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Mental, Physical, and Cognitive Wellbeing during the COVID-19 Pandemic: Data from Scotland and Japan

DATA PAPER

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ABSTRACT

We present data from two studies examining how COVID-19 restrictions affected health behaviours (alcohol consumption, diet, sleep quality, and physical activity levels), mental wellbeing (negative mood) and cognitive function (decision making, attention, learning, working memory, and time perception) in association with socio-demographic factors. Study 1 assessed participants in Scotland and presents cognitive function data for five timepoints. Study 2 is transnational, assessing participants in Scotland and Japan. Data are stored as CSV files. Reuse may involve examining further effects of pandemic enforced social isolation or serve as baseline data when assessing social isolation in expeditions or ageing.

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cognitive function; COVID-19; health behaviour; mood; social isolation

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(1) BACKGROUND

In 2022, the COVID-19 pandemic continues to have a global effect on health and wellbeing. Aside from the possible effects of (re)infection and the potential to develop long-covid, the continually changing guidance surrounding day-to-day life can be associated with poorer wellbeing, particularly in the domains of mental health and cognitive function. We present cross-sectional and longitudinal data which considers environmental and cultural impacts on wellbeing at specific timepoints during the pandemic.

During previous outbreaks of transmissible infectious diseases, time spent in quarantine has been linked to poorer psychological wellbeing (Brooks et al., 2020; Hawryluck et al., 2004), as has fear of contracting or spreading the illness (Bai et al., 2004; Hawryluck et al., 2004). Pre-pandemic reduced social contact and feelings of isolation have been linked to reduced psychological wellbeing and cognitive function (Cacioppo & Hawkley, 2009; Chen & Feeley, 2014), and research early in the COVID-19 pandemic has demonstrated a similar pattern (Ozamiz-Etxebarria et al., 2020).

The present data were collected from two studies with the aim of assessing multiple aspects of wellbeing. Specifically, changes to health behaviours, level of negative mood, and changes in cognitive function. The first study (results of which are published in Ingram et al., 2020 and Ingram et al., 2021) focused on these factors within a sample of participants based in Scotland, UK. This study was completed during the initial COVID-19 lockdown within the UK and continued as restrictions eased. The timeframe of data collection makes our study unique as we were able to assess effects very early in the time course of the pandemic. To compare the effects of differing styles of COVID-19 restrictions, the second study collected data on broadly the same factors from participants based in Scotland, UK, and in Japan during the lockdown conditions of spring 2021 (Ingram et al., 2022; see section 2 Methods for more information on differences between data collected in the first and second study).

Health behaviours, specifically poorer health behaviours, were proposed to be linked to poorer mental health and psychological wellbeing during COVID-19 "lockdowns" in spring 2020 (Lopez-Bueno et al., 2020). In Study 1, we collected data to consider the association between changes in health behaviours (both positive and negative) and negative mood (Ingram et al., 2020). In particular, we examined health behaviours where poorer practice has been linked to poorer psychological wellbeing – alcohol consumption (e.g., Howland et al., 2010; Alford et al., 2020), diet (e.g., Jacka et al, 2010), sleep quality (e.g., Baglioni et al., 2010), and physical activity (e.g., Landers & Arent, 2007). We also collected data on a broad range of socio-demographic circumstances (e.g., living arrangements), and COVID-19 induced changes to circumstances (e.g., changes to working arrangements, shielding).

In addition, we tracked the cognitive performance of participants in Scotland across a period of 12 weeks beginning in May 2020, allowing us to consider changes to cognitive function because of variations in "lockdown" restrictions (Ingram et al., 2021). This period provided a unique opportunity to assess cognitive function in situations of isolation which are rarely available experimentally; research of this nature generally focuses on expeditions (e.g., polar, space, desert; Khandelwal et al., 2017; Kanas & Manzey, 2008; Maruff et al., 2006) or older adults (e.g., Zunzunegui et al., 2003; Read et al., 2020). Following the approaches of these studies, we collected data on five cognitive tasks at five timepoints (Iowa Gambling Task, Flanker Task, Symbol Learning Task, Digit-Symbol Substitution Task, Time Production Task). We were able to track potential improvements in cognitive function as opportunities for socialisation became available, demonstrating plasticity of function as previously seen in older adults (e.g., Bherer, 2015; Karbach & Verhaeghen, 2014). Negative mood was also tracked across 12 weeks to consider the sensitivity of mental wellbeing to the gradual easing of restrictions.

