of answers into the dataset, all three researchers checked for missing data or typing error.

Sociodemographic and Health-Related Conditions

Data on sociodemographic (sex, age, and years of education), lockdown duration, the number of exercise sessions per week previous to the lockdown, and the use of multiple medicines (i.e., polypharmacy) were obtained with open-answer questions. The presence of health conditions (hypertension, dyslipidemia, diabetes, cardiovascular disease, chronic respiratory disease, cancer, and COVID-19) was asked as yes/no questions.

Anthropometry

Body weight (kg) and height (meters) were self-reported, and the body mass index (BMI) was derived as body weight divided by squared height (kg/m^2).

Symptoms of Depression

Symptoms of depression were determined using the Brazilian validated Geriatric Depression Scale–Short Form (GDS-15) (Almeida and Almeida, 1999a). The GDS-15 comprises of 15 questions examining the older adult's mood in the previous week. Answers are "yes" or "no," and 1 point is given either to the answer "yes" or to the answer "no" depending on the question. The final score is the sum of total answers, with higher results reflecting worse depressive states. Scores were coded ranging from no depression symptoms (0–4) and presence of depression symptoms (≥5) (Almeida and Almeida, 1999a). The validated Brazilian version presented a good internal consistency (Almeida and Almeida, 1999b).

Physical Activity

Physical activity was measured using the Brazilian validated short-version of the International Physical Activity Questionnaire (IPAQ-SV) (Craig et al., 2003). The participants were asked to provide information on frequency (days per week) and duration (hours or minutes per day) they spent walking, as well as in moderate and vigorous physical activity. The IPAQ-SV also includes a question about sitting time (time per day in sitting position). The daily duration of each intensity of physical activity (moderate and vigorous) and walking (i.e., light physical activity) was computed multiplying the number of days per week by the time per day in each intensity. After that, the results for each physical activity intensity and walking were divided by 7 to get the mean values per day (i.e., light physical activity/day, moderate physical activity/day, and vigorous physical activity/day). Additionally, moderate and vigorous physical activity per day was summed to get moderate to vigorous physical activity. Participants were also classified against physical activity guidelines ("<150 min per week" or "≥150 min per week" of moderate to vigorous physical activity) (Bull et al., 2020). Participants were asked to self-report changes in physical activity and time spent sitting during home confinement in comparison to the prior-confinement period. Answer options were reduced, maintained, and augmented.

Statistical Analysis

Descriptive statistics and frequency analysis were used to describe the sample. Between-groups comparisons (no depression symptoms versus presence of depression symptoms) were performed using independent *t*-test and chi-square (χ^2) test as appropriate. Hierarchical multiple linear regression analysis, with the enter method, was used to determine the unique contribution of each physical activity intensity variable and sitting time in predicting the depression score. The base model (model 1) included the factors that have plausibility to determine depression (age, gender, educational level, body mass index, and polypharmacy). Model 2 included daily walking (i.e., light physical activity) plus variables from model 1. Model 3 was computed based on model 2 plus moderate physical activity intensity. Model 4 included additional vigorous physical activity plus variables from model 3. Model 5 was computed in line with model 2 with moderate to vigorous physical activity as one single variable. Model 6 was equal to model 1 plus sitting time. Finally, model 7 included model 1 plus daily walking, moderate to vigorous physical activity, and sitting time. The homoscedasticity of the models (residual variance) was checked by visual inspection of dispersion between residues and predicted values. Multicollinearity was checked and considered acceptable when the variance inflation factor (VIF) <10 (Myers, 1990). Sensitivity analysis, excluding older male adults, was also performed for hierarchical regression. All procedures were carried out using the statistical package IBM SPSS Statistics software, version 26 (Chicago, United States). *p*-values <0.05 were considered significant.

RESULTS

One thousand four hundred fifty-three older adults enrolled in the exercise program were contacted. From those, 107 older adults had contact problems, 197 did not answer phone calls, and 11 declined to participate. In total, 1,123 agreed to participate (67.68 ± 5.91 years old, 91.00% females).

Overall sample characteristics and between-groups comparisons are depicted in **Table 1**. Older adults were subject to 11.59 ± 2.42 weeks of home confinement. The two lowest levels of education were the most frequent among the older adults (<6 years: 38.6%; 6–12 years: 54.3%), with significant differences in the distribution of education according to the presence or absence of depression symptoms ($p = 0.008$). Overweight and obesity were present in 47.2% on older adults, with significant BMI differences between groups (presence of depression symptoms: 27.49 ± 4.37 kg/m^2; no depression symptoms: 26.92 ± 3.83 kg/m^2; $p = 0.040$). Regarding the overall risk factors, 62.2% had hypertension and 44.90% had dyslipidemia. At the moment of data collection, 4.7% were infected with COVID-19, and 30-40% had presence of depression symptoms. On average, older adults spent 325.51 ± 144.40 min/day in sitting time during the confinement period. Regardless of the presence of depression symptoms, all older adults reported to have augmented their sitting time per day (73.90%), but it was more frequent within the group with depressive symptoms compared to the

TABLE 1 | Descriptive and between-groups comparisons.

Variables	Overall (N: 1123)	No depression symptoms (N: 782)	Presence of depression symptoms (N: 341)	Statistical inference
Age, years	67.68 ± 5.91	67.66 ± 5.95	67.73 ± 5.87	t (1121) = −0.184; p = 0.854
Gender				
Female, %	91.00%	90.58%	91.20%	χ^2(1, N = 1123) = 0.125; p = 0.469
Male, %	9.00%	9.51%	8.80%	
Education				
<6 years, %	36.6%	36.06%	39.90%	χ^2 (2, N = 1123) = 9.624; p = 0.008
6–12 years, %	54.3%	53.30%	56.60%	
>12 years, %	7.10%	8.70%	3.50%	
Anthropometry				
Body mass index, kg/m^2	27.09 ± 4.00	26.92 ± 3.83	27.49 ± 4.37	t (537.996) = −2.062; p = 0.040
Overweight and Obesity, N (%)	530 (47.20%)	369 (46.60%)	161 (48.60%)	χ^2 (2, N = 1101) = 0.653; p = 0.721
Health conditions				
Hypertension, %	62.20%	56.80%	80.80%	χ^2 (2, N = 1123) = 33.008; p < 0.001
Dyslipidemia, %	44.80%	42.80%	49.60%	χ^2 (2, N = 1123) = 4.383; p = 0.112
Diabetes, %	29.50%	26.50%	36.40%	χ^2 (2, N = 1123) = 11.442; p = 0.003
Cardiovascular disease, %	9.60%	8.30%	13.20%	χ^2 (2, N = 1123) = 8.882; p = 0.012
Cancer,%	4.40%	3.50%	6.50%	χ^2 (2, N = 1123) = 12.870; p = 0.002
COVID-19,%	4.70%	4.70%	4.70%	χ^2 (2, N = 1123) = 0.510; p = 0.775
Chronic respiratory disease	12.90%	6.90%	26.70%	χ^2 (2, N = 1123) = 92.156; p < 0.001
Polypharmacy, n	2.40 ± 1.78	2.32 ± 1.76	2.60 ± 1.75	t (851.766) = −2.448; p = 0.015
Physical activity				
Daily walking, min/day	11.74 ± 21.68	12.08 ± 20.31	11.21 ± 25.78	t (1109) = 0.791; p = 0.447
Moderate PA, min/day	15.25 ± 26.13	16.96 ± 26.11	10.42 ± 22.73	t (699.271) = 4.005; p = 0.000
Vigorous PA, min/day	3.48 ± 8.60	4.05 ± 10.61	2.48 ± 8.54	t (721.410) = 2.487; p = 0.013
MVPA, min/day	18.70 ± 29.76	21.28 ± 31.02	12.78 ± 25.73	t (767.657) = 4.761; p < 0.001
Daily sitting time, min/day	325.51 ± 144.40	321.05 ± 146.11	334.45 ± 140.17	t (1115) = −1.360; p = 0.174
Meeting PA Guidelines,%	20.90%	23.50%	15.00%	χ^2 (1, N = 1117) = 10.247; p = 0.001
Changes in PA during confinement				
Reduced, %	83.80%	80.2%	92.10%	χ^2(2, N = 1123) = 25.786; p < 0.001
Maintained, %	12.90%	16.10%	5.60%	
Augmented, %	3.30%	3.70%	2.30%	
Changes in daily sitting time				
Reduced, %	4.20%	4.60%	3.20%	χ^2 (2, N = 1123) = 22.734; p < 0.001
Maintained, %	21.90%	25.60%	13.50%	
Augmented, %	73.90%	69.80%	83.30%	
Depression symptoms, score	3.57 ± 2.83	2.03 ± 1.31	7.09 ± 2.817	t (450.834) = −39.791; p < 0.001

PA, physical activity; MVPA, moderate to vigorous physical activity.

group without symptoms (83.30 versus 69.80%, respectively; $p < 0.001$). The depressive symptoms group spent, on average, 12.78 ± 25.73 min/day in moderate to vigorous physical activity, which was significantly lower compared to the mean of the group without depression symptoms (21.28 ± 31.02 min/day; $p < 0.001$). Overall, 83.80% of older adults diminished their physical activity levels, which was significantly higher within the group with depressive symptoms (92.10%) compared to the one without depressive symptoms (80.2%; $p < 0.001$); 20.8% of older adults met physical activity guidelines, with significant differences between groups (without depressive symptoms: 15%; depressive symptoms group: 23.5%; $p < 0.001$).

Table 2 presents hierarchical regression analysis aiming to determine the independent prediction of physical activity variables and sitting time on the depression score. Model 1 (R^2: 0.012; $p = 0.020$) was built considering the variables with clinical/physiological plausibility [age (β = −0.027; 95% CI = −0.042 to 0.016; $p = 0.383$), gender (β = −0.033; 95% CI = −0.912 to 0.253; $p = 0.267$), education level (β = −0.011; 95% CI = −0.332 to 0.230; $p = 0.723$), BMI (β = 0.056; 95% CI = −0.003 to 0.082; $p = 0.067$), and polypharmacy (β = 0.080; 95% CI = 0.031–0.224; $p = 0.010$). The independent variable "daily walking" (β = −0.019; 95% CI = −0.010 to 0.005; $p = 0.528$) within model 2 (R^2: 0.013; $p = 0.031$) did not significantly predict the outcome, increasing 0.1% of the depression score variance. Time spent in moderate physical activity (β = −0.174; 95% CI = −0.026 to −0.012; $p < 0.001$) within model 3 (R^2: 0.039; $p < 0.001$) significantly predicted the depression score, explaining

TABLE 2 | Hierarchical linear regression results for physical activity variables as a predictor of symptoms of depression.

		Age	Gender	Education level	BMI	Polypharmacy	Daily walking	Moderate PA	Vigorous PA	MVPA	Sitting time
Model 1 R^2: 0.012 *F* for change in R^2: 2.701 *p*: 0.020	B	0.013	0.330	0.051	0.040	0.129					
	SE	0.015	0.297	0.143	0.022	0.049					
	β	−0.027	−0.033	−0.011	0.056	0.080					
	95% CI UB; LB	−0.042; 0.016	−0.912; 0.253	−0.332; 0.230	−0.003; 0.082	0.031; 0.224					
	p	0.383	0.267	0.723	0.087	0.010					
Model 2 R^2: 0.013 *F* for change in R^2: 2.326 *p*: 0.031	B	−0.013	−0.367	−0.042	0.040	0.129	−0.002				
	(SE)	0.015	0.299	0.145	0.022	0.050	0.004				
	β	−0.027	−0.037	−0.009	0.056	0.079	−0.019				
	95% CI UB; LB	−0.042; 0.016	−0.954; 0.220	−0.326; 0.242	−0.003; 0.083	0.029; 0.224	−0.010; 0.005				
	p	0.362	0.221	0.773	0.070	0.011	0.526				
Model 3 R^2: 0.039 *F* for change in R^2: 6.343 *p* < 0.001	B	−0.017	−0.293	−0.046	0.032	0.136	0.005	−0.019			
	(SE)	0.015	0.296	0.143	0.022	0.049	0.004	0.003			
	β	−0.035	−0.030	−0.010	0.045	0.085	0.040	−0.174			
	95% CI UB; LB	0.045; 0.012	0.873; 0.287	0.327; 0.235	0.011; 0.074	0.040; 0.232	0.003; 0.013	0.026; 0.012			
	p	0.252	0.322	0.748	0.142	0.006	0.207	0.001			
Model 4 R^2: 0.042 *F* for change in R^2: 5.947 *p* < 0.001	B	0.015	0.313	0.033	0.033	0.138	0.006	0.018	0.015		
	(SD)	0.015	0.298	0.143	0.022	0.049	0.004	0.003	0.009		
	β	−0.032	−0.032	−0.007	0.046	0.085	0.047	−0.166	−0.054		
	95% CI UB; LB	0.044; 0.014	0.893; 0.267	0.313; 0.248	0.009; 0.075	0.040; 0.232	0.002; 0.014	0.025; 0.011	0.033; 0.002		
	p	0.304	0.290	0.819	0.126	0.005	0.139	< 0.001	0.079		
Model 5 R^2: 0.042 *F* for change in R^2: 6.799 *p* < 0.001	B	0.015	0.316	0.030	0.033	0.138	0.006			0.017	
	(SE)	0.015	0.295	0.143	0.022	0.049	0.004			0.003	
	β	−0.032	−0.032	−0.006	0.047	0.085	0.047			−0.183	
	95% CI UB; LB	−0.044; 0.014	−0.895; 0.263	−0.311; 0.250	−0.009; 0.076	0.040; 0.232	−0.002; 0.014			−0.023; −0.011	
	p	0.303	0.285	0.832	0.122	0.005	0.141			< 0.001	

(Continued)

TABLE 2 | Continued

		Age	Gender	Education level	BMI	Polypharmacy	Daily walking	Moderate PA	Vigorous PA	MVPA	Sitting time
Model 6	B	−0.016	−0.917	−0.037	0.038	0.129					0.000
R^2: 0.013 F for change in R^2: 2.368 p: 0.029	(SE)	0.015	0.297	0.145	0.022	0.049					0.001
	p	−0.038	−0.052	−0.006	0.054	0.091					0.024
	95% CI LB, LB	−0.045, 0.013	−0.901, 0.166	−0.322, 0.248	−0.005, 0.081	0.032, 0.226					−0.001, 0.002
	p	0.285	0.266	0.796	0.083	0.009					0.422
Model 7	B	−0.017	−0.910	−0.041	0.024	0.135	0.006			−0.017	0.000
R^2: 0.042 F for change in R^2: 6.828 p < 0.001	(SE)	0.015	0.296	0.145	0.022	0.049	0.004			0.003	0.001
	p	−0.036	−0.051	−0.009	0.047	0.065	0.048			−0.194	−0.005
	95% CI LB, LB	−0.046, 0.012	−0.990, 0.370	−0.324, 0.243	−0.009, 0.076	0.039, 0.231	−0.002, 0.014			−0.023, −0.011	−0.001, 0.001
	p	0.256	0.205	0.779	0.122	0.006	0.133			< 0.001	0.976

Age: standardized and unstandardized beta coefficients are reported; CI: confidence interval; LB: lower bound; UB: upper bound; PA: physical activity; MVPA: moderate to vigorous physical activity; Gender: 0 females, 1 male; Education level: 0 = <8 years, 1 = 8–12 years, 2 = >12 years.

2.6% of its variance. Model 4 (R^2: 0.042; $p < 0.001$) added time spent in vigorous physical activity (β = −0.054; 95% CI = −0.033 to 0.002; $p = 0.079$), which explained an additional 0.3% of the depression variance. When considering time spent in moderate to vigorous physical activity (β = −0.183; 95% CI = −0.023 to −0.011; $p < 0.001$) together with daily walking and the other covariables, it significantly improved the model, explaining the depression score variance in 2.9% (model 5; R^2: 0.042; $p < 0.001$). Time spent in sitting position did not explain the depression score [models 6 (β sitting time = 0.024; 95% CI = −0.001 to 0.002; $p = 0.422$] and 7 (β sitting time = −0 to 005; 95% CI = −0.001 to 0.001; $p = 0.876$)]. The collinearity between variables was checked for each model, and the VIF values were always below 10. Sensitivity analysis excluding older male adults maintained the same results (**Supplementary Material**).

