# The impact of COVID-19 on wellbeing, depression, and physical activity of informal caregivers and non-caregivers during isolation.

Nick Schorren

17th of July 2020

**Supervisors**

Annemarie Braakman-Jansen

Christian Wrede

# Abstract

**Background.** While self-isolation of the population is proving to prevent rapid contamination of COVID-19 in the Netherlands, these measures seem to alter daily life and induce mental and physical deficiencies. Especially informal caregivers, who already displayed caregiving burden and health issues, could be vulnerable to the current isolation. Therefore, wellbeing, depression, and physical activity scores are compared before and during isolation for all respondents, between informal and non-caregivers, and between informal caregivers having either a caretaker at their household or outside their household.

**Methods.** A cross-sectional survey design was used. Respondents were gathered by spreading the questionnaire via a range of social media platforms and by contacting healthcare professionals. The SMFQ, SWEMWBS, and IPAQ-SF were used to determine depression, wellbeing, and physical activity values, respectively, before and during isolation.

**Results.** A total of 275 participants were included of which n = 60 (22%) were identified as informal caregivers, with n = 12 (20%) of the informal caregivers having a caretaker at their household. Findings proved small to moderate significant negative effects of isolation on the total sample's wellbeing ($p < .001$), depression ($p < .001$), and physical activity ($p = .001$) scores. Informal caregivers reported a significantly greater change in wellbeing ($p = .015$) and depression ($p = .001$) scores than non-caregivers, while physical activity changes proved insignificant between the two. Informal caregivers having a caretaker at their household showed significantly greater change in depression ($p = .03$) than informal caregivers having a caretaker outside their household but not in physical activity and wellbeing.

**Conclusion.** Isolation of the Dutch population is showing negative mental and physical effects, with informal caregivers displaying somewhat more vulnerability for changes in wellbeing and depression values. Therefore, the impact of COVID-19 should not be underestimated and handled accordingly.

# Introduction

Early June, approximately 6.8 million people are or have been infected by COVID-19 (ECDC, 2020). Of these cases, almost 50.000 patients are registered in the Netherlands, with a mortality rate of over 7 percent (RIVM, 2020a). This number is expanding with such pace, that one speaks of a pandemic. To avoid excessive contagion in the Netherlands, the RIVM (Rijksinstituut voor Volkgezondheid en Milieu) has set up a plan of isolation, which aims to 'control' the virus (RIVM, 2020b). To elaborate, a list of rules and norms has been set up, mainly including work from home, stay home when you feel ill, wash your hands more often, keep a distance of 1.5 meters from others, wear masks in public transport, do not execute professions that include physical contact, and do not attend crowded events (RIVM, 2020b). Vital professions including caregiving, however, are continued during isolation due to the urgency of these jobs but reduced to minimal occupation.

Notably, caregiving is not only performed by professionals but also by informal or unpaid caregivers. These individuals execute the same tasks as professional caregivers, including household care (cleaning, shopping), personal care (dressing up, washing), and psychosocial care (emotional support, undertaking activities), but are not eligible to perform medical procedures (Rijksoverheid, n.d.). Often, informal care is unpaid, executed beside one's regular job, and provided for spouses, family members, or friends who either live in the same household, nearby, or at a long distance. In the Netherlands, roughly 600.000 caretakers are assisted by informal caregivers, reporting averages of more than 32 hours per month of received care (Evita, 2017). Reasonably, informal caregiving initiates great respect from health care institutions by alleviating pressure on the organization and the population (Berglund, Lytsy & Westerling, 2015). However, the great amount of effort informal caregivers put in brings about consequences: they seem to display a caregiving burden (Hampton & Newcomb, 2018). To elaborate, Hampton and Newcomb (2018) highlight that

proportions of informal caregivers perceive caregiving as a heavy workload, resulting in high amounts of stress and lower assessments of self-efficacy and self-care needs compared to non-caregivers. Additionally, Chou, Yeung, and Chi (2001) explain that the psychological and financial distress is even higher when informal caregivers' spouse, friend, or family member lies within 20 minutes of traveling distance compared to caretakers living at a further distance. Over the long term, Berglund et al. (2015) conclude that informal caregivers can even develop a need for care themselves.

