research

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ORIGINAL RESEARCH Parallel, cluster randomised controlled trial

App based education programme to reduce salt intake (AppSalt) in schoolchildren and their families in China

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Study question Can a smartphone application based education programme lower salt intake in schoolchildren and their families?

Methods A cluster randomised controlled trial of 54 primary schools from three provinces was conducted in northern, central, and southern China, from 15 September 2018 to 27 December 2019. 592 schoolchildren (mean age 8.58 years) were enrolled, with 1184 adult family members (mean age 45.80 years). Schools were randomly assigned to either the intervention or the control group. Children in the intervention group were taught, with support of the app, about salt reduction and assigned homework to encourage their families to participate in activities to reduce salt consumption. The primary outcome was the difference in salt intake change (as measured by 24 hour urinary sodium excretion) at 12 months between intervention and control groups.

Study answer and limitations 297 children and 594 adult family members (n=27 schools) were allocated to the intervention group, and 295 children and 590 adult family members (n=27 schools) were allocated to the control group. During the trial, 27 (4.6%) children and 112 (9.5%) adults were lost to follow-up, owing to children having moved to another school or adults unable to attend follow-up assessments. The remaining 287 children and 546 adults (n=27 schools) in the intervention group and 278 children and 526 adults (n=27 schools) in the control group completed the 12 month follow-up assessment. Mean salt intake at baseline was 5.5 g/day (standard deviation 1.9) in children and 10.0 g/day (3.5) in adults in the intervention group, and 5.6 g/day (2.1) in children and 10.0 g/day (3.6) in adults in the control group. During the study, salt intake of the children increased in both study groups but to a lesser extent in the intervention group (mean effect of intervention after adjusting for confounding factors −0.25 g/day, 95% confidence interval −0.61 to 0.12, P=0.18). In adults, salt intake decreased in both study groups but to a greater extent in the intervention group (mean effect −0.82 g/day, −1.24 to −0.40, P<0.001). The mean effect on systolic blood pressure was −0.76 mm Hg (−2.37 to 0.86, P=0.36) in children and −1.64 mm Hg (−3.01 to −0.27, P=0.02) in adults. These results showed that the app based education programme was effective in lowering salt intake in adults, but the effect was not significant in children, which could be due to various factors such as a lack of intervention on school meals.

What this study adds These findings suggest that the app based education programme, delivered through primary school using a child-to-parent approach, is feasible and could help families to reduce salt intake. Although this novel approach could potentially be scaled up to larger populations, the programme needs further strengthening to reduce salt intake across the whole population, including schoolchildren.

Funding, competing interests, and data sharing Full details available on bmj.com.

Trial registration Chinese Clinical Trial Registry ChiCTR1800017553.

A lonely planet?

ORIGINAL RESEARCH Systematic review and meta-analysis

The prevalence of loneliness across 113 countries

Surkalim DL, Luo M, Eres R, et al
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Study question What is the prevalence of loneliness in populations, across different age groups, on a global level?

Methods To identify studies for this systematic review and meta-analysis, Embase, Medline, PsycINFO, and Scopus were searched, along with grey literature using Google Scholar and Open Grey. Studies were included if they were based on nationally representative samples (n≥292), used validated instruments, and included prevalence data for 2000-19. Two researchers independently extracted data and assessed the risk of bias using the Joanna Briggs Institute checklist. Random effects meta-analysis was conducted in the subset of studies with relatively homogeneous research methods by measurement instrument, age group, and World Health Organization region.

Study answer and limitations Prevalence data were available for 113 countries or territories from 57 studies. Data were available for adolescents (12-17 years) in 77 countries or territories, young adults (18-29 years) in 30 countries, middle aged adults (30-59 years) in 32 countries, and older adults (≥60 years) in 40 countries. 212 estimates for 106 countries from 24 studies were included in meta-analyses. The pooled prevalence of loneliness for adolescents ranged from 9.2% (95% confidence interval 6.8% to 12.4%) in South-East Asia to 14.4% (12.2% to 17.1%) in the Eastern Mediterranean region. For adults, meta-analysis was conducted for the European region only, and a consistent geographical pattern was shown for all adult age groups. The lowest prevalence of loneliness was consistently observed in northern European countries (young adults 2.9%, 1.8% to 4.5%; middle aged adults 2.7%, 2.4% to 3.0%; and older adults 5.2%, 4.2% to 6.5%) and the highest in eastern European countries (young adults 7.5%,5.9% to 9.4%; middle aged adults 9.6%, 7.7% to 12.0%; and older adults 21.3%, 18.7% to 24.2%). These findings are limited by data scarcity and methodological heterogeneity.