DISCUSSION

In this large observational study among previously active older adults, greater time spent in moderate and moderate to vigorous physical activity was associated with a lower depressive score during COVID-19 confinement. To the best of our knowledge, this is the first large community-based study to suggest that time spent in moderate and in moderate to vigorous physical activity during home confinement might impact depressive symptoms of previously active older adults. It was recommended that older adults engage in regular physical activity and avoid sedentary behaviors during confinement; however, 83.80% of older adults who participated in this study diminished their physical activity levels, and this was significantly higher in the participants who reported depressive symptomatology.

Depression is known to be a critical problem among aging populations, often being underdiagnosed and undertreated (Huang et al., 2015). Approximately 20% of older adults who live in the western countries suffer from depression (Volkert et al., 2013). This highly prevalent mental disorder is often related to physical health problems, disability, loss of functionality, and mortality (Cacioppo et al., 2006). The COVID-19 pandemic potentially increases the symptoms of anxiety, depression, and stress (Quittkat et al., 2020). The administrative measures of social isolation, in order to minimize the effects of COVID-19, can cause greater distress and feelings of sadness, especially for those who previously had a large proportion of social contacts in public places (Umberson and Karas Montez, 2010; Armitage and Nellums, 2020). Moreover, it is well known that social isolation and consequent loneliness are considered specific risk factors for depressive symptoms (Cacioppo et al., 2006). Our data showed that being previously active did not prevent 30.40% of the older adults from having depressive symptoms during the COVID-19 pandemic. However, these results, when compared to the prevalence of depression among the Brazilian general population during the COVID-19 pandemic (that was 68%) (Goularte et al., 2021), are much lower and could indicate that previously physically active older adults were somehow protected from depressive symptomatology during the COVID-19 confinement.

The benefits of physical activity in reducing scores of depressive symptoms in older adults are well documented (Kandola et al., 2019). In fact, physical activity and exercise may lower rates of anxiety and depression by triggering the release of endorphin, dopamine, and serotonin, neurotransmitters involved in the body's stress response, which could help the individuals to remain more stable during extrinsic demanding situations, such as the current pandemic situation (Craft and Perna, 2004). Our results have demonstrated that, from the large spectrum of physical activity intensities, moderate intensity explains 2.6% of the depression score variance, and moderate to vigorous physical activity together explains 2.9%. Conversely, light physical activity (evaluated as walking time) and vigorous physical activity alone were not significantly associated with the depression score. Our results might suggest moderate intensity physical activity as the variable most closely related with lower depression symptomatology. These results might be explained because, with advancing age, in many older adults, the ability to perform some types of physical activity might decrease; thus, moderate exercise intensity may be an especially important component of overall fitness routines. Previous evidence showed that physical activity and exercise have therapeutic effects on individuals' physical and mental health. For example, Mumba et al. (2020) have showed that recreational moderate and vigorous physical activity was associated with a lower depression score in 2,474 adults and older adults aged 50 years and older. Huang et al. (2015) revealed that exercising at moderate intensity, for 50 min, three times a week, for 12 weeks, was effective in reducing depressive symptoms. In another study with frail and pre-frail older adults, physical exercise was effective in significantly reducing the depression score (Ng et al., 2017). Langoni et al. (2019) developed a 24-weeks intervention with 52 mild cognitively impaired and sedentary older adults. Results demonstrated that the program reduced the median geriatric depression score against the initial value. In addition to reducing depressive symptoms, physical exercise also improves aerobic capacity and the perception of social support, balance, and mobility. These improvements positively affect older adults' quality of life, diminishing sadness, melancholy, and hopelessness (Huang et al., 2015), maintaining the ability to perform activities of daily living (Demura et al., 2005).

Social isolation, due to home confinement, can lead to reduced everyday physical activity and enlarge sedentary time (Schrempft et al., 2019). Some previous reports have suggested that such restrictions may lead older adults to perform less physical activity compared to the preconfinement period (Jakobsson et al., 2020; Jiménez-Pavón et al., 2020). In fact, our participants reported similar results, as 83.80% of the sample decreased their usual physical activity levels, and 73.90% increased sitting time. When comparing groups with and without depressive symptoms, those with depression symptoms showed a greater reduction in physical activity (92.10% versus 80.20%), as well as a significant increase in sitting time (83.30% versus 69.80%). In agreement, Callow et al. (2020), in a cross-sectional study conducted through an online questionnaire with North American and Canadian older adults, indicated that higher physical activity was associated with lower depressive symptoms during social isolation due to COVID-19. Our results also showed that older adults without depressive symptoms are more likely to meet WHO recommendations for physical activity (23%) compared with 15% among those with depressive symptoms. A reduction of moderate to vigorous physical activity among previously physically active older adults was found, and at least partially, it was a consequence of the interruption of structured physical activities realized by the "Fortaleza Cidade Amiga do Idoso" project. As mentioned by Schrempft et al. (2019), social restrictions and home confinement orders, including the temporary closure of usual activities, such as sports and physical fitness centers, may have compromised physical activity levels.

During the outbreak, the WHO published the new physical activity guidelines, including, for the first time, specific topics on mental health. Indeed, the 2020 WHO physical activity recommendations encourage older adults to exercise between 150 and 300 min per day at moderate to vigorous intensity and to replace sedentary time by any physical activity intensity to sustain physical and mental health (Bull et al., 2020). In this sense, it should be a priority to properly adapt previous in-person interventions to virtual/home-based formats, particularly to those who were physically active before COVID-19. Efficient and safe actions are needed to stimulate the practice of physical activity at home and consequently minimize the psychological effects of social isolation. Moreover, health systems and individual clinicians must be prepared to offer and implement specific physical activity and mental well-being programs in order to reduce the prevalence of depression.

Our analysis had several strengths. A large number of participants, data collection through telephone interviews carried out by acquainted individuals (older adults' trainers before confinement), and adjustment for a wide range of major risk factors minimized the potential impact of residual confounding. The telephone interview allowed for clear and precise explanations of each question, avoiding misunderstandings.

Potential limitations were also present. The cross-sectional design with a convenience sample makes causal inferences difficult. Results were attained predominantly for women and might not be generalizable to men. However, to overcome this bias, we conducted sensitivity analysis removing males from the procedures, and the results were maintained. Physical activity was assessed with questionnaires that tend to overestimate moderate to vigorous physical activity and underestimate sitting time. Moreover, the percentage of the level of depression explained by physical activity is not very high. This means that other factors may be involved in the changes of the depressive symptoms during the COVID-19 outbreak.

The data suggest that physical activity, particularly the time spent in moderate intensity, might have an important protective role on depressive symptoms during home confinement. Our findings are especially important given the fact that older adults are already more susceptive to depressive symptomatology and confinement might have exacerbated it, so strategies to control or diminish depressive symptoms are of extreme importance. These results support the need for clinicians and policy makers to focus on physical activity interventions through technology and

remotely supervise to maintain and promote the mental health of older adults during the COVID-19 pandemic.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Núcleo de Produções Culturais e Esportivas (NUPROCE) and the Secretaria de Direitos Humanos e Desenvolvimento Social of Fortaleza, Ceará, Brazil. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

LB, SG, and ES conceived and designed the analysis. AL, ES, and SG collected data. AL, SG, ES, and LB contributed data and analysis tools. AL, SC, and LB performed the analysis. AL, LB, SC, and LS-M wrote the manuscript. All authors contributed to the article and approved the submitted version.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2021.644106/full#supplementary-material

REFERENCES

Almeida, O. P., and Almeida, S. A. (1999a). Confiabilidade da versão brasileira da Escala de Depressão em Geriatria (GDS) versão reduzida. *Arq. Neuropsiquiatr.* 57, 421–426. doi: 10.1590/s0004-282x1999000300013

Almeida, O. P., and Almeida, S. A. (1999b). Short versions of the geriatric depression scale: a study of their validity for the diagnosis of a major depressive episode according to ICD–10 and DSM-IV. *Int. J. Geriatr. Psychiatry* 14, 858–865. doi: 10.1002/(sici)1099-1166(1999101)14:10<858::aid-gps35>3.0.co;2-8

Armitage, R., and Nellums, L. B. (2020). COVID-19 and the consequences of isolating the elderly. *Lancet Public Health* 5:e256. doi: 10.1016/s2468-2667(20)30061-x

Banerjee, D., and Rai, M. (2020). *Social Isolation in Covid-19: The Impact of Loneliness*. London: SAGE Publications.

Blazer, D. G. II, and Hybels, C. F. (2005). Origins of depression in later life. *Psychol. Med.* 35, 1241–1252. doi: 10.1017/s0033291705004411

Bull, F. C., Al-Ansari, S. S., Biddle, S., Borodulin, K., Buman, M. P., Cardon, G., et al. (2020). World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *Br. J. Sports Med.* 54, 1451–1462.

Cacioppo, J. T., Hughes, M. E., Waite, L. J., Hawkley, L. C., and Thisted, R. A. (2006). Loneliness as a specific risk factor for depressive symptoms: cross-sectional and longitudinal analyses. *Psychol. Aging* 21, 140–151. doi: 10.1037/0882-7974.21.1.140

Callow, D. D., Arnold-Nedimala, N. A., Jordan, L. S., Pena, G. S., Won, J., Woodard, J. L., et al. (2020). The mental health benefits of physical activity in older adults survive the COVID-19 pandemic. *Am. J. Geriatr. Psychiatry* 28, 1046–1057. doi: 10.1016/j.jagp.2020.06.024

Craft, L. L., and Perna, F. M. (2004). The benefits of exercise for the clinically depressed. *Prim. Care Companion J. Clin. Psychiatry* 6, 104–111. doi: 10.4088/pcc.v06n0301

Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., et al. (2003). International physical activity questionnaire: 12-country reliability and validity. *Med. Sci. Sports Exerc.* 35, 1381–1395.

Demura, S., Kobayashi, H., and Kitabayashi, T. (2005). QOL models constructed for the community-dwelling elderly with ikigai (purpose in life) as a composition factor, and the effect of habitual exercise. *J. Physiol. Anthropol. Appl. Human Sci.* 24, 525–535. doi: 10.2114/jpa.24.525

Goulart, J. F., Serafim, S. D., Colombo, R., Hogg, B., Caldieraro, M. A., and Rosa, A. R. (2021). COVID-19 and mental health in Brazil: psychiatric symptoms in the general population. *J. Psychiatr. Res.* 132, 32–37. doi: 10.1016/j.jpsychires.2020.09.021

Huang, T.-T., Liu, C.-R., Tsai, Y.-H., Chin, Y.-F., and Wong, C.-H. (2013). Physical fitness exercise versus cognitive behavior therapy on reducing the depressive symptoms among community-dwelling elderly adults: a randomized controlled trial. *Int. J. Nurs. Stud.* 52, 1542–1552. doi: 10.1016/j.ijnurstu.2015.05.013

Jakobsson, J., Malm, C., Furberg, M., Ekelund, U., and Svensson, M. (2020). Physical activity during the coronavirus (COVID-19) pandemic: prevention of a decline in metabolic and immunological functions. *Front. Sports Act. Living* 2:57. doi: 10.3389/fspor.2020.00057

Jiménez-Pavón, D., Carbonell-Baeza, A., and Lavie, C. J. (2020). Physical exercise as therapy to fight against the mental and physical consequences of COVID-19 quarantine: special focus in older people. *Prog. Cardiovasc. Dis.* 63, 386–388. doi: 10.1016/j.pcad.2020.03.009

Kandola, A., Ashdown-Franks, G., Hendrikse, J., Sabiston, C. M., and Stubbs, B. (2019). Physical activity and depression: towards understanding the antidepressant mechanisms of physical activity. *Neurosci. Biobehav. Rev.* 107, 525–539. doi: 10.1016/j.neubiorev.2019.09.040

Langoni, C. D. S., Resende, T. L., Barcellos, A. B., Cecchele, B., da Rosa, J. N., Knob, M. S., et al. (2019). The effect of group exercises on balance, mobility, and depressive symptoms in older adults with mild cognitive impairment: a randomized controlled trial. *Clin. Rehabil.* 33, 439–448. doi: 10.1177/0269215518815218

Mazeika, M. N., Navarrete, A. F., Cody, S., Key, B. A., Wang, H., Robb, M., et al. (2020). Intensity and type of physical activity predicts depression in older adults. *Aging Ment. Health* 25, 661–671. doi: 10.1080/13607863.2020.1711861

Mura, G., and Carta, M. G. (2013). Physical activity in depressed elderly. A systematic review. *Clin. Pract. Epidemiol. Ment. Health* 9, 125–135. doi: 10.2174/1745017901309010125

Myers, R. H. (1990). *Classical and Modern Regression With Applications*, 2nd Edn. Boston, MA: PWS KENT.

Ng, T.-P., Nyunt, M. S. Z., Feng, L., Niti, M., Tan, B., Chan, G., et al. (2017). Multidomains lifestyle interventions reduces depressive symptoms among frail and pre-frail older persons: randomized controlled trial. *J. Nutr. Health Aging* 21, 918–926. doi: 10.1007/s12603-016-0867-y

Perez-Lopez, F. R., Martinez-Dominguez, S. J., Lajusticia, H., Chedraui, P., and Project, T. H. O. S. A. (2017). Effects of programmed exercise on depressive symptoms in midlife and older women: a meta-analysis of randomized controlled trials. *Maturitas* 106, 38–47. doi: 10.1016/j.maturitas.2017.09.001

Quittkat, H. L., Düsing, R., Holtmann, F.-J., Buhlmann, U., Svaldi, J., and Vocks, S. (2020). Perceived impact of Covid-19 across different mental disorders: a study on disorder-specific symptoms, psychosocial stress and behavior. *Front. Psychol.* 11:586246. doi: 10.3389/fpsyg.2020.586246

Roux, A. V. D. (2007). Neighborhoods and health: where are we and were do we go from here? *Rev. Epidemiol. Sante Publique* 55, 13–21. doi: 10.1016/j.respe.2006.12.003

Santini, Z. I., Jose, P. E., Cornwell, E. Y., Koyanagi, A., Nielsen, L., Hinrichsen, C., et al. (2020). Social disconnectedness, perceived isolation, and symptoms of depression and anxiety among older Americans (NSHAP): a longitudinal mediation analysis. *Lancet Public Health* 5, e62–e70.

Schrempft, S., Jackowska, M., Hamer, M., and Steptoe, A. (2019). Associations between social isolation, loneliness, and objective physical activity in older men and women. *BMC Public Health* 19:74. doi: 10.1186/s12889-019-6424-y

Shahid, Z., Kalayanamitra, R., McClafferty, B., Kepko, D., Ramgobin, D., Patel, R., et al. (2020). COVID-19 and older adults: what we know. *J. Am. Geriatr. Soc.* 68, 926–929.

Umberson, D., and Karas Montez, J. (2010). Social relationships and health: a flashpoint for health policy. *J. Health Soc. Behav.* 51(Suppl. 1), S54–S66.