As differing national approaches to limiting the spread of the virus emerged, we developed Study 2 – taking this opportunity to look cross-culturally at wellbeing in Scotland and Japan (Ingram et al., 2022). Those living in Scotland were subject to two highly restrictive, legally enforced, "lockdowns" (23rd March to 28th May 2020, and 5th January to 2nd April 2021). The approach to reducing viral transmission in Japan was significantly less intrusive. Within Japan, a state of emergency, described as "mild lockdown", was in place from 7th or 16th April 2020 (prefecture dependant) to 14th May 2020, and another state of emergency was declared from 8th January 2021 to 21st March 2021 (Sugaya et al., 2022). During this second state of emergency the key limitation was to hospitality venues, particularly those which sold alcohol, with little limitation to work, travel, or education. In addition, restrictions in Japan were not legally enforced as they were in Scotland; rather, these changes were requested (e.g., Sugaya et al., 2020; Tahara et al. 2021).

Within Study 2 we collected demographic data, health behaviour information, negative mood scores, and a self-assessed score of perceived social isolation. We also collected the same measures of cognitive function as those used in Study 1. Data was collected from participants in both countries in spring 2021 whilst restrictions were in place. The key aim of Study 2 was to consider the implications of differing styles of restrictions on wellbeing.

(2) METHODS

2.1 STUDY DESIGN

Study 1 was a longitudinal, web-based study conducted with residents of Scotland. We measured negative mood and performance on a range of cognitive tasks

(Iowa Gambling, Flanker, Symbol Learning, Digit-Symbol Substitution, and Time Production; see section 2.5.2 for more information) at five timepoints over 13 weeks (Weeks 1, 3, 5, 9, & 13). The aim was to track changes in wellbeing and cognitive function as lockdown conditions in Scotland were eased. Participants also completed a questionnaire (at the start of the study) that gathered demographic information, including experiences with COVID-19, and measured changes in health behaviours (alcohol consumption, diet, perceived sleep quality, physical activity) as a result of the pandemic. Key variables include negative mood and performance on the five cognitive tasks at each timepoint as well as pandemic-induced health-behaviour change. For more information about the variables, see 2.5 Materials.

Study 2 was a transnational, web-based study conducted with residents of Scotland and Japan. Participants completed the same negative mood scale, cognitive tasks, and questionnaire as in Study 1, but we also included a measure of perceived social isolation. Key variables include negative mood, perceived social isolation, task performance, and pandemic-induced health-behaviour change for residents of Scotland versus Japan. The aim was to examine and compare the effects of different lockdown styles within the two countries on wellbeing, cognitive function, and health behaviours. In short, restrictions in Scotland were strict and persisted over a long period of time, with breaches punishable by law. Restrictions in Japan, on the other hand, were mild and allowed for travel and social interaction, with citizens *requested* rather than *required* to conform. For more information on the nature of restrictions in the two countries before and during data collection, see Ingram et al. (2022).

2.2 TIME OF DATA COLLECTION

Study 1 began on 20th May 2020. The first timepoint (Week 1) aligned with the most-restrictive conditions in Scotland – leaving the house was permitted only for essential work, grocery shopping, and necessary individual outdoor exercise. Those in the shielding group (i.e., individuals at high-risk of complications from COVID-19) were advised to isolate completely. At Week 3, it was possible to meet outside with one other household, unless self-isolating or shielding. At Week 5, this was extended to two households, and those in the shielding group could leave the house for individual outdoor exercise. At Week 9, it was possible to meet with up to two other households *indoors*, and retail, hospitality, and cultural venues re-opened. At Week 13, nurseries and schools re-opened. All participants completed each timepoint by the end of its corresponding week.

Study 2 took place between 2nd and 7th February 2021. For Scotland, this was within the reinstated full-scale lockdown, due to the spread of the alpha variant (B1.1.7; also known as the Kent variant), which began on 5th January 2021 and ended on 2nd April 2021. This included restrictions to travel and social interaction, as well as school closures and hospitality/entertainment venue closures. For Japan, data collection fell within a declaration of a state of emergency in 11 of the 47 prefectures, including Tokyo, from 8th January 2021 to 21st March 2021 (Sugaya et al., 2022). Anecdotally, the declaration mainly impacted hospitality, especially businesses that sold alcohol. Citizens experienced little-to-no disruption to everyday activities but were advised to be vigilant.

2.3 LOCATION OF DATA COLLECTION

Data were collected online (for more information, see 2.4 Sampling, sample, and data collection). Participants were residents of Scotland (Studies 1 & 2) or Japan (Study 2) living throughout each country.

2.4 SAMPLING, SAMPLE, AND DATA COLLECTION

2.4.1 Study 1

Three hundred and ninety-nine participants (56.4% female, 41.9% male, 1% non-binary, 0.8% transgender) of various ages ($range_{age}$: 18–72 years, M_{age} = 32.4, SD_{age} = 11.4) completed the questionnaire prior to the first timepoint (Week 1), for which they received £2.50. Participants were recruited from the general population through convenience sampling via Prolific Academic (https://prolific.co/) – a crowdsourcing site for academic research. All were residents of Scotland ($range_{residence}$: 0.5–72 years, $M_{residence}$ = 29.0, $SD_{residence}$ = 12.2) at the time of the study. 98.2% of participants identified as Caucasian, 1.5% as Asian, and 0.3% as Armenian. 98.5% of participants were Scottish/British, 0.3% American, 0.3 % Sri Lankan, 0.3% Finnish, 0.3% Latvian, 0.3% Polish, and 0.3% Romanian. For further demographic information, such as marital and employment status, see the Sample file.