Besides the psychological distress associated with informal caregiving, the individual's physical health also seems to be affected by the unpaid provision of care. Berglund et al. (2015) found plausibly higher mortality rates for informal caregivers, forming an at-risk group in developing major health problems, such as increased blood pressure, due to the high physical demands of the caring process. While the intensity of informal caregiving negatively affects one's health, physical inactivity may also be a major contributor: chronic diseases, loss of function and mortality are often occurring deficits resulting from not partaking into physical exercises or sports (Haskell, Blair & Hill, 2009). For that reason, undertaking regular physical activities – e.g. walking for 30 minutes per day, performing cardio for 150 minutes per week, lifting 75 minutes per week or a combination of the three - could relieve physical issues and is recommended for at-risk groups (Haskell, Blair & Hill, 2009). Subsequently, King and Brassington (1997) confirm that physical inactivity is apparent among informal caregivers but say that this group is willing to take part in physical activity programs. While this seems contradictory, the reasoning behind the physical inactiveness might account for it: the awareness of informal caregivers that inactiveness results into physical health problems motivates them to be active, but the burden of caregiving and the dual role played in daily life restricts them from doing so (Berglund et al. 2015; King & Brassington, 1997). Moreover, King and Brassington (1997) found that

informal caregivers possibly limit themselves by not willing to attend an exercise class or group and prefer to perform physical activities at home.

As explained, informal caregivers already seem to display caregiving burden 'before' isolation, while the detrimental effects of the current COVID-19 outbreak on a population need to be examined (Jihola, 2020). Under similar circumstances of isolation, such as the SARS (Severe Acute Respiratory Syndrome) outbreak in Canada, Hawryluck et al. (2004) found that individuals reported higher amounts of psychological distress, even displaying forms of PTSD and depressive symptoms. These psychological issues seemed to arise from the social as well as physical distance with family members and friends, the restriction of going outside, the sense of isolation due to wearing masks, and the anxiety for the virus (Johal, 2009; Hawryluck et al., 2004). Additionally, professional caregiving is reduced to minimal occupation while day-care is being closed, meaning that caretakers are mostly depending on their informal caregivers during isolation (Rijksoverheid, n.d.). Consequently, informal caregivers are left with a fulltime care task and might become even more prone to caregiving burden, especially when their care recipients live in the same household (Chou et al., 2001). Also, physical health issues were reported by individuals concerning headaches, sleep problems, and shortness of breath, partly reported by wearing masks (Johal, 2009). However, little is known about individuals' levels of physical (in)activity during isolation, but restrictions of contact with friends and family would have excluded the possibility to perform group exercises or team sports.

As a result, it would be interesting to capture the psychological and physical impact of COVID-19 on the Dutch population and informal caregivers in particular. Therefore, examined will be what effects the current isolation has on individuals' wellbeing, depression, and physical activity, by comparing 'during' and 'before' isolation scores of the three variables. If there are any differences between 'before' and 'during' isolation, it will be

investigated if these changes in wellbeing, depression, and physical activity differ between informal caregivers and non-caregivers. Also, examined will be if informal caregivers display different levels of wellbeing, depression, and physical activity when their caretaker lives in the same household compared to informal caregivers whose caretaker lives outside the household. Expected will be that the entire population's reported wellbeing and physical activity scores are lower and depression scores are higher 'during' COVID-19 compared to 'before' isolation. Next, it is predicted that informal caregivers report greater change in scores between 'before' and 'during' isolation than non-caregivers, and that informal caregivers with caretakers at home display bigger change in wellbeing, depression, and physical activity scores between 'during' and 'before isolation' than informal caregivers who provide care outside their household.

# Methods

## Design

A cross-sectional survey design was used as the method for this research, which includes that the questionnaire is handed in once, at one moment in time, per participant.

## Participants

To be included in the sample, participants should be at least 18 years or older and participants' country of residence should be the Netherlands, as it is the focus of this study. It is expected that small effects (0.2) will be found for all components of the research question, including changes in scores on wellbeing, depression, and physical activity of the total sample between non-caregivers and informal caregivers (living in the same household as their caretaker or not). Assuming an 80% power of the study and keeping a 5% margin of error, a sample size of 393 respondents is desired to confirm any small effects. To gather these participants, non-probability sampling methods, such as snowball techniques, were mostly used by sharing the questionnaire via social media platforms such as professionals' authoritative accounts on LinkedIn and ResearchGate, other digital mediums such as Facebook, WhatsApp, and Twitter, and via e-mail. Also, health care professionals, including caregivers in training, were purposively sampled to gain insights about the specific target group. Contacting health care institutions and acquaintances active in healthcare by email, platforms, or phone assisted this probability sampling technique.

## Materials

### Defining the target groups

Determining whether someone provided informal care or not, was based on the multiple-choice question: ''Please select what is most applicable to you.'', with three possible

answers, namely ‘’At the moment, I provide professional care to elderly (e.g. a parent, family member or friend)’’, ‘’At the moment, I provide unpaid care to elderly (e.g. a parent, family member or friend)’’, or ‘’None’’. Respondents providing unpaid care were labelled as informal caregivers, whereas all other respondents, including professional caregivers and other professions, were labelled as non-caregivers (by which is meant ‘not an informal caregiver’). Consequently, informal caregivers received the question ‘’What living situation applies to you’’, with two answer options: `’My caretaker does not live in the same household’’ and ‘’I live in the same household as my caretaker’’. Based on this question, a distinction was made between informal caregivers who provide care at home and outside home. What this means, is that the total sample is divided into a group of non-caregivers and a group of informal caregivers, with the latter being categorized by informal caregivers who provide care in their household and informal caregivers who provide care outside their household.