Volkert, J., Schulz, H., Harter, M., Wlodarczyk, O., and Andreas, S. (2013). The prevalence of mental disorders in older people in Western countries – a meta-analysis. *Ageing Res. Rev.* 12, 339–353. doi: 10.1016/j.arr.2012.09.004

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ORIGINAL PAPER

Physical and mental health of older people while cocooning during the COVID-19 pandemic

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Summary

Background: Cocooning or shielding, i.e. staying at home and reducing face-to-face interaction with other people, was an important part of the response to the COVID-19 pandemic for older people. However, concerns exist regarding the long-term adverse effects cocooning may have on their physical and mental health.
Aim: To examine health trajectories and healthcare utilization while cocooning in a cohort of community-dwelling people aged ≥70 years.
Design: Survey of 150 patients (55% female, mean age 80 years and mean Clinical Frailty Scale Score 4.8) attending ambulatory medical services in a large urban university hospital.
Methods: The survey covered four broad themes: access to healthcare services, mental health, physical health and attitudes to COVID-19 restrictions. Survey data were presented descriptively.
Results: Almost 40% (59/150) reported that their mental health was 'worse' or 'much worse' while cocooning, while over 40% (63/150) reported a decline in their physical health. Almost 70% (104/150) reported exercising less frequently or not exercising at all. Over 57% (86/150) of participants reported loneliness with 1 in 8 (19/150) reporting that they were lonely 'very often'. Half of participants (75/150) reported a decline in their quality of life. Over 60% (91/150) agreed with government advice for those ≥70 years but over 40% (61/150) reported that they disliked the term 'cocooning'.
Conclusions: Given the likelihood of further restrictions in coming months, clear policies and advice for older people around strategies to maintain social engagement, manage loneliness and continue physical activity and access timely medical care and rehabilitation services should be a priority.

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Introduction

In terms of morbidity and mortality, COVID-19 disproportionately affects frail, older people. Older people with COVID-19 are more likely to develop severe respiratory illness[1] and delirium.[2] In Ireland, almost 80% of deaths from COVID-19 have involved people aged ≥75 years[3] and the crude mortality proportion in people aged 70–79 years with COVID-19 is almost 23%, rising to almost 30% in those aged ≥80 years.[4]

In order to reduce the risk of contracting COVID-19, in late March 2020 all people aged ≥70 years (as well as some younger people with underlying health conditions) in Ireland were advised to stay at home and reduce face-to-face interaction with other people as much as possible.[3] Older people were advised to stay indoors, have groceries and medicines delivered and avoid contact with friends and family in order to minimize spread within a high-risk group, delay peaks in case numbers and relieve pressure on health services. The term most commonly used to describe this strategy of self-isolation in Ireland was 'cocooning',[5] however alternative terms such as shielding or sheltering have also been used to describe similar strategies involving older populations in other countries.[6,7] Cocooning recommendations remain in place at this current time, but there have been some relaxations since they were introduced, involving for example, that shopping is now allotted to designated hours and support bubbles for those living alone are now recommended.

Social isolation, an inevitable consequence of cocooning for many older people, can have a profound impact longitudinally on health in later life. Indeed, socially isolated older people are more likely to report loneliness[8] and disturbed sleep,[9] have a higher likelihood of developing depression and psychological distress,[10] engage in less physical activity and more sedentary time,[11] demonstrate unhealthy behaviors in general[12] and have premature mortality.[13]

Other potential consequences of cocooning, including increased sedentary behavior and lack of physical exercise,[14] reduction in leisure activities[15] and restricted access to important services can also adversely affect health in later life.[16]

Therefore, while cocooning forms an important part of the public health response to the COVID-19 pandemic, with an overall aim to prevent transmission to vulnerable older people, concerns exist regarding the long-term adverse effects it may have on their physical and mental health. The aim of this study was to examine trajectories of physical and mental health, access to important services and activities and healthcare utilization while cocooning in a cohort of community-dwelling people aged ≥70 years attending ambulatory services in a large university teaching hospital.

Materials and methods

Study design and setting

A questionnaire was administered to community-dwelling older people attending older person-specific ambulatory care services in a large teaching hospital.

St James's Hospital is a large urban teaching hospital with a well-developed ambulatory care service for older people. Participants were recruited from general medicine for the older person clinics, the day hospital service and falls and syncope clinics.

This was a convenience sample, with older people attending ambulatory services approached between October 2020 and December 2020.

Inclusion/exclusion criteria

Participants were included if they were aged ≥70 years, had not been diagnosed with COVID-19 or admitted to hospital since March 2020 and were able to give informed consent to complete the questionnaire. The questionnaire was administered by healthcare professionals seeing the participant in the respective ambulatory care setting.

Questionnaire

As well as collecting basic demographic information, the questionnaire covered four broad themes:

i. Access to essential services, particularly healthcare services, while cocooning during the COVID-19 pandemic.
ii. Trend in mental health while cocooning during the COVID-19 pandemic.
iii. Trend in physical health while cocooning during the COVID-19 pandemic.
iv. Compliance with and attitude to advice regarding cocooning during the COVID-19 pandemic.

The Clinical Frailty Scale (CFS, version 2.0) was also completed on all participants.[17] See Supplementary Material for a copy of the questionnaire.

Statistical analysis

Data were analysed using Stata version 14.1 (StataCorp. Stata Statistical Software: Release 14. College Station, TX: StataCorp LP; 2015).

Survey data was presented descriptively as means with 95% confidence intervals and percentages. Chi-square test was used to test for differences between categorical variables.

Ethics

The study was approved by the Tallaght University Hospital and St James's Hospital Research Ethics Committee (Reference 2020-10).

Results

Baseline characteristics

Almost 55% (82/150) of participants were female, and the mean age was 79.8 years (95% CI 78.8–80.8).

Over half (78/150) of participants were married; 39% (59/150) were widowed; 8% (12/150) were single and 1% (1/150) were cohabiting. Almost half (72/150) of participants lived with a spouse or partner; 38% (57/150) lived alone while 14% (21/150) lived with family other than a spouse or partner or a friend/colleague.

The mean CFS was 4.8 (95% CI 4.6–5.0). Thirteen percent of participants (19/150) had a CFS ≤3 indicating that they were fit or managing well; 37% (55/150) had a CFS = 4 indicating very mild frailty; one fifth had a CFS =5 (28/150) indicating mild frailty and a CFS =6 (30/150) indicating moderate frailty, respectively, while the remaining 12% (18/150) had a CFS ≥7 indicating severe or very severe frailty.

Access to healthcare

Over 57% (86/150) of participants had a scheduled healthcare-related visit cancelled while cocooning. The most frequently cancelled service was hospital outpatient appointments, with one third (50/150) of participants reporting a cancelled appointment.

Almost 1 in 6 participants reported that while cocooning they did not seek medical attention for an illness, when they otherwise would have done so. Half of those who did not seek medical attention (12/150) said this was because they were afraid of catching COVID-19 while 46% (11/150) cited a lack of the service through which they would usually access healthcare as the reason for not seeking medical attention when unwell.

Mental health

Almost 40% (59/150) of participants reported that their mental health was worse or much worse since the start of cocooning, while 57% (86/150) reported no change in their mental health and 3% (5/150) reported an improvement in their mental health since they were advised to cocoon (Figure 1).

Figure 2 demonstrates the reported prevalence of loneliness, low mood, worry and anxiety amongst participants during cocooning.

Over 57% (86/150) of participants reported loneliness at least some of the time while cocooning with 1 in 8 (19/150) participants reporting that they were lonely 'very often'. Seventy percent (105/150) of participants reported low mood at least some of the time, with 12% (18/150) reporting low mood 'very often'.

Participants were almost twice as likely to report loneliness if they lived alone (47% vs. 27%; $X^2 = 6.20$; $P = 0.013$).

Physical health

Over 40% (63/150) of participants reported a decline in their physical health since cocooning, while 55% (82/150) reported no change in their physical health and 3% (5/150) reported an improvement in their physical health status (Figure 1).

Of those reporting a decline in physical health, one third (21/63) reported not leaving the house at all while cocooning, compared to 10% (9/87) of those who did not report a decline in physical health ($X^2 = 12.07$; $P = 0.001$).

Figure 3 demonstrates the changes in physical health parameters reported by participants while cocooning.

Almost 40% (59/150) reported a decline in their mobility since cocooning, with 8% (12/150) reporting their mobility was 'much worse'. Over one third (56/150) felt their physical fitness had declined and almost half (70/150) of participants reported lower energy levels since beginning cocooning. Almost one third (43/150) reported a decline in the quality of their sleep and one fifth (29/150) reported a worse diet.

Quality of life

Half of participants (75/150) reported a decline in their quality of life (QOL) while cocooning. Three percent (4/150) reported an improved QOL, while the remaining participants (71/150) noted no change in their QOL. Almost 10% (13/150) reported that their QOL was 'much worse' than prior to the pandemic (Figure 1).

QOL was more likely to decline in those who also reported a decline in mental health ($X^2 = 17.46$; $P < 0.001$) and physical health ($X^2 = 33.52$, $P < 0.001$) or who reported loneliness ($X^2 = 10.90$; $P = 0.001$). There was no association between poorer QOL and living alone ($X^2 = 1.39$; $P = 0.239$), family visiting less frequently ($X^2 = 1.32$; $P = 0.251$) or QOL and not leaving the house at all while cocooning ($X^2 = 0.67$; $P = 0.414$).

Attitudes to and compliance with COVID-19 restrictions

Over half (81/150) of participants reported seeing their family members less frequently since being advised to cocoon. Three percent (5/150) reported seeing their families more during this time.

One in five (30/150) reported not leaving their house at all since being advised to cocoon, while over 60% (92/150) left the

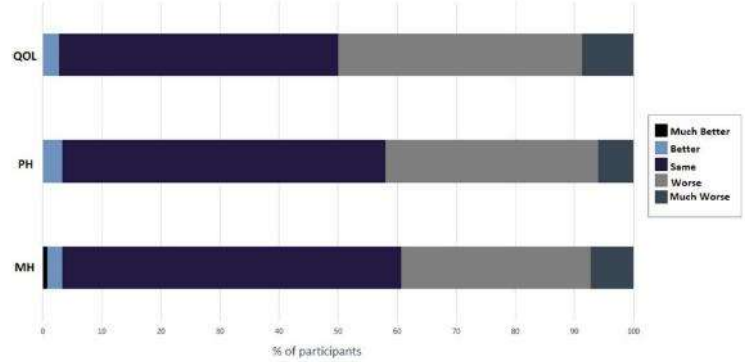

Figure 1. Self-reported trends in QOL, physical and mental health while cocooning. Notes: n = 150. Abbreviations: QOL, quality of life; PH, physical health and MH, mental health. Participants were asked: (1) How would you say your QOL has changed while you were cocooning? Is it Much better, better, Same/No Change, Worse or Much Worse? (2) In general, compared to before the pandemic, how would you say your physical health was while cocooning? Is it Much better, Better, Same/No Change, Worse or Much Worse? (3) In general, compared to before the pandemic, how would you say your mental heal was while cocooning? Is it Much better, Better, Same/No Change, Worse or Much Worse?

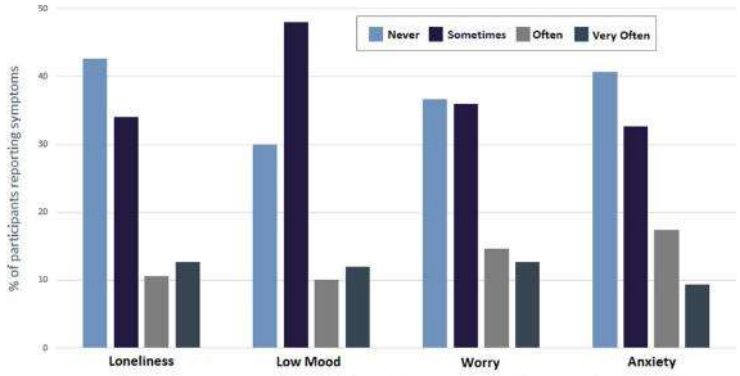

Figure 2. Reported prevalence of loneliness, low mood, worry and anxiety while cocooning. *Notes:* $n = 150$. Participants were asked: How would you say your mobility/fitness/energy levels/sleep/diet has changed while you were cocooning? Is it Much Better, Better, Same/No Change, Worse or Much Worse?

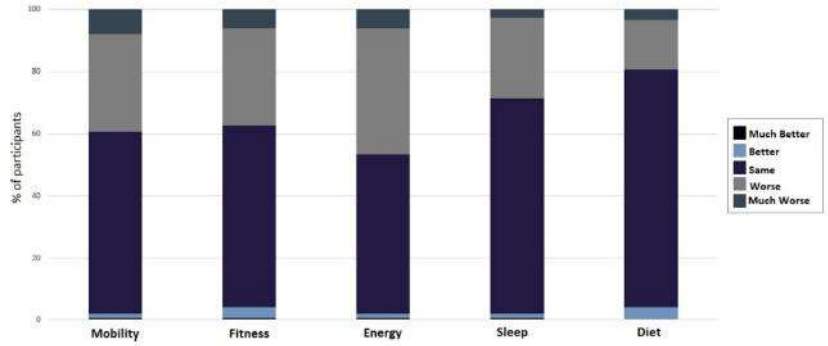

Figure 3. Self-reported change in physical health parameters while cocooning. *Notes:* $n = 150$. Participants were asked: How would you say your mobility/fitness/energy levels/sleep/diet has changed while you were cocooning? Is it Much Better, Better, Same/No Change, Worse or Much Worse?

house less often and a further one in five (28/150) reported leaving the house as frequently as before.

Over half (79/150) of participants reported not seeing friends or colleagues at all since being advised to cocoon, while a further 38% (57/150) saw friends less frequently. Less than 1 in 10 reported seeing friends as frequently as before.

One-quarter of participants (41/150) reported not exercising at all, 42% (63/150) reported exercising less frequently than before, 29% (43/150) reported exercising the same amount of time, while 2% (3/150) reported exercising more frequently while cocooning.

Over 60% (91/150) reported not using public transports at all, while one third (51/150) reported not doing grocery shopping at all since being advised to cocoon.

One quarter (39/150) of participants reported that they did not agree with the government advice regarding cocooning. Almost 17% (25/150) strongly agreed with cocooning, 44% (66/150) agreed and 13% (20/150) reported that they neither agreed nor disagreed with the government advice.

There was no association between reported loneliness ($X^2 = 1.99$; $P = 0.158$), decline in mental health ($X^2 = 0.07$; $P = 0.786$) or decline in physical health ($X^2 = 0.01$; $P = 0.941$) with the level of agreement with advice to cocoon. There was also no association between the frequency of times participants left the house while cocooning and reported agreement with cocooning advice ($X^2 = 0.25$; $P = 0.616$).

Over 40% (61/150) of participants reported that they disliked the term 'cocooning' however, while almost 10% (14/150) reported that they liked the term.

Over half (77/150) of participants were not in favor of 'virtual' clinics over the telephone or via video call, while one quarter (38/150) were in favor of such clinics.

Discussion

The study involved a convenience sample of older adults attending specialist ambulatory medical services who were not acutely unwell and examined changes in their physical and mental health while cocooning during the COVID-19 pandemic. We also explored the effect the pandemic has had on their access to healthcare, as well as the compliance to and attitudes toward COVID-19 restrictions amongst this cohort.

Self-reported mental health declined significantly while cocooning. We found that 2 in 5 participants reported a decline in their mental health overall, with 70% reporting low mood at least some of the time and 12% reporting low mood very often. Three in five participants reported loneliness and loneliness was twice as prevalent in those living alone than those living with spouses or other family members.

These findings are consistent with other studies demonstrating a decline in mental health amongst older people during the COVID-19 pandemic. In the UK Household Longitudinal Study, the prevalence of clinically significant mental distress rose from 11% to 18% from 2018–19, prior to the COVID-19 pandemic, to April 2020 amongst participants aged ≥70 years.[18] In Ireland, perceived stress amongst adults aged ≥60 years increased by 20% post-pandemic.[19] Pre-existing health conditions, high estimates of personal risk and time spent quarantining, all of which are more prevalent in those aged ≥ 70 years, appear to be independent risk factors for depression during the COVID-19 pandemic.[20,21]

Additionally, over 40% of participants reported a decline in their physical health while cocooning. Participants reporting a decline in physical health were three times more likely to also report not leaving the house at all since being advised to cocoon. Almost 40% of participants noted a decline in their mobility and 40% reported having lower levels of fitness while cocooning. Almost half of those surveyed reported lower energy levels and over one quarter reported poorer sleep while cocooning. Half of participants reported a decline in QOL.