In terms of pandemic-related experiences, 12.8% of participants suspected they had had COVID-19, 1% confirmed they had tested positive, and 8.0% reported they had lived with someone with suspected or confirmed COVID-19 (half of whom suspected/had it themselves). 43.1% of participants reported to have self-isolated at one point.

Almost 5% (4.8%) of participants had experienced bereavement and 32.1% reported a change in their employment due to the pandemic; 35.3% of participants were working from home, 21.6% were unemployed, 19% furloughed, 15% keyworkers, 5% carers/parents, and 2.5% were working away. All participants experienced social isolation during lockdown. On average, they would leave the house five times in a week (range: 1–30, M = 4.8, SD = 3.9), most often for grocery shopping (81.7% of participants), exercise (75.2%), or work (14.8%). In addition, 15.3% of participants identified as having shielded throughout lockdown. Approximately 3% of the general adult population in Scotland were vulnerable and required to shield (Scottish Government, 2020). Approximately 12% of participants lived alone during lockdown – in the broader context, approximately 15% of people in Scotland live alone (National Records Scotland, 2018; https://www.nrscotland.gov.uk/).

Three hundred and forty-two of the 399 participants completed the first timepoint (i.e., the negative mood scale and cognitive tasks) the day immediately after they had completed the questionnaire. Participants who did not have normal or corrected-to-normal vision, had any attention and/or learning difficulties, or knew Mandarin (which we used in the symbol learning task) were not invited to take part in the longitudinal phase. Participants received £5 for each timepoint completed. There was moderate dropout across timepoints – 328 participants remained at Week 3, 275 at Week 5, 228 at Week 9, and 203 at Week 13. Two of the 342 participants were removed from the Symbol Learning data because they knew Japanese and were therefore familiar with the Mandarin characters used in our task. Japanese and Mandarin use the same writing system (known as Kanji and Hanzi, respectively). The Flanker RT and DSST RT files excluded incorrect responses (3.0% and 2.2% of responses, respectively) as well as correct responses ±2 SDs from a participant's mean at each timepoint (4.0% and 4.7% of correct responses, respectively). There were no missing data otherwise.

2.4.2 Study 2

Two hundred and seventy-seven adults from the general population, who were not involved in Study 1, took part in the study. The sample included 138 participants (59.4% female, 40.6% male; $range_{age}$: 18–69 years, M_{age} = 39.3, SD_{age} = 12.5) who identified as residents of Scotland ($range_{residence}$: 1–69 years, $M_{residence}$ = 34.2, $SD_{residence}$ = 14.8). All were recruited through convenience sampling via Prolific Academic (https://prolic.co/) and received £6 in exchange for participation. The sample also included 139 participants (46.0% female, 53.2% male, 0.7% undisclosed gender; $range_{age}$: 20–70 years, M_{age} = 39.3, SD_{age} = 9.2) who identified as residents of Japan ($range_{residence}$: 20–70 years, $M_{residence}$ = 39.1, $SD_{residence}$ = 9.1). All were recruited through convenience sampling via CrowdWorks (https://crowdworks.jp/), a popular crowdsourcing site in Japan, and were paid ¥850 (equivalent to £6 at the time of data collection). For further demographic information, such as marital and employment status, see the Sample file. A minority of participants lived alone (12.3% of Scottish participants, 22.3% of Japanese participants). Professionally, 44.2% of Scottish participants[1] were working from home (vs. 25.9% of Japanese participants), 13.8% were unemployed (vs. 21.6%), 7.3% furloughed (vs. 0.7%), 20.3% keyworkers (vs. 18.7%), 8.0% carers/parents (vs. 18.0%), 5.1% were working away (20.9%), and 1.4% did not disclose their employment status (vs. 2.2%). Scottish participants would leave the house four times on average in a lockdown week (range: 0–21, *M* = 4.1, *SD* = 3.8). This estimate was slightly lower for Japanese participants (range: 0–10, *M* = 3.5, *SD* = 2.0). For information on pandemic-related experiences, see Table 1 below.