What this study adds Problematic levels of loneliness are experienced by a substantial proportion of the population in many countries. This study identified an inconsistent level of data coverage between high income countries (particularly European countries) and low and middle income countries. Evidence is insufficient to show temporal trends of loneliness.

Funding, competing interests, and data sharing No funding provided. No competing interests declared. No additional data available.

Systematic review registration PROSPERO CRD42019131448.

COMMENTARY Loneliness is costly to individuals and society; it should be a political priority

GARY WATER/GETTY IMAGES

The public health and social measures implemented during the covid-19 pandemic highlight the importance of social capital to health and wellbeing. As many countries move into a new stage with the reduction and removal of many public health social measures, renewed energy is needed to rethink social and community connections in which "building back better" includes evidence based initiatives to deal with loneliness, especially among those most vulnerable.

Surkalim and colleague's systematic review and meta-analysis on the prevalence of loneliness in 113 countries provides useful pre-pandemic baseline data to support public health interventions.[1] Notable variations in loneliness by age and region require further exploration. Additionally, the authors show the need for standardised and validated instruments to support comparability and assessment of loneliness as well as the

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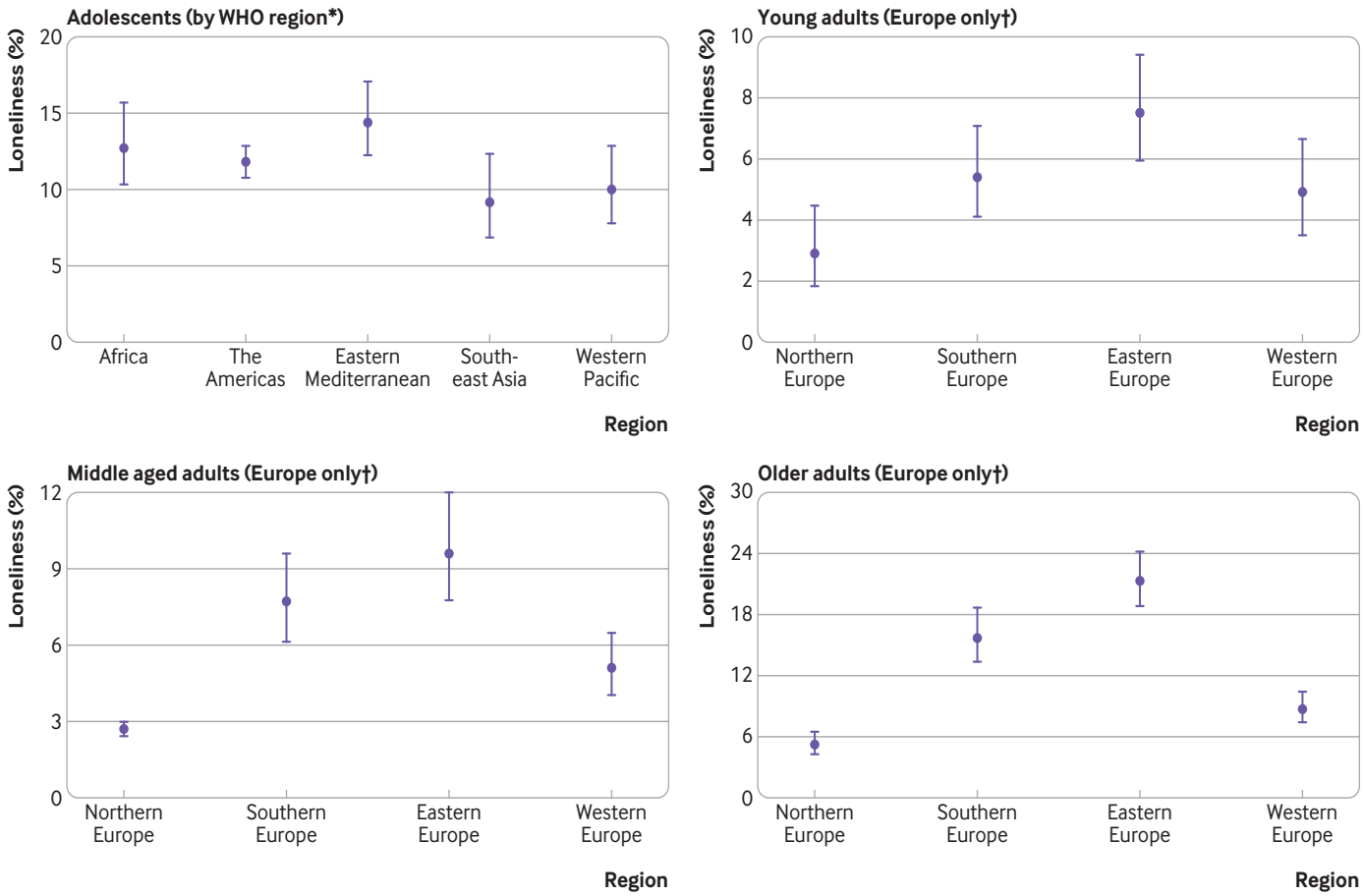