Given the constraints imposed by cocooning on social interaction and physical activity, these findings are not necessarily surprising. Maintenance of social engagement is strongly associated with better self-reported health status and lower burden of depressive symptoms in later life[22] while physical activity is associated with better mental health,[23] QOL[24] and better health trajectories in general.[25] A period of 3 months detraining in older adults who previously exercised regularly is associated with a significant decline in standing balance, gait and QOL for example.[26]

Despite these poorer health trajectories while cocooning, over 60% of participants agreed with government advice regarding cocooning and there was a high degree of reported compliance with this advice, even amongst those who also reported declining physical or mental health. Worryingly, one in six participants also reported that they avoided seeking medical attention when unwell while cocooning, with concern regarding contracting COVID-19 or inability to access appropriate clinical pathways cited as common reasons.

There are some limitations to this study that should be noted. While participants were asked about health trajectories it is beyond the scope of the study to determine if decline in health status was directly related to cocooning or for other reasons but participants who were diagnosed with COVID-19 or those who were admitted to hospital during the COVID-19 pandemic were excluded. All participants were surveyed while in a healthcare setting, and responses regarding compliance with government advice and attitudes to COVID-19 restrictions must be interpreted in this context, as for example, it is possible that some may have been reluctant to report non-compliance in this context. Further, all measures of health are by self-report only and further studies with objective health measures would therefore be welcome. The strengths of this study include the fact that it involves a sample of older adults attending ambulatory medical services and therefore with relatively high rates of frailty and comorbid disease. Surveys were completed face-to-face, rather than online or virtually and to the authors knowledge, this is the first study conducted on a clinical sample of older adults who did not contract COVID-19 regarding health trajectories while cocooning or shielding.

These findings highlight the potential secondary impact of the COVID-19 pandemic on older people. While cocooning or shielding reduces the likelihood of older people contracting COVID-19, there may be important adverse impacts on the health of those who cocoon that need to be addressed. Given the likelihood of further waves of COVID-19 in coming months, with the possibility of further restrictions despite the rollout of vaccines, clear policies and advice for older people around strategies to maintain social engagement, manage loneliness, continue physical activity and avoid deferring the need for medical attention when unwell should be a priority, as well as a focus on provision of appropriate rehabilitation services for this cohort.

Supplementary material

Supplementary material is available at *QJMED* online.

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Conflict of interest: The authors have no conflicts of interest to declare.

References

1. Liu K, Chen Y, Lin R, Han K. Clinical features of COVID-19 in elderly patients: a comparison with young and middle-aged patients. *J Infect* 2020; **80**:e14–18.
2. Zazzara MB, Penfold RS, Roberts AL, Lee KA, Dooley H, Sudre CH, *et al*. Probable delirium is a presenting symptom of COVID-19 in frail, older adults: a cohort study of 322 hospitalised and 535 community-based older adults. *Age Ageing* 2021; **50**:40–8.
3. Kennelly B, O'Callaghan M, Coughlan D, Cullinan J, Doherty E, Glynn L, *et al*. The COVID-19 pandemic in Ireland: an overview of the health service and economic policy response. *Health Policy Technol* 2020; **9**:419–29.
4. Bonanad C, García-Blas S, Tarazona-Santabalbina F, Sanchis J, Bertomeu-González V, Fácila L, *et al*. The effect of age on mortality in patients with COVID-19: a meta-analysis with 611,583 subjects. *J Am Med Dir Assoc* 2020; **21**:915–8.
5. Donnelly SM. The elderly and COVID-19: cocooning or culling-the choice is ours. *QJM* 2020; **113**:453–4.
6. Armitage R, Nellums LB. COVID-19 and the consequences of isolating the elderly. *Lancet Public Health* 2020; **5**:e256.
7. Wang X, Du Z, Huang G, Pasco RF, Fox SJ, Galvani AP, *et al*. Cocooning is essential to relaxing social distancing. *medRxiv [Preprint]* 2020; 2020.05.03.20089920.

8. Wu B. Social isolation and loneliness among older adults in the context of COVID-19: a global challenge. *Glob Health Res Policy* 2020; **5**:27.
9. Choi H, Irwin MR, Cho HJ. Impact of social isolation on behavioral health in elderly: systematic review. *World J Psychiatr* 2015; **5**:432–8.
10. Taylor HO, Taylor RJ, Nguyen AW, Chatters L. Social isolation, depression, and psychological distress among older adults. *J Aging Health* 2018; **30**:229–46.
11. Schrempft S, Jackowska M, Hamer M, Steptoe A. Associations between social isolation, loneliness, and objective physical activity in older men and women. *BMC Public Health* 2019; **19**: 74.
12. Hämmig O. Health risks associated with social isolation in general and in young, middle and old age. *PLoS One* 2019; **14**: e0219663.
13. Steptoe A, Shankar A, Demakakos P, Wardle J. Social isolation, loneliness, and all-cause mortality in older men and women. *Proc Natl Acad Sci USA* 2013; **110**:5797–801.
14. de Rezende LF, Rey-López JP, Matsudo VK, do Carmo Luiz O. Sedentary behavior and health outcomes among older adults: a systematic review. *BMC Public Health* 2014; **14**:333.
15. Sala G, Jopp D, Gobet F, Ogawa M, Ishioka Y, Masui Y, *et al.* The impact of leisure activities on older adults' cognitive function, physical function, and mental health. *PLoS One* 2019; **14**:e0225006.
16. Zhang T, Liu C, Ni Z. Association of access to healthcare with self-assessed health and quality of life among old adults with chronic disease in China: urban versus rural populations. *Int J Environ Res Public Health* 2019; **16**:2592.
17. Rockwood K, Song X, MacKnight C, Bergman H, Hogan DB, McDowell I, *et al.* A global clinical measure of fitness and frailty in elderly people. *CMAJ* 2005; **173**:489–95.
18. Pierce M, Hope H, Ford T, Hatch S, Hotopf M, John A, *et al.* Mental health before and during the COVID-19 pandemic: a longitudinal probability sample survey of the UK population. *Lancet Psychiatr* 2020; **7**:883–92.
19. Ward M, Kenny RA. Perceived stress before and during the COVID-19 pandemic. *The Irish Longitudinal Study on Ageing Report*, 2020. Doi https://www.doi.org/10.38018/TildaRb.2020-03.
20. Wu T, Jia X, Shi H, Niu J, Yin X, Xie J, *et al.* Prevalence of mental health problems during the COVID-19 pandemic: a systematic review and meta-analysis. *J Affect Disord* 2021; **281**:91–8.
21. Shevlin M, McBride O, Murphy J, Miller JG, Hartman TK, Levita L, *et al.* Anxiety, depression, traumatic stress and COVID-19-related anxiety in the UK general population during the COVID-19 pandemic. *BJPsych Open* 2020; **6**:e125.
22. Hajek A, Brettschneider C, Mallon T, Ernst A, Mamone S, Wiese B, *et al.*, for the AgeCoDe Study Group. The impact of social engagement on health-related quality of life and depressive symptoms in old age–evidence from a multicenter prospective cohort study in Germany. *Health Qual Life Outcomes* 2017; **15**:140.
23. Maugeri G, Castrogiovanni P, Battaglia G, Pippi R, D'Agata V, Palma A, *et al.* The impact of physical activity on psychological health during COVID-19 pandemic in Italy. *Heliyon* 2020; **6**: e04315.
24. Ward M, McGarrigle CA, Kenny RA. More than health: quality of life trajectories among older adults-findings from The Irish Longitudinal Study of Ageing (TILDA). *Qual Life Res* 2019; **28**: 429–39.
25. Cunningham C, O' Sullivan R, Caserotti P, Tully MA. Consequences of physical inactivity in older adults: a systematic review of reviews and meta-analyses. *Scand J Med Sci Sports* 2020; **30**:816–27.
26. Esain I, Gil SM, Bidaurrazaga-Letona I, Rodriguez-Larrad A. Effects of 3 months of detraining on functional fitness and quality of life in older adults who regularly exercise. *Aging Clin Exp Res* 2019; **31**:503–10.

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Loneliness, physical activity, and mental health during COVID-19: a longitudinal analysis of depression and anxiety in adults over the age of 50 between 2015 and 2020

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ABSTRACT

Objective: Loneliness and physical activity are important targets for research into the impact of COVID-19 because they have established links with mental health, could be exacerbated by social distancing policies, and are potentially modifiable. In this study, we aimed to identify whether loneliness and physical activity were associated with worse mental health during a period of mandatory social distancing in the UK.

Design: Population-based observational cohort study.

Setting: Mental health data collected online during COVID-19 from an existing sample of adults aged 50 and over taking part in a longitudinal study of aging. All had comparable annual data collected between 2015 and 2019.

Participants: Three-thousand two-hundred and eighty-one participants aged 50 and over.

Measurements: Trajectories of depression (measured by PHQ-9) and anxiety (measured by GAD-7) between 2015 and 2020 were analyzed with respect to loneliness, physical activity levels, and a number of socioeconomic and demographic characteristics using zero-inflated negative binomial regression.

Results: In 2020, PHQ-9 score for loneliness, adjusted for covariates, was 3.23 (95% CI: 3.01–3.44), an increase of around 1 point on all previous years in this group and 2 points higher than people not rated lonely, whose score did not change in 2020 (1.22, 95% CI: 1.12–1.32). PHQ-9 was 2.60 (95% CI: 2.43–2.78) in people with decreased physical activity, an increase of .5 on previous years. In contrast, PHQ-9 in 2020 for people whose physical activity had not decreased was 1.66, 95% CI: 1.56 – 1.75, similar to previous years. A similar relationship was observed for GAD-7 though the absolute burden of symptoms lower.

Conclusion: After accounting for pre-COVID-19 trends, we show that experiencing loneliness and decreased physical activity are risk factors for worsening mental health during the pandemic. Our findings highlight the need to examine policies which target these potentially modifiable risk factors.

Key words: COVID-19, mental health, loneliness, physical activity, exercise, depression, anxiety, pandemic

Introduction

In order to contain and reduce the spread of COVID-19, the UK government introduced nationwide lockdown measures on March 23, 2020 which restricted time permitted outside and all nonessential in-person contact. Those with certain high-risk medical conditions were advised to "shield" (i.e. not leave the house for 12 weeks) and those aged 70 and over were advised to strictly adhere to the restrictions. The potential mental health impacts of this type of policy have been highlighted in a number of high-profile commentaries, with possible mechanisms including the pressures of lockdown, anxieties about infection and the knock-on economic consequences (Armitage and Nellums, 2020; Duan and Zhu, 2020; Galea et al., 2020; Gunnell *et al.*, 2020; Holmes *et al.*, 2020;

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Hwang *et al.*, 2020; Jeste, 2020; Pfefferbaum and North, 2020; Yao *et al.*, 2020). Previous research into mental health in the pandemic has largely focused on socioeconomic, demographic, and clinical comorbidities, with younger age, female gender, and low socioeconomic status being consistently associated with higher risk (COVID-19 Psychological Research Consortium (C19PRC), 2020; Frank *et al.*, 2020; McGinty *et al.*, 2020; Pierce *et al.*, 2020). While these links are undoubtedly important, research must also focus on potentially modifiable risk factors.

Loneliness and physical activity are critical mediators of mental health, and therefore warrant close consideration during the pandemic (Armitage and Nellums, 2020; Haskell *et al.*, 2009; Santini *et al.*, 2020). The pandemic may lead to low activity levels and exacerbate the relationship between loneliness and mental health in some (e.g. through social distancing and movement restrictions) and as such, they may represent modifiable targets for resilience and management programs (Treichler *et al.*, 2020). Specifically, there is evidence from other contexts that both loneliness and physical activity can be modified (Fakoya et al., 2020; Garcia-Hermoso *et al.*, 2020). The first step is understanding what links exist between loneliness, physical activity, and mental health during the pandemic. Longitudinal data covering the pre-pandemic and pandemic period is needed to address this key question. Three representatively sampled surveys (two USA and one UK) with data pre- and during the pandemic reported no significant changes in loneliness, but the interactions with the onset of the pandemic on mental health levels were not examined (Luchetti *et al.*, 2020; McGinty *et al.*, 2020; Office for National Statistics, 2020). Two cross-sectional studies have linked loneliness with worse mental health and psychological distress, and a third indicated that people with low social support (a possible proxy for loneliness) had a more severe trajectory of depression during the pandemic (Frank *et al.*, 2020; Frenkel-Yosef *et al.*, 2020; Killgore *et al.*, 2020). However without data prior to 2020, it is impossible to evaluate fully the specific importance of these factors during the pandemic. In particular, it will be important to understand whether these relationships reflect well-established links between loneliness and mental health or whether there was a specific effect of the pandemic. Though highlighted as important in commentaries, there has been little research into the links between physical activity and mental health; to our knowledge, the only published study used a cross-sectional design (Maugeri *et al.*, 2020).

To address the gap in research around the impact of loneliness and physical activity on mental health during COVID-19, we analyzed data from 3281 participants, all of whom had mental health data available from before the pandemic. We hypothesized that trajectories of depressive and anxiety symptoms in people who were lonely or whose physical activity had decreased during the pandemic would be adversely affected. In addition, we also examined a number of other demographic and socioeconomic variables on mental health trajectories.

Method

Study design and setting

The study was conducted with participants from the PROTECT study. PROTECT is a longitudinal study of mental and cognitive health, with annual assessment, in people over the age of 50 on enrollment which was launched in November 2015 (http://www.protectstudy.org.uk/) (Creese *et al.*, 2019). In April 2020, there were 24,030 people enrolled in PROTECT. Written informed consent was obtained online from all participants.

On May 13, 2020, around 4.5 years after PROTECT started, a specific COVID-19 mental health questionnaire was launched in PROTECT, again completed online. All 24,030 participants were invited by email to complete the COVID-19 questionnaire and taking part was voluntary. Here, we present an analysis of data collected between May 13 and June 8, 2020, combined with existing data from previous years.

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. All procedures involving human subjects/patients were approved by the UK London Bridge National Research Ethics Committee (Ref: 13/LO/1578) and the COVID-19 mental health questionnaire was approved by the same committee (as an amendment) on April 6, 2020.

Participants

The PROTECT cohort includes people aged 50 or over at enrollment living in the UK. Additional inclusion criteria are access to a computer and internet, able to read and write English, and no diagnosis of dementia. All participants who opted in to receive study communications were invited to complete the COVID-19 mental health questionnaire.

Variables

The principal outcome measures for this study were PHQ-9 and GAD-7 scores (measuring depression and anxiety, respectively). These were recorded pre-pandemic (2015–2019) as part of the main

PROTECT study, and during the pandemic (2020) as part of the COVID-19 mental health questionnaire.

PROTECT pre-pandemic data collection 2015–2019

Before the pandemic, all participants completed a series of online self-report questionnaires, which included demographic information (date of birth [in this study, age in 2020 was used], gender, highest level of education [left school at 16, left school at 18, undergraduate degree, postgraduate degree], employment status [full-time, part-time, self-employed, retired, unemployed], marital status [married/civil partnership/cohabiting, widowed/divorced/separated, single], and history of psychiatric and physical illness). In addition, mental health assessments by PHQ-9 and GAD-7 were completed annually prior to the pandemic.

Depression was assessed with the PHQ-9, a 9-item questionnaire, which assesses the frequency of depressive symptoms over a 2-week window (Kroenke *et al.*, 2001). Each item is rated on a 4-point scale (0 = not at all; 1 = several days; 2 = more than half the days; 3 = nearly every day) and a total score (maximum 27) is obtained by adding the nine items. Anxiety was assessed with the GAD-7, a 7-item questionnaire assessing the frequency of anxiety symptoms over a 2-week window (Spitzer *et al.*, 2006). The ratings are the same as PHQ-9, with the maximum total score being 21 (7 × 3). For both scales, a threshold of 5 or above on the total score is indicative of mild symptoms and 10 or above is indicative of moderate or severe symptoms.