All 277 participants completed the five cognitive tasks and measures of negative mood and perceived social isolation. However, six participants were later removed from all the cognitive task data – four Scottish and one Japanese participant due to self-reported attention difficulties, and one Scottish participant due to self-disclosed learning difficulties. All other participants had normal or corrected-to-normal vision, no attention or learning difficulties, and were native speakers of English/Japanese. Three Scottish and two Japanese participants were removed from the Symbol Learning data because they either did not understand the task or disclosed they had written down symbol-meaning mappings and used the notes during recall. The Flanker RT and DSST RT files excluded incorrect responses (3.1% and 4.3% of

	SCOTTISH PARTICIPANTS (n = 138)			JAPANESE PARTICIPANTS (n = 139)		
EXPERIENCE	***YES***	***NO***	***NA***	***YES***	***NO***	***NA***
1. Tested positive for COVID-19	1 [<1%]	137 [99%]	–	–	–	–
2. Suspected COVID-19	23 [17%]	121 [83%]	1 [<1%]	–	–	–
3. Member of household tested positive or suspected COVID-19	17 [12%]	121 [88%]	–	–	–	–
4. Had to self-isolate	51 [37%]	86 [62%]	1 [<1%]	12 [9%]	126 [91%]	–
5. Shielding	15 [11%]	122 [88%]	1 [<1%]	9 [7%]	129 [94%]	–
6. Suffered bereavement due to the pandemic	14 [10%]	123 [89%]	1 [<1%]	–	–	–
7. Experienced a change in employment due to the pandemic	35 [25%]	103 [75%]	–	28 [20%]	109 [79%]	1 [<1%]

Table 1 Numbers of Scottish and Japanese participants with different pandemic-related experiences.

Note: NA = not available/undisclosed. Relative percentages are given in the parentheses. Items 1–3 and 6 were omitted from the Japanese version of the questionnaire due to cultural sensitivities surrounding this information. Item 5 Shielding in Japan includes elderly people and those who have underlying diseases, such as chronic obstructive lung disease (COLD), chronic kidney disease (CKD), diabetes, high-blood pressure, cardiovascular condition, obesity, and those who are in the last trimester of pregnancy.

responses, respectively) as well as correct responses ±2 SDs from a participant's mean at each timepoint (4.4% and 4.6% of correct responses, respectively). There were no missing data otherwise.

2.5 MATERIALS

Both studies were constructed in Gorilla Experiment Builder (https://gorilla.sc/). For information about the stimulus and response timing precision of this experiment hosting platform, see Anwyl-Irvine et al. (2020) and Bridges et al. (2020). Participants were required to use a computer, rather than a tablet or phone, and could run any browser other than Internet Explorer. The order of materials in both studies was the same. The cognitive tasks in Study 1 were completed in the same order at each timepoint. For Japanese participants in Study 2, all materials were translated from English into Japanese by the third author and then checked for accuracy by another native Japanese speaker who was otherwise uninvolved in the study. Examples of the materials used in both studies can be found within our open materials page on Gorilla (https://app.gorilla.sc/openmaterials/386193).

2.5.1 Questionnaire

Study 1 involved a multi-purpose questionnaire consisting of three sections. The first section pertained to general demographics, such as age, gender, nationality, marital status, student status, and type of home. The second section pertained to experiences related to the pandemic and social isolation. For instance, participants were asked whether they suspected they had contracted or had tested positive for COVID-19, whether their employment changed as a result of the pandemic, who they lived with, and whether they had to shield or self-isolate at any time. Participants also indicated why and how often they would leave the house in a typical lockdown week, how and how often they would communicate with relatives/friends from a different household, and what they did in their free time.

The third section measured changes to health behaviours as a result of the pandemic. Participants rated changes to their alcohol consumption, diet, perceived sleep quality, and physical activity during lockdown. A five-point scale was used for all four behaviours (alcohol: 1 = "drinking a lot more", 3 = "about the same", 5 = "a lot less"; diet: 1 = "a lot more unhealthy", 3 = "about the same", 5 = "a lot more healthy"; sleep: 1 = "a lot worse", 3 = "about the same", 5 = "a lot better"; physical activity: 1 = "a lot less", 3 = "about the same", 5 = "a lot more"). Participants also rated their physical activity during lockdown using a 100-point slider scale, where higher values denoted greater activity level. For more detail about the questions and response options, see the questionnaire at https://osf.io/kvpbt/.

The questionnaire was slightly adapted for Study 2. We removed questions about COVID-19 infection from the Japanese version due to cultural sensitivities surrounding this information. We also removed questions about sexual orientation, nationality, ethnicity, type of home, means and frequency of communication with people from other households, free time activities, and physical activity level. The rationale for this decision was that these data proved to be not particularly useful or relevant to our hypotheses in Study 1. However, we added a new open-ended question for participants to reflect on measures they were taking to protect themselves and other from COVID-19. This aimed to uncover potential differences in lockdown strategies between Scotland and Japan at the individual level. The questionnaire used in Study 2 is available at https://osf.io/qsbuk in English and within the open materials page on Gorilla in Japanese (https://app.gorilla.sc/openmaterials/386193).

2.5.2 Cognitive tasks

The *Iowa Gambling Task* was adapted from Bechara et al. (1994) and used as a measure of decision making. Participants selected cards from one of four decks of cards to win as much 'game money' as possible. Participants received a virtual £2000 at the start and were told that each deck held cards that would either reward or penalise them. There 100 randomised trials with no time limit, half of which involved a penalty. There were two 'advantageous' decks that resulted in an overall gain in the long run (£50 reward, £50 penalty) and two 'disadvantageous' decks that penalised the most (£100 reward, £250 penalty). The same trials were used across the five timepoints in Study 1. The data set includes advantageous or disadvantageous choices at the trial level (Iowa gambling files).