Loneliness prevalence based on meta-analysis (based on single item measures) in age groups across regions. *Adolescent data grouped by WHO regions (except for Europe, owing to the lack of comparable data). †Data only presented for young adults, middle aged adults, and older adults for Europe, owing to the lack of comparable data in other regions

necessity for increased data collection in low and middle income countries. They conclude that while loneliness is a public health issue, a public health approach to successfully tackle it demands focus and enhanced action.

Focus

A key challenge is not only to understand prevalence but to "segment" the experience of loneliness for groups who are at risk. Not everyone has the same risk of becoming lonely: poverty, poor physical or mental health, few community connections, and living alone have been shown to increase the risk of loneliness, both before and during the pandemic.[2] A better understanding is required of the intensity and impact of the experience of loneliness, as well as cultural differences and geographical variations.[3 4] Those planning policy and services need more nuanced and targeted data to deliver effective outcomes. Public health interventions must consider the personal and subjective experience of loneliness, taking account of differences between an individual's preferred and actual experience of social and emotional connections.

Additionally, various types of loneliness (emotional, social, and existential) need to be considered, as well as frequency (transient, situational, occasional, and chronic) and causes.[5] Although the focus is often on older people, loneliness is experienced across all age groups. The pandemic has dispelled the myth that loneliness is just an older person's problem. Public health interventions must now take this into account and take a life course approach.

Recent reports from the US[6] and UK[7] underline the need for robust methods to evaluate the effectiveness of interventions for loneliness, especially those seeking longer term change. Research funding and focus must, however, also be more strategic given the ongoing changes in how people live and work, the growth of technology and individualism, and the erosion of many aspects of civic society; all evolving against a backdrop of diminishing public finances and growing austerity in health and public service provision.

A public health approach to loneliness means confronting the social and structural factors that influence risk of loneliness

The pandemic has dispelled the myth that loneliness is just an older person's problem

across the life course, including poverty, education, transport, inequalities, and housing, and implement policies to address them. It is important to facilitate healthy social choices, making it easier to connect with others in the community, change work environments, and increase opportunities for building trust and social capital.

Importantly, protective interventions must be increased, such as public awareness campaigns that deal with stigma and stereotypes around loneliness, valuing community involvement and participation. Both group and individual interventions are required, tailored to support personalised need. Finally, governments must recognise the personal, social, and economic costs of loneliness and prioritise both political and financial support for specialised programmes to address it.[8]

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Risk of persistent and new clinical sequelae among adults aged 65 years and older during the post-acute phase of SARS-CoV-2 infection