Participants completed up to four annual GAD-7 and PHQ-9 assessments spread over 5 years between 2015 and 2019 (depending on enrollment date). Enrollment to PROTECT is open continuously and started with a national publicity drive in October and November 2015, and as a result, the majority of current participants enrolled in those 2 months. For those who completed the COVID-19 mental health questionnaire, this figure was 1930 (59%). After the initial wave of enrollment, 405, 382, 338, and 18 enrolled in 2016, and in 2017, 2018, and 2019, respectively. Thus, most completed annual assessments between October and January of each year. PROTECT pre-pandemic data was available from a data freeze in early October 2019.

Data collected during COVID-19 (May 13–June 8, 2020)

The following information was collected during the pandemic.

Symptoms of COVID-19 infection

Participants were asked whether they had any of the main symptoms of COVID-19 in the last 2 weeks (which at the time were a new persistent cough for more than 24 h or a high temperature) or if they had been hospitalized with COVID-19 in the last 4 weeks.

Physical activity changes

Participants were asked about changes in their physical activity since March 2020. The data were categorized to identify people who reported a decrease in their level of physical activity and those who did not.

Physical illnesses

Participants were asked if they had any of the following conditions associated with moderately increased risk of severe illness from coronavirus: long-term respiratory illness, chronic heart disease, chronic kidney disease, liver disease, neurological disease, diabetes, illness affecting the spleen, weakened immune system, or BMI $\geq$ 40. They were also asked if they had any of the following conditions, which would require them to shield (high risk of severe illness from coronavirus): received an organ transplant and remain on ongoing immunosuppression medication, undergoing active chemotherapy or radiotherapy, cancer of the blood or bone marrow who are at any stage of treatment, severe chest conditions such as cystic fibrosis or severe asthma (requiring hospital admissions or course of steroid tablets), severe diseases of body systems. People were also asked if they had received a letter advising them to shield and if they answered yes, they were included in the high-risk group. These physical conditions were coded 0 (no relevant conditions); 1 (moderate-risk conditions); and 2 (high-risk conditions).

Loneliness

Loneliness was assessed using the 3-item UCLA loneliness scale (Hughes *et al.*, 2004). The questions ask how often the participant has felt a lack of companionship, left out, and isolated from others with the possible answers being "hardly ever", "some of the time", and "often". Loneliness was treated as binary for this analysis, dichotomized into those experiencing any loneliness (i.e. rating at least "some of the time" on any question) and those experiencing none.

Finances

Participants were asked to respond yes or no to the question "Has the COVID-19 (coronavirus) pandemic had a negative impact on your finances?"

Statistical methods

The statistical analyses were carried out in two stages.

In the full cohort, we first undertook a case-level analysis of PHQ-9 and GAD-7 rated in 2020 during the pandemic, categorizing both into a three-level factor (see above for cutoffs) representing no, mild, and moderate-to-severe symptoms. Differences in the proportions of current depression and anxiety levels by risk factor were analyzed using the χ^2 test. We then undertook a descriptive analysis of the change in case-level proportions between 2019 and 2020.

For the second and principal analysis, we examined trajectories of PHQ-9 and GAD-7 between October 2015 (the start of the PROTECT study) and June 8, 2020. Initial analysis of PHQ-9 and GAD-7 total scores using linear mixed-effects models showed evidence of departure from the assumption of normally distributed residuals (see supplement). This could not be rectified by transformations and instead, we considered models for counts of symptoms. A zero-inflated negative binomial regression (ZINB) was chosen for each scale due to over-dispersion and evidence of excess zeros. ZINB models use a mixture model approach in which the population is assumed to consist of an at-risk subgroup, and a subgroup not at risk for PHQ-9 and GAD-7 symptoms during the study period (the source of the excess zeros). The model is comprised of two components: the first accounts for the distribution of symptoms in the at-risk population (negative binomial component) and the second is a logit model accounting for factors associated with membership of the non-risk subpopulation (zero-inflated component). A random intercept term was included to allow for correlations between repeated measurements on the same individual.

First, separate ZINB models were run for both PHQ-9 and GAD-7 for each individual risk factor (i.e. loneliness and physical activity, as well as the following socioeconomic variables: age group [under 70 and 70 and over], gender, psychiatric diagnosis history, education level, employment status, marital status, negative financial impact of the pandemic, and risk medical condition). Education, employment status, and marital status were all dummy coded. Linear and quadratic terms for time since study start and a 2020 indicator variable were added to estimate the effect of the pandemic on PHQ-9 and GAD-7 scores after removing any background trend in previous years. The zero-inflated components of the models did not include an interaction term between each risk factor and the year 2020 because models were not significantly improved by including one. Therefore, the zero-inflated component did not tell us anything specific about the effect of 2020 so for simplicity they are not reported here. Incidence rate ratios (IRR) were calculated to illustrate the incremental effect on PHQ-9 and GAD-7 scores of each risk factor in 2020 relative to those without the risk factor.

All statistically significant variables were included in the final adjusted model to assess which risk factors were independently associated with PHQ-9 and GAD-7. Predicted values from the adjusted final model were obtained and plotted for year 0 (study start, October 2015), 1 year, 2 years, and 3 years after study start, and during the pandemic (i.e. ~4.5 years after study start).

Of the 3281 people who completed the COVID-19 mental health questionnaire in 2020, 2238 had 4 previous data points; 566 had 3; 415 had 2; and 62 had 1 (Figure 1). The distribution of assessment by month in each year is shown in the supplement.

Statistical analysis was undertaken in the R software environment for statistical computing. Longitudinal zero-inflated negative binomial regression models were fitted using the package glmmTMB (https://github.com/glmmTMB/glmmTMB).

Role of the funding source

The funder had no role in any part of the project. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Results

Participants

In total, 3281 people completed the COVID-19 mental health questionnaire, 542 of these either joined PROTECT in May/June 2020 specifically to do the COVID-19 element or they joined PROTECT after the October 2019 data freeze so there was no pre-pandemic data available for this analysis. These were excluded, but there were no major differences in characteristics between the 3281 used in this analysis and the 542 excluded (see supplement). The characteristics of the sample analyzed are described in Table 1. The mean age in 2020 was 67 (standard deviation 6.5, range 55–96), around one-third had an undergraduate level education, 80% were female and 98% were White (because of the very low numbers of other ethnicities, ethnicity was not considered further in the analysis). These figures are similar to the wider 25,000 PROTECT study sample (Creese *et al.*, 2019). Twenty-six (.7%) people reported having a new continuous cough or high temperature in the last 2 weeks, a similar proportion (1%) reported a family member with these symptoms. One person in

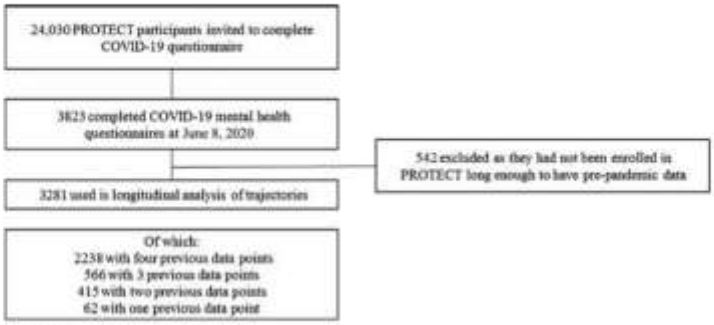

Figure 1. Consort chart.

Table 1. Demographics characteristics for the whole sample

	TOTAL	%
Age group		
70 and over	1001	30
Under 70	2280	70
Gender		
Female	2610	80
Male	671	20
Marital status		
Married/civil partnership/cohabiting	2421	74
Widow/separated/divorce	615	19
Single	245	7
Education		
School–16	400	12
16–18	1006	31
Undergrad	1142	35
Postgrad	733	22
Employment		
Employed (full-time)	509	16
Employed (part-time)	569	17
Self-employed	280	9
Retired	1847	56
Unemployed	76	2
Lifetime history of any psychiatric illness		
No	2134	65
Yes	1147	35

the sample had been hospitalized with COVID-19 in the last 4 weeks.

Risk factors and trajectories

Case-level analysis

In the cross-sectional pandemic data, every variable except education level was associated with higher proportions of mild and moderate-to-severe depressive and anxiety symptoms (see supplement for proportions). Mild and moderate-to-severe anxiety cases were generally less common. All variables except education level and marital status were associated with higher proportions of anxiety cases.

We then compared case-level differences in 2019 with 2020. Overall, case-level estimates for moderate-to-severe symptoms were comparable across the 2 years. One-hundred and eighty-five (5.6%, 95% CI: 4.9–6.4) and 89 (2.7% 95% CI: 2.2–3.3) of 3281 people in 2020 had a PHQ-9 score of ≥ 10 and a GAD-7 score of ≥ 10, respectively. This is compared with 124 (4.1%, 95% CI: 3.5–5) and 66 (2.2%, 95% CI: 1.8–2.8), respectively, with moderate-to-severe symptoms in 2019 ($n = 2959$). There was a more pronounced difference in mild symptoms. In 2020, 634 (19%, 95% CI: 18–20.7) had mild depressive symptoms compared with 392 (13.2%, 95% CI: 12.1–14.5) in 2019. Similarly, 415 people had mild anxiety symptoms in 2020 (12.6%, 95% CI: 11.6–13.8) compared with 276 in 2019 (9.3%, 95% CI: 8.3–10.4).

Trajectories of PHQ-9 and GAD-7 scores

The results from the ZINB models for each individual risk factor are shown in supplementary data. Loneliness, decreased physical activity, being a woman, and being retired were all associated with significant worsening of depressive symptoms in 2020. Similarly, loneliness, decreased physical activity, and being a woman were also associated with worsening GAD-7 scores in 2020. Not being in full-time employment was associated with a greater worsening of GAD-7 score relative to being full-time employed. Both those with a psychiatric history and those without experienced worsening symptoms during the pandemic, but the change was relatively higher in the no history group. The absolute GAD-7 score for people with a psychiatric diagnosis was

Table 2. Adjusted negative binomial regression component of ZINB models of PHQ-9 and GAD-7. Regression coefficients represent the effect of the 2020 indicator variable on scores (rows in bold) and the interaction between each risk factor and the 2020 indicator (all other rows)

	PHQ-9			
RISK FACTOR	IRR	L 95% CI	U 95% CI	P
Year 2020	**.97**	**.88**	**1.08**	**.64**
Loneliness*Year 2020	1.29	1.21	1.38	<.0001
Activity level decreased*Year 2020	1.15	1.08	1.22	<.0001
Women*Year 2020	1.13	1.04	1.23	.004
Retired*Year 2020	1.11	1.04	1.17	.001
		GAD-7		
Year 2020	**1.24**	**1.08**	**1.43**	**.003**
Loneliness*Year 2020	1.37	1.25	1.50	<.0001
Activity level decreased*Year 2020	1.20	1.10	1.30	<.0001
Women*Year 2020	1.22	1.09	1.36	.0004
Full-time employed*Year 2020	.88	.78	.98	.02
History of psychiatric condition*Year 2020	.85	.78	.92	<.0001

Abbreviations: ZINB, zero-inflated negative binomial regression; IRR, incidence rate ratio.

consistently higher throughout the entire study period.

For the final adjusted model of PHQ-9 trajectory, loneliness, activity level, gender, and retirement status were all included as covariates. For the GAD-7 adjusted model, loneliness, physical activity, gender, full-time employment status, and history of the psychiatric condition were included as covariates.

Results from the adjusted models are shown in Table 2 and predicted adjusted PHQ-9 and GAD-7 scores for each time point are provided in full in the supplement along with their 95% confidence intervals, plots of these predicted values for loneliness and physical activity are shown in Figures 2 and 3.

Loneliness

In 2020, the difference in PHQ-9 scores between the lonely and the not lonely groups was 29% greater than in previous years (IRR = 1.29, 95% CI: 1.21–1.38, $p < .0001$). Prior to 2020, people rated as lonely scored approximately 1 point higher than those rated not lonely (Figure 2). In 2020 (4.5 years after study start), the difference between the two groups was ~2 points (Cohen's $d = .42$), with PHQ-9 score increasing to 3.23 (95% CI: 3.01–3.44) among those who reported loneliness and remaining stable (1.22, 95% CI: 1.12–1.32) for those not reporting loneliness. In other words, about 50% of the difference in PHQ-9 score between loneliness and no loneliness during the pandemic was accounted for by the general higher burden of symptoms associated with being lonely. For context, this means that in 2020, people who were lonely reported either a new PHQ-9 symptom for several days of the last 2 weeks or a worsening of an existing symptom to more than half the days in the last 2 weeks.

For GAD-7, in 2020, symptoms were 37% worse in those who rated as lonely relative to the not lonely group, than in previous years (IRR = 1.37, 95% CI: 1.25–1.50, $p < .0001$). Among those with no loneliness, GAD-7 total score was .5 across all years (Figure 3). For those with loneliness, GAD-7 score was .5 higher (at around 1) in years prior to 2020 compared to the not lonely group, but in 2020, the score increased to 1.55 (95% CI: 1.43–1.67, Cohen's $d = .23$). Again, the pandemic accounted for around 50% of the difference in GAD-7 scores attributable to loneliness in 2020.

Physical activity

In 2020, the differences in PHQ-9 and GAD-7 scores between those with decreased physical activity and those without were 15% and 20% higher than in previous years (IRR = 1.15, 95% CI: 1.08–1.22, $p < .0001$ and IRR = 1.20, 95% CI: 1.10–1.30, $p < .0001$, respectively). The general trajectory of PHQ-9 and the difference in scores between those reporting a decrease in physical activity, and those not, was similar to loneliness, although the absolute scores were smaller (Figure 2). That is, there was around a .5 point difference in the years prior to 2020 and 1 point difference in 2020 (decreased physical activity: 2.60, 95% CI: 2.43–2.78, no decrease: 1.66, 95% CI: 1.56–1.75, Cohen's $d = .37$). Similar to loneliness again, GAD-7 score was modestly higher for people with decreased physical activity in the years prior to 2020 (Figure 3). However, in 2020, GAD-7 score increased to 1.17 (95% CI 1.06–1.27) among those reporting decreased physical activity, which compares with .83 for those with no decrease in physical activity (95% CI: .76–.89), a Cohen's d of .14.

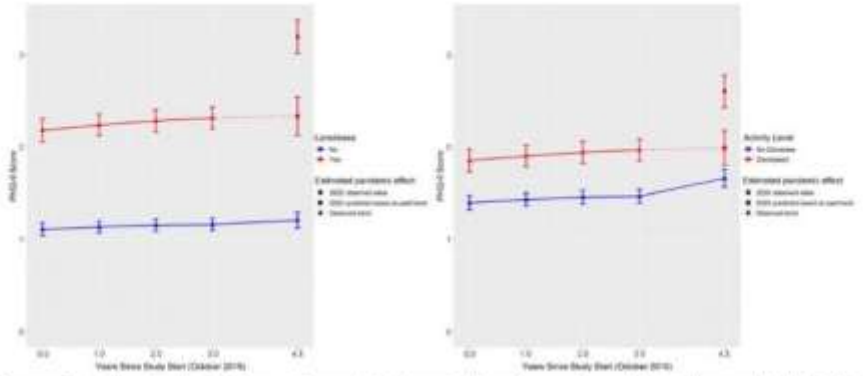

Figure 2. Trajectories of predicted PHQ-9 scores from zero-inflated negative binomial regression models for loneliness and physical activity. Error bars are 95% confidence intervals.