The *Flanker Task* was adapted from Wylie et al. (2007) and was used as a measure of selective attention, or the ability to inhibit task-irrelevant information. Participants were presented with a target arrow located in the centre of the screen and two distractor arrows, or flankers, located on each side of the target arrow. Participants were instructed to ignore flankers and press the J key when the target pointed right, or the F key when it pointed left. Participants had to respond as fast and accurately as possible. On congruent trials, the target arrow and flankers pointed in the same direction. On incongruent trials, they pointed in the opposite directions. Trials began with a 500 ms fixation cross in the centre of the screen. The target arrow and flankers were displayed until a response was made and were followed by a 750 ms inter-trial interval. There were 20 practice trials with feedback on response accuracy and 80 experimental trials; all trials were presented in random order and had equal numbers of the four direction-by-congruency combinations. The same trials were used across the five timepoints in Study 1. The data set includes response accuracy and latency (for correct, trimmed responses) at the trial level (Flanker Acc & RT files). Data trimming involved removing correct responses that were ±2 *SD*s from each participant's mean.

The *Symbol Learning Task* was adapted from Yang et al. (2017) and used as a measure of learning ability. In Study 1, participants studied and then recalled the meanings of Mandarin characters. We used 50 characters with concrete meanings. The characters were randomly split into five list, one for each timepoint. The lists were counterbalanced across participants and timepoints, and the characters were presented in random order both in the learning and the recall phase. In the learning phase, participants had unlimited time to study a given symbol-meaning mapping and pressed the space bar to move to another. The learning phase was followed by a short distractor task, in which participants solved 10 mathematical problems that required adding or subtracting two-digit numbers. The problems were presented in random order, one at a time. In the recall phase, participants were presented with a character and had unlimited time to recall and type in its meaning (or the word 'nothing' if they could not recall any information). In Study 2, the Mandarin characters were replaced with symbols that are not used in any language (these new symbols were obscure 'alien language' symbols taken from various pieces of graphic design and fiction). This was because Japanese and Mandarin use the same writing system, and as such, our materials were not suitable for Japanese participants. Participants learnt only 10 symbols as Study 2 involved a single testing session/timepoint. There were no differences between the studies otherwise. The data set includes recall accuracy at the trial level (Symbol learning files).

The *Digit-Symbol Substitution Task* (DSST) was adapted from Chatterjee et al. (2019, Version 1) and used as a measure of working memory. Participants were presented with an array of nine digit-symbol pairs, or a lookup table, at the top of the screen and a target digit-symbol pair in the centre. Participants pressed the J key if the target pair matched with either of the pairs shown in the lookup table, or the F key if it did not. Participants had to respond as fast and as accurately possible. The target pair and lookup table were displayed until a response was made, then followed by a 300 ms inter-trial interval. There were 10 practice trials with feedback on response accuracy and 50 experimental trials, all presented in random order. Different sets of symbols were used for the practice and experimental trials. In Study 1, we used the same lookup table but different target pairs at each timepoint. The data set includes response accuracy and latency (for correct, trimmed responses) at the trial level (DSST Acc & DSST RT files).

The *Time Production Task* was adapted from Tortello et al. (2020) and used as a measure of time estimation ability. Participants estimated when a certain amount of time (500, 1000, 1500, or 4000 ms) had passed. Trials began with the target duration (e.g., 'produce 1000 ms') displayed for 5000 ms. A response cue ('?') was then displayed until participants pressed the space bar to indicate when the given amount of time had passed. Responses were followed by a 1000 ms inter-trial interval. There were four practice and 16 experimental trials, both of which were randomised and involved equal numbers of the four target durations. The same trials were used across the five timepoints in Study 1. Time deviation scores (in ms) were calculated by subtracting target durations from response times – negative values indicated underestimation, and positive values indicated overestimation. The data set includes time deviation scores at the trial level (Time production files).

2.5.3 Negative mood

We used 10 negative items from Grove and Prapavessis' (1992) abbreviated Profile of Mood State (POMS) scale, with two items from each of the five subscales – Confusion ('forgetful', 'unable to concentrate'), Tension ('anxious', 'uneasy'), Depression ('helpless', 'sad'), Fatigue ('exhausted', 'worn out'), and Anger ('angry', 'annoyed'). The abbreviated POMS scale (Grove & Prapavessis, 1992) has a mean subscale inter-correlation of .58 (.53–.67), mean subscale internal consistency (Cronbach's α) of .80 (.66–.80), and clear validity (winner-loser differences $p < .001$). Participants rated their mood on each item *at that point in time* using a 100-point slider scale. Negative mood scores (NMS) were calculated by summing ratings across the 10 items, with higher scores denoting greater negative mood. In Study 2, the 10 items from Grove and Prapavessis (1992) were translated into Japanese by the third author. Synonyms were used where literal translations were not possible. The data set includes NMS (for each timepoint for Study 1; Mood files).