Cohen K, Ren S, Heath K, et al

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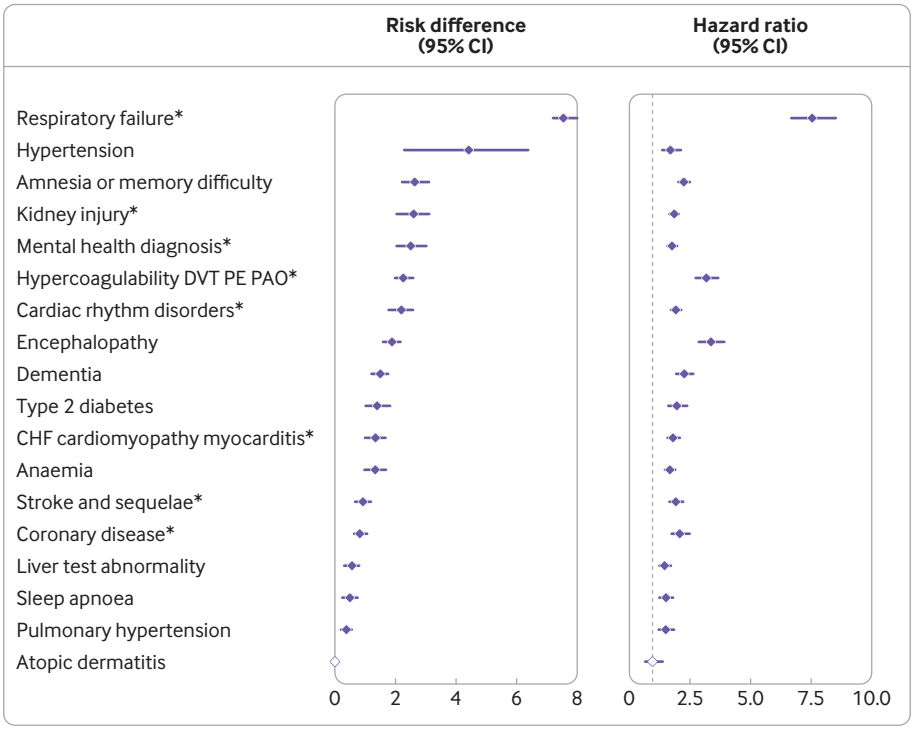
Study question What are the risks for persistent and new clinical sequelae after SARS-CoV-2 infection in adults aged ≥65 years?

Methods 87 337 individuals aged ≥65 years who were continuously enrolled in a Medicare Advantage plan from January 2019 to the date of diagnosis of SARS-CoV-2 infection were matched by propensity score to three comparison groups, including a group with a viral lower respiratory tract illness. The presence of persistent and new sequelae at 21 or more days after a diagnosis of covid-19 was determined with ICD-10 (International Classification of Diseases, 10th revision) codes. Excess risk for sequelae associated with SARS-CoV-2 was estimated for 120 days after acute covid-19 infection and measured by risk difference and hazard ratios. The incidence of sequelae in the post-acute phase was analysed by age, race, sex, and hospital admission for covid-19.

Study answer and limitations Among individuals with a diagnosis of SARS-CoV-2, 32% (27 698 of 87 337) sought medical attention in the post-acute period for one or more new or persistent clinical sequelae, which was 11% higher than the 2020 comparison group who did not have a diagnosis of covid-19. The greatest risk differences were for respiratory failure (risk difference 7.55, 95% confidence interval 7.18 to 8.01), fatigue (5.66, 5.03 to 6.27), hypertension (4.43, 2.27 to 6.37), memory difficulties (2.63, 2.23 to 3.13), kidney injury (2.59, 2.03 to 3.12), mental health diagnoses (2.50, 2.04 to 3.04), hypercoagulability 1.47 (1.2 to 1.73), and cardiac rhythm disorders (2.19, 1.76 to 2.57) compared with the 2020 comparison group. Compared with the group with viral lower respiratory tract illness, however, only respiratory failure, dementia, and post-viral fatigue had increased risk differences (2.39, 1.79 to 2.94; 0.71, 0.3 to 1.08, and 0.18; 0.11 to 0.26 per 100 patients, respectively). Individuals with severe covid-19 requiring admission to hospital had a markedly raised risk for most but not all clinical sequelae. ICD-10 codes might not be reliable for diagnoses based on symptoms and therefore the true incidence of symptoms is not accurately reflected in ICD-10 codes.

What this study adds The results confirm an excess risk for persistent and new sequelae in adults aged ≥65 years after acute infection with SARS-CoV-2; almost a third of adults aged ≥65 had persistent or new sequelae after infection with SARS-CoV-2.

Funding, competing interests, and data sharing
Funded by Optum Labs. No competing interests declared. No additional data available.



SARS-CoV-2 group versus 2020 comparison group for risk difference per 100 individuals (left) and hazard ratio (right) for clinical sequelae in post-acute phase. Clinical sequelae are diagnoses with incidence ≥ 1 per 100 in the SARS-CoV-2 group at 120 days after the start of the post-acute phase (index date +21 days) and highest in hierarchy if an aggregate or group diagnosis is noted. This rule was adopted to avoid confidence intervals that were too wide to display. Symptoms are not displayed. eTables 4a-b in the supplementary file on bmj.com list all associations for each of the 53 outcomes. Symbols indicate significant risk difference or hazard ratio (Bonferroni corrected P value ≤0.05); atopic dermatitis=negative control. *Aggregate diagnosis includes all subdiagnoses (supplementary eTable 1 on bmj.com). DVT=deep vein thrombosis; PE=pulmonary embolism; PAO=peripheral arterial occlusion; CHF=congestive heart failure