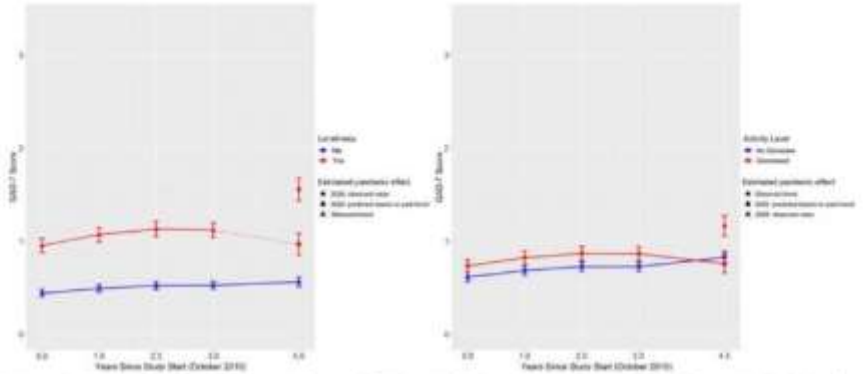

Figure 3. Trajectories of predicted GAD-7 scores from zero-inflated negative binomial regression models for loneliness and physical activity. Error bars are 95% confidence intervals.

Gender, employment status, and psychiatric history

In 2020, the differences in PHQ-9 score between women and men and being retired and not retried were greater than in previous years (IRR = 1.13, 95% CI: 1.04–1.23, $p = .004$; IRR = 1.11, 95% CI: 1.04–1.17, $p = .001$). Similarly, the difference in GAD-7 scores between women and men was also greater in 2020 than in previous years (IRR = 1.22, 95% CI: 1.09–1.36, $p = .0004$). Having a history of a psychiatric condition was associated with a relatively lesser increase in GAD-7 score in 2020 compared to those without a history of psychiatric diagnosis (IRR = .85, 95% CI: .78 – .92, $p < .0001$). The absolute GAD-7 score for people with a psychiatric history was higher in 2020 and all years prior than those without (1.49 [95% CI: 1.36–1.63] vs .72 [95% CI: .67–.78], see supplement). Similarly, full-time employment was associated with a more stable GAD-7 score, with a relative worsening in 2020 observed for those not in full-time employment, although the absolute values of PHQ-9 and

GAD-7 were higher for people in full-time employment (IRR = .88, 95% CI: .78–.98, $p = .02$, see supplement) (Table 2).

Discussion

To our knowledge, this is the first longitudinal study to focus specifically on the links between loneliness, physical activity, and mental health during the COVID-19 pandemic with longitudinal data also pertaining to pre-pandemic mental health. Overall, in a cohort aged between 55 and 96, there was an increase in the proportion of people with mild depressive symptoms from 13.2% in 2019 to 19% in 2020 and an increase in the proportion of people with mild anxiety symptoms (from 9.3% to 12.6%). The proportions of people with moderate-to-severe symptoms were comparable. Both loneliness and decreased physical activity were associated with worse mental health in 2020 compared to previous years. This suggests that the association observed in 2020 was not solely due to a longer standing relationship between current loneliness, physical activity, and mental health before 2020, overcoming an important limitation of previous cross-sectional studies with a measurement taken only during the pandemic (Frenkel-Yosef *et al.*, 2020). Our data also show that the impact of the pandemic on mental health would have been overestimated without the longitudinal perspective, bringing new insight to these established mental health risk factors and in line with other recent findings (Banks and Xu, 2020).

Around half of the sample reported some degree of loneliness during the pandemic. Loneliness was associated with a 1 point higher score on the PHQ-9 between 2015 and 2019 compared to people who did not report loneliness, but this difference doubled to 2 points during the pandemic. In contrast, there was no worsening of mental health symptoms for people who did not report loneliness. Over one-third of the sample reported decreased physical activity during the pandemic. The effect on PHQ-9 scores was more modest than that of loneliness, but was nevertheless associated with a worsening of symptoms. There were also statistically significant increases in GAD-7 scores for both loneliness and decreased physical activity though the absolute scores were smaller than for PHQ-9. For context, the increases in PHQ-9 can be interpreted as the emergence of a new symptom, or an existing symptom increasing in frequency to more than half the days in the last 2 weeks. This is a relatively modest increase, but an important observation given the established links between loneliness, physical activity, and mental health and given that it occurred within only the first 2 months of the UK lockdown. More longitudinal data through the later stages of the pandemic will help elucidate whether this upward trend is sustained or whether symptoms resolve. Collectively, these findings emphasize the potential impact of finding novel solutions to tackle loneliness and decreased physical activity during the pandemic and underscore the important general relationship between the two and mental health (Age UK, no date; Haskell *et al.*, 2009; Killgore *et al.*, 2020).

Of the socioeconomic and demographic variables analyzed, both being a woman, being retired, and not being full-time employed were associated with pandemic-specific worsening in mental health, in line with the previous UK representatively sampled studies (Fancourt *et al.*, 2020; Pierce *et al.*, 2020). While our data do not show any increase in mental health symptoms related to the pandemic having a negative financial impact, we believe it would be premature to rule out an effect of this variable on mental health; first because the economic impact of the pandemic has not yet fully taken hold and second because we note other large representative surveys have reported clear links (Frank *et al.*, 2020; Pierce *et al.*, 2020). Finally, similar to other studies, we found no evidence that having a medical condition, which is associated with increased risk of severe COVID-19 was associated with worsening symptoms of depression and anxiety (Pierce *et al.*, 2020).

Limitations

One important limitation is the potential for bias in an on-line self-selecting sample. In particular, we note the overrepresentation of women, White British people, and those with a higher education, which means our findings may not be generalizable. However, because our analysis is focused on longitudinal patterns rather than prevalence, there is still merit in identifying these trends within this sample. The second limitation is determining causation, a pervasive issue in observational studies. Because the loneliness and physical activity questions were only asked during the pandemic, it may be the case that worse mental health drove a decrease in physical activity and an increase in loneliness. The wider literature has highlighted a causal relationship between higher physical activity levels and lower risk for major depressive disorder (but no causal relationship for the reverse) so in the context of this evidence, it would be reasonable to hypothesize that maintaining physical activity during the pandemic may mitigate the risk of mental health deterioration (Choi *et al.*, 2019). A large randomized control trial would be needed to assess this but our findings pave the way for robust intervention testing. We are not aware of any studies, which have

conclusively shown a causal directional link between loneliness and mental health, but the well-established link between the two is one of the reasons why loneliness is a critical policy area in the UK and internationally. Here, we are able to show that for the first time that the association between loneliness and worse mental health is not solely due to those who are currently lonely having long-standing worse mental health; there is a specific effect of 2020 in this sample, which is an important advance over previous cross-sectional studies. The effect of the pandemic was modeled by an interaction term between loneliness and the year 2020 and we modeled the 2020 trend without the interaction term to show what a continuation of the trend of past years may look like. We have, therefore, concluded that the increase we observed in 2020 is attributable to the pandemic. We would argue this is a reasonable conclusion given that our 4 years of measurements prior to the pandemic show symptoms to be generally flat. However, we cannot rule out that there may also be other factors influencing mental health changes which we could not measure, longer term data through the later phases of the pandemic will help answer this question.

In conclusion, in this large longitudinally studied sample exploring mental health effects of the COVID-19 pandemic in middle-aged and older people in the UK, we found that loneliness and decreased physical activity were both associated with worse mental health and that this was distinct from the general relationship between these two risk factors and poor mental health. Our study provides robust evidence in support of targeted interventions – which may include resilience training, physical activity, or strategies to reduce loneliness – to improve the mental health of people in mid to late life in the subsequent waves of the pandemic.

Conflict of interests

The authors declare no competing interests. The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR, or the Department of Health and Social Care or Public Health England.

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Description of authors' roles

BC: design, analysis, figures, literature search, data collection, interpretation, drafting, review; ZK: design, funding, analysis, manuscript drafting, and review; WH: statistical analysis and data visualization, manuscript review; SOD: design, manuscript drafting, and review; AC: data collection; MVS: funding, data collection; KM: literature search; NW: design, manuscript drafting, and review; IT: design, funding, manuscript drafting, and review; DA: design, funding, manuscript drafting, and review; CB: design, funding, manuscript drafting, and review.

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Supplementary material

To view supplementary material for this article, please visit https://doi.org/10.1017/S1041610220004135.

References

Age UK. (no date). *Loneliness and Isolation Evidence Review.*

Armitage, R. and Nellums, L. B. (2020). COVID-19 and the consequences of isolating the elderly. *The Lancet Public Health*, 5(5), e256. https://doi.org/10.1016/S2468-2667(20)30061-X

Banks, J. and Xu, X. (2020). The mental health effects of the first two months of lockdown and social distancing during the Covid-19 pandemic in the UK. IFS Working Paper W20/16.

Choi, K. W. et al. (2019). Assessment of bidirectional relationships between physical activity and depression among adults: a 2-sample mendelian randomization study. *JAMA Psychiatry*, 76(4), 399–408. https://doi.org/10.1001/jamapsychiatry.2018.4175

COVID-19 Psychological Research Consortium (C19PRC). (2020). Initial Research Findings on COVID-19 and Mental Health in the UK. University of Sheffield and University of Ulster.

Creese, B. et al. (2019). Mild behavioral impairment as a marker of cognitive decline in cognitively normal older adults. *American Journal of Geriatric Psychiatry*, 27(8), 823–834. https://doi.org/10.1016/j.jagp.2019.01.215

Duan, L. and Zhu, G. (2020). Psychological interventions for people affected by the COVID-19 epidemic. *The Lancet Psychiatry*, 7(4), 300–302. https://doi.org/10.1016/S2215-0366(20)30073-0

Fakoya, O. A., McCorry, N. K. and Donnelly, M. (2020). Loneliness and social isolation interventions for older adults: a scoping review of reviews. *BMC Public Health*, 20(1), 129. https://doi.org/10.1186/s12889-020-8251-6

Fancourt, D. et al. (2020). *Covid-19 Social Study: Results Release 16*.

Frank, P. et al. (2020). Trajectories of depressive symptoms among vulnerable groups in the UK during the COVID-19 pandemic. *medRxiv*, 2020.06.09.20126300. https://doi.org/10.1101/2020.06.09.20126300

Frenkel-Yosef, M., Maytles, R. and Shrira, A. (2020). Loneliness and its concomitants among older adults during the COVID-19 pandemic. *International Psychogeriatrics*, 32(10), 1257–1259. https://doi.org/10.1017/S1041610220003476

Galea, S., Merchant, R. M. and Lurie, N. (2020). The mental health consequences of COVID-19 and physical distancing: the need for prevention and early intervention. *JAMA Internal Medicine*, 180(6), 817–818. https://doi.org/10.1001/jamainternmed.2020.1562

Garcia-Hermoso, A. et al. (2020). Safety and effectiveness of long-term exercise interventions in older adults: a systematic review and meta-analysis of randomized controlled trials. *Sports Medicine*, 50(6), 1095–1106. https://doi.org/10.1007/s40279-020-01259-y

Gunnell, D. et al. (2020). Suicide risk and prevention during the COVID-19 pandemic. *The Lancet Psychiatry*, 7(6), 468–471. https://doi.org/10.1016/S2215-0366(20)30171-1

Haskell, W. L., Blair, S. N. and Hill, J. O. (2009). Physical activity: health outcomes and importance for public health policy. *Preventive Medicine*, 49(4), 280–282. https://doi.org/10.1016/j.ypmed.2009.05.002

Holmes, E. A. et al. (2020). Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. *The Lancet Psychiatry*, 7(6), 547–560. Elsevier. https://doi.org/10.1016/S2215-0366(20)30168-1

Hughes, M. E. et al. (2004). A short scale for measuring loneliness in large surveys: results from two population-based studies. *Research on Aging*, 26(6), 655–672. https://doi.org/10.1177/0164027504268574

Hwang, T.-J. et al. (2020). Loneliness and social isolation during the COVID-19 pandemic. *International Psychogeriatrics*, 32(10), 1217–1220. https://doi.org/10.1017/S1041610220000988

Jeste, D. V. (2020). Coronavirus, social distancing, and global geriatric mental health crisis: opportunities for promoting wisdom and resilience amid a pandemic. *International Psychogeriatrics*, 32(10), 1097–1099. https://doi.org/10.1017/S104161022000366X

Killgore, W. D. S. et al. (2020). Loneliness: a signature mental health concern in the era of COVID-19. *Psychiatry Research*, 290, 113117. https://doi.org/10.1016/j.psychres.2020.113117

Kroenke, K., Spitzer, R. L. and Williams, J. B. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of General Internal Medicine*, 16(9), 606–613. https://doi.org/10.1046/j.1525-1497.2001.016009606.x

Luchetti, M. et al. (2020). The trajectory of loneliness in response to COVID-19. *The American Psychologist*, 75(7), 897–908. United States. https://doi.org/10.1037/amp0000690

Maugeri, G. et al. (2020). The impact of physical activity on psychological health during Covid-19 pandemic in Italy. *Heliyon*, 6(6), e04315–e04315. https://doi.org/10.1016/j.heliyon.2020.e04315

McGinty, E. E. et al. (2020). Psychological distress and loneliness reported by US adults in 2018 and April 2020. *JAMA*, 324(1), 93–94. https://doi.org/10.1001/jama.2020.9740

Office for National Statistics. (2020). Coronavirus and loneliness, Great Britain: 3 April to 3 May 2020.

Pfefferbaum, B. and North, C. S. (2020). Mental health and the Covid-19 pandemic. *New England Journal of Medicine*. https://doi.org/10.1056/NEJMp2008017

Pierce, M. et al. (2020). Mental health before and during the COVID-19 pandemic: a longitudinal probability sample survey of the UK population. *The Lancet Psychiatry*, 7(10), 883–892. https://doi.org/10.1016/S2215-0366(20)30308-4

Santini, Z. I. et al. (2020). Social disconnectedness, perceived isolation, and symptoms of depression and anxiety among older Americans (NSHAP): a longitudinal mediation analysis. *The Lancet Public Health*, 5(1), e62–e70. https://doi.org/10.1016/S2468-2667(19)30230-0

Spitzer, R. L. et al. (2006). A brief measure for assessing generalized anxiety disorder: the GAD-7. *Archives of Internal Medicine*, 166(10), 1092–1097. https://doi.org/10.1001/archinte.166.10.1092

Treichler, E. B. H. et al. (2020). A pragmatic trial of a group intervention in senior housing communities to increase resilience. *International Psychogeriatrics*, 32(2), 173–182. https://doi.org/10.1017/S1041610219002096

Yao, H., Chen, J.-H. and Xu, Y.-F. (2020). Patients with mental health disorders in the COVID-19 epidemic. *The Lancet Psychiatry*, 7(4), e21. https://doi.org/10.1016/S2215-0366(20)30090-0

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Physical activity, resilience, emotions, moods, and weight control of older adults during the COVID-19 global crisis

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Abstract

Background: The main purpose of the research was to examine the differences between adults in the age group 70+ and two other age groups (45–59 and 60–69), concerning their healthy and active lifestyle. The death toll of the current COVID-19 pandemic is strongly biased toward the elderly. However, some studies of crises suggest that older adults tend to perceive events as less stressful than do younger people. Therefore, we examined healthy behavior in populations at risk according to the age cutoff points used by the Ministry of Health at the time of vaccination, and divided the participants into three age groups (45–59, 60–69, and 70+) following health organizations' recommendations.

Methods: Participants were 1202 people, 381 males and 821 females, aged 45–90. A survey comprised of six parts was used: Demographic background, the International Physical Activity Questionnaire–short version, Positive and Negative Affect Schedule – PANAS, the Connor and Davidson Resilience Scale, a questionnaire for measuring depressive moods, and questions regarding weight change, based on the Israeli National Health and Nutrition (MABAT) survey. Data were collected in Israel during the first complete lockdown. The questionnaire was distributed via e-mail, WhatsApp, Twitter, and Facebook using a snowball sampling method.