2.5.4 Perceived social isolation

Participants rated how socially isolated they felt *at that point in time* using a 100-point slider scale, with higher scores denoting greater isolation. This measure was used in Study 2 only. The data set includes social isolation scores (Isolation file).

2.6 QUALITY CONTROL

Both studies were pre-tested by the research team and then piloted on five participants. Minor issues with task instructions or technical issues were addressed before full roll-out.

Since the studies explored the effects of social distancing measures in Scotland/Japan, we made sure that participants were indeed in the country before and during data collection. This involved pre-screening participants on Prolific Academic, restricting participant location on Gorilla Experiment Builder, and confirming participant location within the questionnaire.

Pre-screening on Prolific Academic and via the questionnaire also confirmed that participants had normal or corrected-to-normal vision and no attention or learning difficulties, as these would influence their performance on the cognitive tasks. Any participants who did not meet the criteria were either not invited to complete the tasks (Study 1) or excluded from the data set post hoc (Study 2; see 2.4 Sampling, sample, and data collection).

We asked participants whether they had cheated on any of the tasks (e.g., using a stopwatch in the time production task) and whether anything may have influenced their performance (e.g., issues with stimulus display, mindless response-making, lapses in attention). Several participants admitted to using a calculator to solve the mathematical problems within the Symbol Learning task. This was not an issue since the problems served as a distractor task. As mentioned in 2.4 Sampling, sample, and data collection, we removed a small number of participants from the Symbol Learning data, either because they had prior knowledge of the symbols (two participants in Study 1) or because they admitted to writing down both the symbols and their meanings, rather than memorising them (five participants in Study 2).

Overall, performance on the five cognitive tasks was good and accurate (for descriptive statistics, see Tables 2 & 3 below), which is indicative of participants' thorough approach to the study. Although it is very difficult to distinguish poor ability from poor engagement with the study at the individual level, we have identified certain participants with suboptimal and divergent performance on the DSST and Flanker tasks, for which the distinction may be clearer. In Study 1, there were 10 participants with response accuracy below 50% and four participants with mean RT twice as high as the group mean in the DSST as well as one participant with response accuracy below 50% and four participants with mean RT twice as high as the group mean in the Flanker Task. In Study 2, there were two Scottish and two Japanese participants with response accuracy below 50% in the DSST, four Scottish and one Japanese participant with mean RT twice as high as the group mean in the DSST, one Scottish and one Japanese participant with response accuracy below 50% in the Flanker Task, and two Scottish participants with mean RT twice as high as the group mean in the Flanker Task. These participants were retained in the data set, but we provide their anonymous participant codes in the Performance notes files for further scrutiny. We recommend that researchers either remove these participants from analyses or employ analyses that are

TASK (VARIABLE)	WEEK				
	1 (n = 342)	3 (n = 328)	5 (n = 275)	9 (n = 228)	13 (n = 203)
Iowa Gambling (% advantageous choices)	62.7 (19.7)	69.4 (21.5)	74.7 (22.8)	74.4 (23.1)	77.5 (23.9)
Symbol Learning (% correctly recalled meanings)	56.8 (29.6)	58.8 (27.1)	59.8 (28.7)	63.9 (27.8)	62.3 (28.7)
DSST (% correct responses)	94.7 (11.0)	98.4 (6.2)	99.1 (6.1)	99.6 (1.2)	98.3 (9.8)
DSST (RT in ms)	1545.1 (417.0)	1360.0 (357.5)	1223.5 (294.3)	1188.0 (271.2)	1160.4 (285.1)
Flanker (% correct responses)	96.8 (6.3)	97.4 (3.8)	97.1 (4.0)	96.8 (5.3)	96.8 (5.5)
Flanker (RT in ms)	483.1 (92.6)	462.7 (67.2)	464.6 (84.5)	465.1 (83.3)	462.3 (87.2)
Time Production (time deviation score in ms)	–67.7 (493.9)	11.1 (499.8)	8.4 (534.8)	15.0 (546.4)	42.1 (534.9)

Table 2 Study 1: Mean performance for cognitive tasks across the five timepoints.

Note: Standard deviations are given in parentheses. Two participants were excluded from the statistics for the Symbol Learning Task. Incorrect responses and correct responses ٢± SDs from each participant's mean were excluded from the statistics for RT variables. For time deviation scores, negative values indicate underestimation, and positive values indicate overestimation.