**Scales**

**Mental wellbeing (Short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS))**. The short version of the Mental Wellbeing scale is a 7-item scale, which asks the participants to judge their thoughts over the past two weeks on a Likert scale including 1 = None of the time, 2 = Rarely, 3 = Some of the time, 4 = Often, and 5 = All the time (Fat et al., 2017). An example of the item states: ‘’I’ve been feeling relaxed’’. The SWEMWBS showed good internal reliability, with Cronbach’s alpha being 0.84. Regarding criterion validity, Spearman’s correlations showed moderate relationships with the happiness index ($\rho = 0.53$, $p < 0.001$) (Collins, et al. 2012; Maheswaran, et al. 2012). As the SWEMWBS was not available in Dutch, it was translated followed by back-translation with the supervision of

international scientists from the organization, displaying moderate reliability with Cronbach's alpha being 0.74.

**Mood and feeling (Short Mood and Feelings Questionnaire (SMFQ)).**

The SMFQ consists of 13 items, regarding how you felt over the past two weeks. Based on a 3-point Likert Scale, answers ranged from 1 = Not true, 2 = Sometimes and 3 = True, with ''I felt miserable or unhappy'' being an item included in the questionnaire. The items displayed good internal reliability ($\alpha$ = .88 to .89), as well as content validity (r > .50) for all 13 items (Thabrew et al. 2018). This questionnaire was also made available in the Dutch language to the respondents, reporting good reliability as Cronbach's Alpha is 0.92.

**Physical activity (International Physical Activity Questionnaire Short Form (IPAQ-SF)).**

The Short form of the IPAQ consists of 7 items, in which open-ended questions, which could be answered in minutes and hours per day, are proposed to the participants about their last 7-day recall of physical activity. These items are divided by their activity weight, including vigorous activities (‘’ During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?’’), moderate activities (‘’During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.’’), and walking (‘’ Think about the time you spent walking in the last 7 days. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.’’). The scores on the IPAQ are named Metabolic Equivalent Task (MET) and calculated as follows: Weight scores are given to the three different categories (Vigorous activity = 8, Moderate activity = 4, Walking = 3.3), and multiplied by the activity in minutes per day and the days per week the

activity was carried out. So, for example, if someone performs only moderate activities 3 days per week, with an average amount of 60 minutes per day, the MET-score will be: 4 x 60 x 3 = 720. It should be mentioned, however, that scores are not included in the MET calculation when individuals reported physical activity for less than 10 minutes per day or more than 180 minutes per day. The shortened version of the scale did show moderate to good reliability (ranging from r = .53 to r= .62). Regarding validity, the Dutch IPAQ-SF showed reasonable assessment properties capturing physical activity rates ($\rho = 0.09$ to $\rho = 0.29$) (Craig et al., 2003; Blikman, Stevens, Bulstra, van den Akker-Scheek, & Reininga., 2013).

**Demographic information and the need for physical and psychosocial support**.

Open-ended questions could be answered by filling in letters or number for the demographic information, such as ‘’Age (years old)’’, ‘’Country (first letter in capital letter)’’, and ‘’Gender’’, with answer possibilities including: ‘’Male’’, ‘’Female’’, ‘’Non-binary’’ and ‘’Not relevant’’. Questions regarding the state of health were asked in multiple-choice format, in which answer options are based on a 5-point Likert scale with 1 = never, 2 = rarely, 3 = sometimes, 4 = often and 5 = all times. E.g. ‘’Did you think that you are in need of psychosocial support during isolation’’ and ‘’Did you think that you are in need of psychosocial support before isolation’’. These questions were formulated in Dutch for respondents from the Netherlands.

**Procedure**

Initially, a literature review was performed to give a theoretical base for the research and to determine notable aspects that should be included when investigating isolation. Consequently, the digital ECLB-COVID19 questionnaire, a collection of different brief

questionnaires, was created by a leading group of academics and scientific professionals working in different departments, including physiological, psychological, and computer studies. This leading group concerned people at the University of Magdeburg (principal investigator), the University of Sfax, the University of Münster, and the University of Paris-Nanterre. Moreover, the content of the questionnaire was checked and improved by other colleagues around the world (approximately 50 experts, with details about them included at consortium in the digital questionnaire). Google Forms was used as an online publication method, with students and professors converting all brief questionnaires into one file to provide the participants with one 'link'. Besides, ethical approval was obtained from the Ethics Committee of the University of Twente to conduct this research.