Results: Resilience and negative feelings and depression symptoms were higher in age group 45–59 compared to 70+ year-old participants, and the depression symptoms score was also higher among participants aged 45–59 compared to ages 60–69. Physical activity was associated with higher resilience, fewer depression symptoms, and fewer negative emotions. Regarding gender and psychological variables, no differences were found. During the time of lockdown, weight change was not prevalent and sleeping hours increased.

Conclusion: In adults at 70+, the physical activity level, physical activity before and during the lockdown, emotions, sleeping hours, and weight change were similar to the other adult groups that were examined (45–59 and 60–69). However, in the older adults groups (70+ and 60–69), resilience and depression symptoms were lower than in the youngest age group.

Keywords: Healthy behavior, COVID-19, Resilience, Depression symptoms

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Introduction

The global outbreak of the COVID-19 plague in early 2020 has paralyzed the entire world. The sudden and rapid spread of the pandemic has shattered the normality of daily life, with a long-term impact that has yet to be assessed [1]. Governments' response efforts have been directed at restraining the transmission of the virus, and lockdowns were imposed. Universities, colleges, and entire education systems, in addition to many work places, transitioned to online activity instead of physical presence. Businesses, public places, restaurants, and parks were shut down. Flights were suspended, airports and borders were closed. These restrictions were aimed at ensuring social distancing, limiting the movement of the population, and curtailing the effect of the pandemic. Although this strategy was reported to be effective for decelerating the COVID-19 outbreak, the subsequent quarantine was also reported as being associated with harmful implications to society [2, 3]. This unique phenomenon has never occurred/been observed before; therefore, the extent of its implications on a variety of aspects of life is still unknown.

A recent review on the psychological impact of quarantine as a result of past epidemic disease outbreaks, such as Ebola, SARS, H1N1, and equine influenza, showed that the psychological health and well-being of people who were forced to go through periods of isolation were negatively affected [4]. Following this line of research, investigators in European countries such as Italy [5], Switzerland [6], and Spain [7], in the UK [8] and the USA [9], and in countries in Asia such as China [10] and Singapore [11], sought to examine the impact of social distancing and isolation on the mental health of the population.

Imposed isolation has a huge impact on many aspects of people's lives, causing considerable psychological strain and triggering a variety of psychological conditions [5]. People are separated from loved ones for unknown durations, they experience uncertainty concerning the disease status due to contradictory messages from health authorities, and they feel a loss of control, a sense of being trapped [12], a threat to their resilience and the well-being of their family [13], and a loss of freedom that on occasion creates dramatic effects [4]. Mass quarantine is likely to substantially raise people's fears, since it shows that the authorities believe the situation to be severe and likely to worsen [12]. Psychological consequences that were reported include post-traumatic stress, depression symptoms, anxiety, irritability, impatience, tension, and anger [4, 12, 14]. Longer-term effects were also considered to be possible. Furthermore, quarantine might lead to physical inactivity, which contributes to adverse health changes such as cardiovascular vulnerability and decreased aerobic capacity [15]. The literature has extensively described the positive contribution of physical activity to general health [16–18]. Hence, long term inactivity, as has been forced upon us by the COVID-19 pandemic, might lead to a marked decline of health, both physical and mental.

The spotlight of the current article is related to public health. The death toll of the current COVID-19 pandemic is strongly biased toward the elderly. However, some studies of crises suggest that older adults tend to perceive events as less stressful than do younger people [19, 20]. Therefore, we examined healthy behavior in at-risk populations according to age cutoff-points used by the Ministry of Health at the time of vaccination, and divided the participants into three age groups (45–59, 60–69, and 70+) following health organizations' recommendations [21–23].

We were seeking to identify both resilience factors and risk factors, in order to report the population's needs in the current crisis and to assess their implications. The main purpose of the research was to examine the differences between adults, age group 70+, and another two age groups (45–59 and 60–69), concerning their healthy and active lifestyle. More specifically: (1) to determine if the participants did or did not regularly participate in physical activity before the lockdown, and whether this changed after the lockdown; (2) to examine their level of physical activity during the lockdown, (3) to examine relationships between weight and physical activity, before and during the lockdown; (4) to examine the relationships between habits and level of physical activity, and psychological well-being variables; and (5) to examine the relationships between the level of physical activity and the duration of daily sleeping hours.

Method

Participants

Nonprobability snowball sampling was used to recruit participants [24]. Sample size was calculated based on two-way analysis of variance (ANOVA) by age and sex using G*Power analysis program. For an effect size of 0.2, $\alpha = 0.05$ and $1\text{-}\beta = 0.9$, a sample size of 450 participants was calculated. Since the data were collected during the first lockdown, 1202 questionnaire were eligible for the current study.

Participants were 1202 people, 381 males and 821 females, aged 45–90, from all parts of the State of Israel, representing its seven main regions. Participants reported their weight and height, and body mass index (BMI) was calculated by the researchers.

Survey

A six-part survey was used, including:

(a) Demographic background.

(b) *The International Physical Activity Questionnaire (IPAQ)* [25] – the short version relating to physical activity that was conducted during the previous week. Participants had to describe their level of physical activity, and its frequency, duration, and intensity. See the original instrument for further details.
(c) *Positive and Negative Affect Schedule* – PANAS [26]. A 20-item questionnaire assessed positive affects (10 items) and negative affects (10 items) experienced by the participants in the previous month. Participants rated their feelings on a 5-point scale (1 = hardly at all or not at all; 5 = to a great extent). Reliabilities, in terms of Cronbach alphas, for the original scale were .89 for positive affect and .92 for negative affect. In the current study Cronbach alphas were .83 for positive affect and .86 for negative affect.
(d) *The Connor and Davidson Resilience Scale* [27] – *The Connor-Davidson Resilience scale (CD-*^{RISC}*)* is comprised of 25 items, each rated on a 5-point scale (0–4), with a higher score reflecting greater resilience. Internal consistency of the original validation study was .89, and test-retest reliability demonstrated a high level of agreement between the two tests, with an intraclass correlation coefficient of .87. Factor analysis in the current study yielded two factors: (1) Personal competence and self-control, and (2) Positive acceptance of change. Internal consistency ranged from .87 to .90.
(e) *A questionnaire for measuring depressive moods* [28] – Six questions on a 4-point scale measured depressive symptoms. Internal consistency for the current sample was .86.
(f) Questions regarding weight change, based on the Israeli National Health and Nutrition (MABAT) survey, questions 50–54 [29].

Procedure

Data were collected during the complete lockdown from April 14, 2020 to May 6, 2020. The survey was approved by the Institutional Review Board (IRB), permission No. 250. The questionnaire was distributed via e-mail, WhatsApp, Twitter, and Facebook using a snowball sampling method. All participants were asked to share the link of the questionnaire with others in order to obtain a wider sample.

Data analysis

Physical activity was defined as the answer to the question: "Were you engaged in physical activity before the lockdown?", along with the answer to the question: "Are you engaged in physical activity during the lockdown?", and categorized into a dichotomous variable: Yes or No. Reported adherence to physical activity prior to the pandemic, and during the lockdown, was categorized into four groups: (a) No/No – have not done physical activity before the lockdown/not doing physical activity during the lockdown; (b) No/Yes – have not done physical activity before the lockdown/doing physical activity during the lockdown; (c) Yes/No – did physical activity before the lockdown/not doing physical activity during the lockdown; (d) Yes/Yes – did physical activity before the lockdown/doing physical activity during the lockdown. In addition, participants were categorized into three groups according to the American College of Sports Medicine (ACSM) recommendations for healthy and active lifestyle [30], as follows: Inactive, insufficiently active – those who are doing less than 150 min of Moderate-to-Vigorous Physical Activity (MVPA) per week, and sufficiently active – those who are doing 150+ minutes of MVPA per week. The background characteristics of the four groups of physical activity behavior are presented by means and standard deviations for normal variables, and by frequency for categorical data.

Confirmatory Factor analysis was conducted to reconfirm the behavior factors for the current cohort. The number of factors to retain was calculated using the Kaiser-Guttman rule (eigenvalue ≥ 1) and the scree plot. Two factors were created for the resilience scale, one factor for the depression scale, and two factors for the PANAS scale with eigenvalues values > 1.

One-way ANOVA with Bonferroni correction was conducted to compare the reported psychological variables among the four groups of physical activity behavior, and a Chi Square test was used to compare weight change in those four groups, using the ALSCAL procedure in IBM SPSS (Version 25.0). Participants were divided into three age groups: 45–59, 60–69, and 70+. Chi-Square tests were conducted to examine the differences between the groups on baseline variables.

Results

Means, SDs, and significant differences in basic variables according to three age groups are presented in Table 1.

Mean BMI was highest among people aged 60–69. The mean BMI in this age group was higher than the normal BMI and is considered overweight. Average weight change was not different across ages with a very large SD. On average, reported weight did not change during the first lockdown.

Most of the participants were sufficiently active during the lockdown according to ACSM criteria, with no significant difference between age groups. There was a significant difference between age groups in both Resilience factors – Positive acceptance of change [F (2; 1146) = 5.309; $p < .01$], and Personal ability, self-competence, and self-control [F (2; 1146) = 4.004;

Table 1 Survey variables according to age groups means (SD) for continuous variables, n (%) for categorical variables

Age (years)	45–59	60–69	70+
	n = 645	n = 393	n = 164
BMI (kg/m²)	25.91(4.56)	26.61(4.36)(a*)	25.88(4.08)
Weight change (kg)	.54(1.91)	.45(1.71)	.44(2.39)
Female (%)	463(71.8)	253(64.9)	103(63.2)
Male (%)	182(28.2)	138(35.1)	60(36.8)
Not active	168(26.0)	124(31.2)	33(20.4.7)
Insufficiently active	89(22.6)	60(15.3)	24(40.2.1)
Active	49(30.1)	21(12.9)	9(57.1)
Resilience			
Positive acceptance of change	3.05(0.74)(c*)	2.97(0.73)	2.86(0.86)
Personal ability, self-competence, and self-control	3.07(0.71)(c*)	2.98(0.74)	2.88(0.82)
PANAS-positive	2.83(0.82)	2.76(0.80)	2.72(0.91)
PANAS-negative	1.95(0.77)(c***)	1.87(0.68)	1.71(0.62)
Depression symptoms	2.01(0.65)(b**,c***)	1.87(0.61)	1.73(0.63)

* $p < .05$; ** $p < .01$; *** $p < .001$; a = compared with 45–59; b = compared with 60–69; c = compared with + 70

$p < .05$]. Post Hoc tests with Bonferroni corrections showed that both factors were higher in age groups 45–59 compared to 70+. No differences were obtained between age groups in positive feelings (PANAS positive), whereas negative feelings (PANAS negative) [F (2; 1072) = 3.228; $p < .05$] and depression symptoms [F (2; 1146) = 10.684; $p < .001$] were higher in age group 45–59 compared to 70+ year-old participants, and the depression symptoms score was also higher among participants aged 40–59 compared to those aged 60–69.

No differences appeared between the three age groups by the three categories of physical activity level [χ^2 (4) = 9.122, $p = .058$]; in addition, no gender differences appeared between age groups according to the physical activity level [χ^2 (4) = 7.122, $p = .115$].

Differences among the age groups according to their physical activity habits before and during the lockdown appeared only with regard to negative feelings: PANAS negative and depression symptoms (Table 2). Two-Way ANOVA (physical activity category X age group) revealed significant differences between the four physical activity categories in PANAS Negative only in age group 45–59 [F (2; 1072) = 3.228; $p < .05$]. Those who were not active before and began physical activity during the

Table 2 Means and SDs of psychological variables according to age groups and physical activity before/during the lockdown

Age	PA	Resilience		PANAS		Depression Symptoms
		PAC	PA, SC & SC	Positive	Negative	
45–59	No/No	2.95(.78)	2.96(.71)	2.79(.92)	1.88(.71)	2.07(.67)
	No/Yes	3.13(.76)	3.04(.77)	2.70(.82)	1.75(.69)	1.93(.59)
	Yes/No	3.03(.73)	3.01(.72)	2.68 (.85)	2.14(.88) b	2.22(.69) b, d
	Yes/Yes	3.07(.75)	3.12(.72)	2.91(.85)	1.93 (.68)	1.93(.69)
60–69	No/No	2.68(.90)	2.66(.79)	2.27(1.03)	1.57(.73)	1.67(.80)
	No/Yes	2.73(.79)	2.67(.87)	2.53(.86)	1.81(.68)	1.76(.55)
	Yes/No	2.95(.64)	2.95(.67)	2.75(.72)	1.84(.72)	1.90(.61)
	Yes/Yes	3.03(.70)	3.05(.72)	2.83(.80)	1.92(.70)	1.89(.61) b
70+	No/No	2.68(.90)	2.66(.79)	2.27(1.03)	1.57(.73)	1.67(.80)
	No/Yes	2.68(.69)	2.91(.78)	2.62(.75)	1.86(.74)	1.77(.61)
	Yes/No	2.88(.83)	3.00(.73)	2.73(.95)	1.74(.55)	1.92(.69)
	Yes/Yes	2.90(.90)	2.85(.87)	2.79(.89)	1.70(.62)	1.60(.56)

b Compared to No/Yes, $p < .05$, d Compared to Yes/Yes, $p < .001$, PA Physical activity, PAC Positive acceptance of change, PA, SC, & SC Personal ability, self-competence, and self-control

lockdown had a lower score than those who used to do physical activity before and stopped during the lockdown.

Depression was more prevalent among ages 45–59 compared to the older ages. Differences were found in the same age group in depression symptoms [F (3, 1146) = 4.323; $p < .01$]. Those who stopped being active during the lockdown had a higher score compared to those who were not active before, and began physical activity during the lockdown ($p < .05$); they also had a higher depression score compared with those who were active both before and during the lockdown. In age group 60–69, those who were active both before and during the lockdown scored higher compared to those who began physical activity only during the lockdown ($p < .001$).

In addition, we sought to examine the differences between the age groups in psychological variables, according to their physical activity level during the lockdown. Among the 45–59 and 60–69 age groups, sufficiently active participants demonstrated a higher level of PANAS-Positive compared to inactive people ($p = 0.39$). In age group 45–59, participants who were not active demonstrated higher depression symptoms compared with the sufficiently active people ($p < .001$), and in age group 60–69 those who were insufficiently active had the highest depression symptoms, compared to both inactive and sufficiently active people ($p < .001$). In age group 60–69 the sufficiently active people scored higher in Personal ability, Self competence, and Self-control than those who were not sufficiently active ($p = .010$).

Results of the Two-Way ANOVA on average sleeping hours in the last week of the lockdown showed significant differences between age groups [F (2; 1168) = 6.490; $p < .01$], as well as significant interaction (Age X Physical activity) [F (6; 1168) = 3.133; $p < .01$]. That is, those participants from the four categories of physical activity at the younger age reported on different sleeping hours than those in the four categories of physical activity at the older age. Specifically, at the younger age, the people who were not active before, but were active during the lockdown (No/Yes), slept more than others, while the group ages 60–69 – those who were active both before and during the lockdown – slept more than others (Yes/Yes), and among the oldest group, those who were neither active before nor during the lockdown (No/No), slept more than the others.

Results regarding weight change are presented in Table 3. No significant differences were demonstrated between the groups [χ^2 (6) = 7.135, $p = .309$].

Discussion

Three main and interesting findings appear from the data: Firstly, the youngest age group demonstrated a higher resilience compared to the older age groups. This result is in line with the findings of other surveys concerning mental health and psychological aspects during the COVID-19 period, which were conducted in China [10], the USA [9], Switzerland [6], and Spain [7], and reported that young adults demonstrated a high level of resilience compared to older adults.

One explanation for this finding lies in the compulsory requirement for social distancing, according to which the older adults should not meet people and should not be visited for fear of being infected. Thus, in addition to the accumulated epidemiological data on the fact that the disease mainly affects the elderly, which serves as a source of stress in itself, there is also the social component of isolation that probably impaired mental resilience among middle-aged and older adults. Researchers who compared the level of resilience of young adults before and during the disease [31] concluded that the changes in resilience levels were more consistently associated with young adults' emotional distress than with COVID-19-related health risk exposures.