TASK (VARIABLE)	SCOTTISH PARTICIPANTS (n = 138)	JAPANESE PARTICIPANTS (n = 139)
Iowa Gambling (% advantageous choices)	59.9 (21.9)	59.4 (20.9)
Symbol Learning (% correctly recalled meanings)	59.3 (30.2)	54.6 (31.6)
DSST (% correct responses)	95.7 (8.6)	95.6 (10.1)
DSST (RT in ms)	1705.6 (535.6)	1596.7 (419.8)
Flanker (% correct responses)	96.8 (7.7)	97.0 (9.2)
Flanker (RT in ms)	507.3 (178.2)	461.8 (86.3)
Time Production (time deviation score in ms)	–16.0 (538.7)	–114.8 (390.2)

Table 3 Study 2: Mean performance for cognitive tasks for Scottish and Japanese participants.

Note: Standard deviations are given in parentheses. Three Scottish and two Japanese participants were excluded from the statistics for the Symbol Learning Task. Incorrect responses and correct responses ±2 SDs from a participant's mean were excluded from the statistics for RT variables. For time deviation scores, negative values indicate underestimation, and positive values indicate overestimation.

less sensitive to the influence of potential outliers (e.g., inverse transformation, mixed effects modelling).

A Cronbach's α = .91 was observed for the NMS in Study 1 (10 items), and the five subscales ranged from.69 to .89. Similar estimates were obtained in Study 2 for Scottish (α = .93; by-subscales range: .64–.91) and Japanese participants (α = .92; by-subscales range: .65–.94), and both groups combined (α = .93; by-subscales range: .69–.91).

There were no missing data, other than a small number of "prefer not to say" responses to the questionnaire. Participants were forced to make a response by the experiment hosting platform. Data were processed in an automated way either in Excel or R, with changes and notes on participant performance recorded in a log.

2.7 Data anonymisation and ethical issues

The studies followed the British Psychological Society (2014) guidelines and were approved by the School of Education and Social Sciences, University of the West of Scotland (Studies 1 & 2) and the Faculty of Humanities and Social Sciences, University of Tsukuba ethics committees (Study 2). Participants provided informed consent and had the right to withdraw during or up to a week after the study. All data were anonymised at the start of each study. Participants from Scotland were assigned an anonymous code by Prolific. Participants from Japan were asked to generate an anonymous username prior to the study. Some of the usernames contained participant names or other potentially identifying information and were thus replaced by the researchers with numbers.

2.8 EXISTING USE OF DATA

Study 1:

Ingram, J., Maciejewski, G., & Hand, C. J. (2020). Changes in diet, sleep, and physical activity are associated with differences in negative mood during COVID-19 lockdown. *Frontiers in Psychology*, 11: 588604. https://doi.org/10.3389/fpsyg.2020.588604

Ingram, J., Hand, C. J., & Maciejewski, G. (2021). Social isolation during COVID-19 lockdown impairs cognitive function. *Applied Cognitive Psychology*, *35*(4), 935–947. https://doi.org/10.1002/ACP.3821

Study 2:

Ingram, J., Hand, C. J., Hijikata, Y., & Maciejewski, G. (2022). Exploring the effects of COVID-19 restrictions on wellbeing across different styles of lockdown. *Health Psychology Open*. https://doi.org/10.1177%2F20551029221099800

(3) DATASET DESCRIPTION AND ACCESS

3.1 REPOSITORY LOCATION

Study 1 data set – https://doi.org/10.17605/OSF.IO/KVPBT
Study 2 data set – https://doi.org/10.17605/OSF.IO/QSBUK

3.2 OBJECT/FILE NAME

Study 1 data set – Variables.csv, Performance notes.csv, Sample.csv, Mood.csv, DSST Acc.csv, DSST RT.csv, Flanker Acc.csv, Flanker RT.csv, Iowa gamling.csv, Symbol learning.csv, Time production.csv

Study 2 data set – Variables.csv, Performance notes.csv, Sample.csv, Mood.csv, Isolation.csv, DSST Acc.csv, DSST RT.csv, Flanker Acc.csv, Flanker RT.csv, Iowa gamling.csv, Symbol learning.csv, Time production.csv

3.3 DATA TYPE

Primary and processed data

3.4 FORMAT NAMES AND VERSIONS

CSV, PDF

3.5 LANGUAGE

British English

3.6 LICENSE

CC-BY

3.7 LIMITS TO SHARING

None

3.8 PUBLICATION DATE

Study 1 data set – 16th January 2021
Study 2 data set – 16th July 2021

3.9 FAIR DATA/CODEBOOK

All data are aligned to digital object identifiers to make them locatable. Files are accessible in widely used CSV format. A data codebook (Variables.csv) is provided for each data set.