Secondly, an interesting and noteworthy finding is that in addition to the fact that the youngest group reported a higher level of resilience compared to older adults,

Table 3 Differences between age groups in weight change, according to their physical activity before/during the lockdown (in percentages)

Age	Weight change	No/No $n = 132$	No/Yes $n = 91$	Yes/No $n = 217$	Yes/Yes $n = 675$
45–59	Lose	12.8	21.2	12.3	15.7
	No change	54	57.6	54.9	60
	Gain	33.4	21.2	32.7	24.3
60–69	Lose	18.2	17.2	11.3	17.4
	No change	57.6	51.7	56.5	66
	Gain	24.2	31.1	32.2	16.6
70+	Lose	16.7	20	21.4	15.7
	No change	58.3	50	54.8	73
	Gain	25	30	23.8	11.3

they also reported higher levels of depressive symptoms compared to older adults. Hence, it can be concluded that people can feel resilience and depression at the same time. The fact that young people suffered from depression symptoms during the lockdown at a greater level than adults is attributed to a number of reasons: (1) A sense of suffocation due to the forced isolation and inability to lead a routine life [5]. (2) A loss of sources of income and/or economic stability [12]. In contrast, older adults are at the end of their careers at work, or in retirement, and the economic threat is less tangible for them; (3) Social isolation from family members and friends [4, 6]. On the other hand, the adults, who were used to hosting their children and grandchildren found plenty of free time for themselves during this period, and initiated activities that probably calmed them down; (4) The prohibition on recreation, travel, shopping, and cultural consumption in any way that constitutes quality utilization of leisure time [2].

A possible explanation for the combination of high mental resilience and symptoms of high-level depression is that this pattern may characterize people who are distressed but must function. Both are due to the fact that the duration of the period of distress is unknown and is expected to continue, and to the fact that they have families with children and must take care of their well-being in every way possible, despite of the difficulties they are experiencing [13].

Since most of the participants were sufficiently active according to ACSM criteria during the lockdown, without a significant difference between age groups, we compared the ages in the psychological variables, according to their habits of doing activity before and during lockdown.

In other words, although we hypothesized that the activity habits of the different age groups would be reflected in the psychological metrics differently, we did not find any evidence to suggest this, except among the younger adults (ages 45–59). Higher negative emotions were reported among those who used to exercise before the quarantine and stopped during the quarantine, compared to those who did not exercise before the quarantine and started exercising during the quarantine. This finding can be explained with reference to physical activity. Others have extensively reported the relationship between physical activity and positive feelings [32–34], and vice versa. Being inactive, especially among people who used to be active and unwillingly had to change this habit, reported negative emotions including frustration, anger, despair, and depression [35, 36].

Similarly, among the youngest age group it was found that people who stopped exercising during the lockdown reported higher depressive symptoms compared to those who were and continued to be active, as well as compared to those who were inactive and started exercising during quarantine. This finding reinforces the knowledge accumulated in the research literature on the relationship between physical activity and depression in routine times (see reviews [37, 38]), in crisis/emergency time in general [39], and in COVID-19 time in particular [40]. In addition, people aged 60–69 who did and continued to do physical activity reported higher levels of depression compared to those who did not exercise and started doing physical activity during the lockdown period. That is to say, when people with a sedentary lifestyle change their habits and begin performing physical activity, they gain immediate benefits, both physically and psychologically, such as in the sense of well-being [41], happiness [42], satisfaction of life [43, 44], and a decrease in negative emotions [45].

Two additional aspects that were examined in the current research were sleeping hours and weight change. No differences were found in weight change between the age groups according to physical activity habits. This result is different from studies that were conducted in India [46] and in the USA [47], which reported that people who went through lockdown during the time of the COVID-19 disease gained weight. However, these studies were conducted on small sample sizes (a few dozen participants). In contrast, the current study was conducted with a large number of participants, and the findings obtained are similar to those reported in a study conducted in Spain in the same period on a sample of 4379 participants aged 16–84, in which most participants maintained their weight during the quarantine period [48]. This finding may be due to the fact that the first lockdown lasted a relatively short period of time. It is possible that staying in quarantine for a longer period of time would have revealed a different picture regarding weight changes in general and in regard to physical activity habits in particular.

Differences were found between age groups according to their physical activity habits and in their sleep duration per night. Among the younger participants, a positive relationship was found between physical activity and the number of sleeping hours, while in the older ones a positive relationship was found between inactivity and the duration of sleep. It would be interesting to examine in further research the relationship between the type and intensity of physical activity and the duration and quality of sleeping hours at different ages.

The current study has some limitations: The sample does not represent the entire Israeli adult population, but those who have access to computers and use them. Also, this is a self-administered questionnaire and therefore a recall bias may occur. Still, due to the fact that it is a large sample, it probably indicates/expresses a typical mood.

Conclusions

In adults at 70+, physical activity level, physical activity before and during the lockdown, emotions, sleeping hours, and weight change were similar to other adult groups that were examined (45–59 and 60–69). However, in the older adults' groups (70+ and 60–69), resilience and depression symptoms were lower than in the youngest age group.

Abbreviations

PA: Physical activity; PAC: Positive acceptance of change; PA, SC, & SC: Personal ability, self-competence, and self-control; ACSM: American College of Sports Medicine; BMI: Body mass index; IPAQ: The International Physical Activity Questionnaire; PANAS: Positive and Negative Affect Schedule

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Authors' contributions

SZ was the study's principal investigator and was responsible for the conception and design of the study. SEA and MD were the co-investigator and prepared the helped with the initial draft of the manuscript. AZ was involved in the statistical analysis and SEA and SZ were involved with an interpretation of the data. All authors were involved in the acquisition of data. All authors read and approved the final manuscript.

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Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due to institutional restrictions but are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

Ethics approval for this study was provided by The Academic College at Wingate Institutional Review Board. Consent to participate was sought from all participants prior to the study.

Consent for publication

Not applicable.

Competing interests

The authors declare that there is no other conflict of interest to disclose.

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References

1. Holmes EA, O'Connor RC, Perry VH, Tracey I, Wessely S, Arseneault L, et al. Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. Lancet Psychiat. 2020April 15. https://doi.org/10.1016/S2215-0366(20)30168-1.
2. Campbell AD. Practical implications of physical distancing, social isolation, and reduced physicality for older adults in response to COVID-19. J Gerontolog Soc Work. 2020:1–3. https://doi.org/10.1080/01634372.2020.1772933.
3. Coibion O, Gorodnichenko Y, Weber M. The cost of the covid-19 crisis: Lockdowns, macroeconomic expectations, and consumer spending (No. w27141). National Bureau of Economic Research 2020.
4. Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. Lancet. 2020;395:912–20.
5. Mazza C, Ricci E, Biondi S, Colasanti M, Ferracuti S, Napoli C, Roma P, et al. A nationwide survey of psychological distress among Italian people during the COVID-19 pandemic: Immediate psychological responses and associated factors. Int J Environ Res Pub Health. 2020. Retrieved 18/8/2020 from https://scholar.google.co.il/scholar?q=Psychological+Distress+among+Italian+People+during+the+COVID-19+Pandemic:+Immediate+Psychological [illegible]
6. de Quervain D, Aerni A, Amini E, Bentz D, Coynel D, Gerhards C, et al. The Swiss Corona Stress Study. [Preprint]. 2020 Retrieved from https://osf.io/jqw6a
7. Carriedo A, Cecchini JA, Fernandez-Rio J, Gonzalez C, Sanchez-Martinez B, Carriedo A. COVID-19, psychological well-being and physical activity levels in older adults during the nationwide lockdown in Spain. Am J Geriat Psychiat. 2020;28:1146–55.
8. Pierce M, Hope H, Ford T, Hatch S, Hotopf M, John A, et al. Mental health before and during the COVID-19 pandemic: a longitudinal probability sample survey of the UK population. Lancet Psychiat. 2020;7:883–92.
9. Pfefferbaum B, North C. Mental health and the COVID-19 pandemic. New Eng J Med. 2020;383:510–512. Retrieved 19/8/2020 from https://www.nejm.org/doi/full/10.1056/NEJMp2008017
10. Qiu J, Shen B, Zhao M, et al. A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. Gen Psychiat. 2020;33.
11. Ho CS, Chee CY, Ho RC, Wang Z, Xie B, Xu Y. Mental health strategies to combat the psychological impact of COVID-19 beyond paranoia and panic. Ann Acad Med Singap. 2020;49:1–3.
12. Rubin J. The psychological effects of quarantining a city. BMJ. 2020;368:m313. https://doi.org/10.1136/bmj.m313.
13. Prime H, Wade M, Browne DT. Risk and resilience in family well-being during the COVID-19 pandemic. Am Psychol. 2020;75:631–43. https://doi.org/10.1037/amp0000660.
14. Maugeri G, Castrogiovanni P, Battaglia G. The impact of physical activity on psychological health during Covid-19 pandemic in Italy. Heliyon. 2020;6:e04315 https://doi.org/10.1016/j.heliyon.2020.e04315.
15. Shuval K, Sinai L, Gabriel KP. Sedentary behavior, physical inactivity, and metabolic syndrome: pilot findings from the rapid assessment disuse index study. J Phys Act Health. 2020;17:1042–6.
16. Pedersen BK, Saltin B. Evidence for prescribing exercise as therapy in chronic disease. Scand J Med Sci Sports. 2006;16:3–63.
17. Romeo J, Wärnberg J, Pozo T, Marcos A. Physical activity, immunity and infection. Proc Nutr Soc. 2010;69:390–9.
18. Warburton DE, Nicol CW, Bredin SS. Health benefits of physical activity: the evidence. Can Med Assoc J. 2006;174:801–9.
19. Neubauer AB, Smyth JM, Sliwinski MJ. Age differences in proactive coping with minor hassles in daily life. J Gerontol Series B Psychol Sci Soc Sci. 2019;74:7–16 https://doi.org/10.1093/geronb/gby061.
20. Birditt KS, Fingerman KL, Almeida DM. Age differences in exposure and reactions to interpersonal tensions: a daily diary study. Psychol Aging. 2005;20:330–40 https://doi.org/10.1037/0882-7974.20.2.330.
21. Boutrell L, Blane D, Field R, Megger R, Jain B, Kelly J, et al. Evidence review assessment of COVID-19 in primary care: the identification of symptoms, signs, characteristics, comorbidities and clinical signs in adults which may indicate a higher risk of progression to severe disease. 2020 https://eprints.gla.ac.uk/[illegible].pdf
22. Duggan MC, Van J, Ely EW. Delirium assessment in critically ill older adults: considerations during the COVID-19 pandemic. Crit Care Clin. 2020;37:175–90 https://[illegible]
23. Reza Analysis. Nearly 3 million older adults living alone face greater financial and health risks during Covid-19 pandemic. States News Service 2020.
24. Kosinski M, Matz SC, Gosling SD, Popov V, Stillwell D. Facebook as a research tool for the social sciences: opportunities, challenges, ethical considerations, and practical guidelines. Am Psychol. 2015;70:543.
25. Craig CL, Marshall AL, Sjöström M, Bauman AE, Booth ML, Ainsworth BE. The IPAQ consensus group and the IPAQ reliability and validity study group. International physical activity questionnaire (IPAQ): 12-country reliability and validity. Med Sci Sports Exerc. 2003;35:1381–95.
26. Watson D, Clark LA, Tellegen A. Development and validation of brief measures of positive and negative affect: the PANAS scales. J Pers Soc Psychol. 1988;54:1063–70 https://doi.org/10.1037/0022-3514.54.6.1063.
27. Connor KM, Davidson JRT. Development of a new resilience scale: the Connor-Davidson resilience scale (CD-RISC). Depress Anxiet. 2003;18:76–82 https://doi.org/10.1002/da.10113.
28. Kandel DB, Davies M. Epidemiology of depressive mood in adolescents: an empirical study. Arch Gen Psychiat. 1982;39:1205–12.
29. Ministry of Health. 2003. https://www.health.gov.il/PublicationsFiles/[illegible].pdf

30. ACSM Guidelines: https://health.gov/our-work/physical-activity/current-guidelines/top-10-things-know 2018.
31. McGinty EE, Presskreischer R, Han H, Barry CL. Psychological distress and loneliness reported by US adults in 2018 and April 2020. JAMA. 2020;324:93–4. https://doi.org/10.1001/jama.2020.9740.
32. Carriedo A, Cecchini JA, Fernández-Río J, Méndez-Giménez A. Resilience and physical activity in people under home isolation due to COVID-19: A preliminary evaluation. Ment Health Phys Act. 2020;19:100361.
33. Shanahan L, Steinhoff A, Bechtiger L, Murray AL, Nivette A, Hepp U, et al. Emotional distress in young adults during the COVID-19 pandemic: evidence of risk and resilience from a longitudinal cohort study. Psychol Med. 2020:1–10 https://doi.org/10.1017/S003329172000241X.
34. Wiese CW, Kuykendall L, Tay L. Get active? A meta-analysis of leisure-time physical activity and subjective well-being. J Pos Psychol. 2018;13:57–66.
35. Evans L, Wadey R, Hanton S, Mitchell I. Stressors experienced by injured athletes. J Sports Sci. 2012;30:917–27.
36. Reese LMS, Pittsinger R, Yang J. Effectiveness of psychological intervention following sport injury. J Sport Health Sci. 2012;1:71–9.
37. Mammen G, Faulkner G. Physical activity and the prevention of depression: a systematic review of prospective studies. Am J Prevent Med. 2013;45:649–57.
38. 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 Psychol Rev. 2015;9:366–78.
39. Vargas G, Rabinowitz A, Meyer J, Arnett PA. Predictors and prevalence of postconcussion depression symptoms in collegiate athletes. J Athl Train. 2015;50:250–5.
40. Courtney D, Watson P, Battaglia M, Mulsant BH, Szatmari P. COVID-19 impacts on child and youth anxiety and depression: challenges and opportunities. Can J Psychiat. 2020;65:688–91.
41. Beck F, Gillison F, Standage M. A theoretical investigation of the development of physical activity habits in retirement. Br J Health Psychol. 2010;15:663–79.
42. Lathia N, Sandstrom GM, Mascolo C, Rentfrow PJ. Lathia N, Sandstrom GM. Happier people live more active lives: using smartphones to link happiness and physical activity. PLoS One. 2017;12:e0160589.
43. Elavsky S. A daily process approach to depict satisfaction with life during the menopausal transition: physical (in) activity, symptoms, and neuroticism. J Happiness Stud. 2017;18:631–45.
44. Parra-Rizo MA, Sanchis-Soler, satisfaction with life, subjective well-being and functional skills in active older adults based on their level of physical activity practice. Int J Environ Res Pub Health. 2020;17:1299.
45. Shachar K, Ronen-Rosenbaum T, Rosenbaum M, Orkibi H, Hamama L. Reducing child aggression through sports intervention: the role of self-control skills and emotions. Child Youth Serv Rev. 2016;71:241–9.
46. Ghosal S, Arora B, Dutta K, Ghosh A, Sinha B, Misra A. Increase in the risk of type 2 diabetes during lockdown for the COVID-19 pandemic in India: a cohort analysis. Diab Metab Syndrome Clin Res Rev. 2020;14:949–52 https://doi.org/10.1016/j.dsx.2020.06.020.
47. Zachary Z, Forbes B, Lopez B, Pedersen G, Welty J, Deyo A, et al. Self-quarantine and weight gain related risk factors during the COVID-19 pandemic. Obes Res Clin Pract. 2020;14:210–6 https://doi.org/10.1016/j.orcp.2020.05.004.
48. Fernandez-Rio J, Cecchini JA, Mendez-Gimenez A, Carriedo A. Weight changes during the COVID-19 home confinement. Effects on psychosocial variables. Obes Res Clin Prac. 2020;14:383–5.

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