(4) REUSE POTENTIAL

These data sets include information on a wide range of socio-demographic variables as well as information on health behaviours, negative mood, and cognitive function which may be reused. Data was gathered to identify participants who were living alone or shielding. These data were considered in line with changes in cognitive task performance to gain confidence in the cause of the effects seen, that is, to rule out practice effects. We ascribe differences in cognitive task performance across time in Study 1 to easing of restrictions in Scotland (Ingram et al., 2021). However, there are a range of socio-demographic factors and COVID-19 induced changes within the data set which have not been considered in relation to cognitive tasks or negative mood. For example, the Study 1 data set includes data collected on alternative social activities carried out during the pandemic (e.g., online parties/quizzes, phone calls), and these could be associated with any of the outcome variables collected or other socio-demographic variables. Selected socio-demographic variables are considered in line with health behaviours and negative mood in Ingram et al. (2020) and Ingram et al. (2022). However, variables such as gender, changes to work status or COVID-19 infection could also be considered in relation to cognitive tasks. However, note that such analysis may be challenging due to small and/or unbalanced group sizes.

Study 1 reports data from five timepoints and the number of participants completing the study at these timepoints, and hence the data available for longitudinal analysis, decreased as time went on. Additional analyses (Ingram et al. (2021) demonstrated no qualitative differences in relation to cognitive task performance or demographic features between all the participants and those who completed all the timepoints. However, these analyses examined very specific interactions between cognitive task performance and indirect measures of isolation (living alone, shielding). The data could be used in several ways to consider the effects of other demographic features across the timepoints. Such analysis could provide insight into possible protective factors or coping strategies which people may have engaged in to mitigate the effects of the pandemic on their wellbeing. For example, Ratschen et al. (2020) reported that living alone and higher frequency of remote social contact were associated with increased levels of loneliness during lockdown. Similar analysis could be conducted on the current data sets – in particular, negative mood and frequency and means of communication with individuals from another household during lockdown. Ratschen et al. (2020) and Shoesmith et al. (2021), for example, also discuss the mental health benefits of companion animals during lockdown. Similar beneficial factors may also be identifiable in the current data sets.

Data is limited in some areas, which may restrict reuse. Scottish participants reported if they had experienced COVID-19 infection but were not asked to specify when they had/might have had COVID-19. Some participants may have been ill during the time of data collection, but this cannot be discriminated. In Study 2, questions on COVID-19 infection were considered culturally insensitive for Japanese participants and so these versions were omitted from the Japanese versions of the study. It is therefore not possible to compare psychological wellbeing and cognitive task performance of people who had experienced COVID-19 infection across countries. Measures of perceived social isolation are available for both Scotland and Japan, but only in Study 2. This measure cannot be considered in relation to data collected in Scotland in 2020.

Beyond research involving the COVID-19 pandemic, our data sets may provide the unique opportunity to consider the effects of social isolation on negative mood and cognitive performance. Previous research examining social isolation often focuses on specific groups. These include participants in polar expeditions (e.g., Khandelwal et al., 2017); astronauts who have spent extended periods of time in space (Kanas & Manzey, 2008); or solo expeditioners who, for example, tracked their cognitive function while crossing the Simpson desert (Maruff et al., 2006). Our data provide an opportunity for researchers working in these areas to consider results in a baseline setting, where social isolation is imposed but physical surroundings are not novel. Further, participants in the current studies did not undergo any specific testing or training before isolation was imposed.

The data also provides an opportunity to consider the effects of social isolation in separation from ageing. Whilst previous research on cognitive function in ageing has demonstrated independent effects of social isolation (e.g., Zunzunegui et al., 2003; Read et al., 2020), this research is often reliant on self-report measures of socialisation. Our data measures cognitive function during a period when level of isolation was imposed. Changes in cognitive function are mapped across timepoints within Study 1 as COVID-19 restrictions eased. These data, and consideration of the many socio-demographic variables measured, may give further insight into cognitive reserve (e.g., Bherer, 2015; Karbach & Verhaeghen, 2014), if considered in line with data from an ageing population.

These data may be used by governments or policy makers when evaluating cost-benefit ratios in considering future restrictions to socialisation in times of medical or civil emergency. Data considering health behaviours and their relationship with mental health may also be valuable in supporting public health advice. For example, our data on physical activity could be used to further substantiate the benefits of an active lifestyle.

NOTE

1 Throughout the report, we describe participants as Scottish or Japanese based on their location, not necessarily nationality.

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COMPETING INTERESTS

The authors have no competing interests to declare.

AUTHOR CONTRIBUTIONS

This manuscript was prepared by Greg Maciejewski (University of the West of Scotland) and Joanne Ingram (University of the West of Scotland), and was reviewed and edited by Christopher Hand (Glasgow Caledonian University at the time of data collection, currently University of Glasgow) and Yuko Hijikata (University of Tsukuba).

Materials for Study 1 were developed by Joanne Ingram, Greg Maciejewski, and Christopher Hand. Data was collected by Greg Maciejewski and processed by Greg Maciejewski and Christopher Hand.

Materials for Study 2 were developed by Joanne Ingram, Greg Maciejewski, and Yuko Hijikata. Data was collected by Greg Maciejewski and Yuko Hijikata, and processed by Greg Maciejewski and Christopher Hand.

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