Starting the questionnaire, participants should have chosen the language of the questionnaire. Then, they were told that the WHO labelled COVID-19 as a pandemic and that this is creating stress around the population. The questionnaire was explained as an assessment that tries to determine the effect on home environments during the pandemic period. By clarifying the exact changes in lifestyle behaviours, the goal is to generate effective (ICT-based) solutions to reduce the unwanted psychosocial effects on the population.

Informed consent was obtained when respondents submitted their answers, participating anonymously in the study, and confirming that they were at least 18 years old. The consent also included that participants could quit at any given moment, by only saving their data when they did submit their answers. Concerning privacy, the participants' data was only used for studying purposes. Google's Privacy Policy, however, does have its own properties, which can be found by clicking on the link in the questionnaire.

Participants reporting that they ''provide unpaid care to elderly'' were asked the additional question: ''What living situation applies to you?'', whereas participants

responding that they ‘’provide professional care’’ or ‘’none’’ were not asked that particular question.

After completion of the questionnaire, which took 14 +- 2 minutes, participants were kindly thanked for their contribution to the study. Besides, they were asked to agree upon partaking in future studies by leaving their email address. By submitting their questionnaire, dismissal of the participants found place.

**Data analysis**

SPSS (version 26) was used to execute the statistical analyses. As responses were only saved when the questionnaire was completed, non-completers were not apparent in this study. When all respondents younger than 18 years old were excluded from the data, descriptive statistics were performed to construct the total amount of responses per survey and to determine the distribution of the total sample scores on depression, wellbeing, and physical activity measures. Also, descriptive statistics gave insight into the sample constitution by providing gender distribution, mean ages, education levels, etc. The Shapiro-Wilk W test rejected normal distribution of wellbeing, depression, and physical activity measures for the total sample, for informal caregiver’s responses, and for non-caregiver’s responses. A Wilcoxon test was performed to compare ‘before’ isolation scores with ‘during’ isolation scores on wellbeing, depression, and physical activity for the total sample. Wilcoxon tests were also executed to check for differences in wellbeing, physical activity, and depression before and during isolation per subgroup: for non-caregivers and informal caregivers (living with or without their care recipient) independently. Δ-Scores were composed by subtracting these ‘before’ isolation scores from ‘during’ isolation scores on wellbeing, physical activity, and depression for informal caregivers and non-caregivers. With the use of these Δ-scores, differences in depression, wellbeing, and physical activity scores of informal caregivers

versus non-caregivers were analysed with a Mann-Whitney-U test. Divergence in Δ-scores of wellbeing, depression, and physical activity between informal caregivers providing care at their household and informal caregivers providing care outside their household was also checked with a Mann-Whitney-U test. Total scores and Δ-scores of wellbeing, physical activity, and depression were quantified and reported as mean ± SD (standard deviation), with significance accepted at $p < 0.05$.

# Results

Frequencies and percentages of demographic variables were presented for the total sample, as well as for informal and non-caregivers independently (see Table 1). The participants were on average 38.8 years old (SD = 16.2). As can be noticed in the gender responses, fairly high amounts of females represent the sample for both informal and non-caregivers. A relatively high number of married/partnered individuals identified themselves as informal caregivers (75%), while non-caregivers who are married/partnered were less represented (44%). Both groups seem highly educated, with almost 90% of the non-caregivers having at least a bachelor's degree compared to half of the informal caregivers. Regarding health status, around one-third of the informal caregivers, compared to 7 percent of the non-caregivers, reported an increased risk for cardiovascular diseases. These respondents implied having high blood pressure, high cholesterol, diabetes, obesity, being a smoker, or performing minimal physical activity.

Table 1

*Sociodemographic characteristics*

| Characteristics | Informal caregivers | | Non-caregivers | | Total sample | |
|---|---|---|---|---|---|---|
| | *n* | *%* | *n* | *%* | *n* | *%* |
| Gender | | | | | | |
| Male | 11 | 18.3 | 58 | 27.0 | 69 | 25.1 |
| Female | 49 | 81.7 | 155 | 72.1 | 204 | 74.2 |
| Other | | | 2 | 1.0 | 2 | .8 |
| Marital status | | | | | | |
| Single | 12 | 20.0 | 113 | 52.6 | 125 | 45.5 |
| Married/partnered | 45 | 75.0 | 95 | 44.2 | 140 | 50.9 |
| Divorced/widowed | 3 | 5.0 | 7 | 3.3 | 10 | 3.6 |
| Highest educational Level | | | | | | |
| Scientific degree | 15 | 25.0 | 101 | 47.0 | 116 | 42.2 |
| Bachelor's degree | 18 | 30.0 | 91 | 42.3 | 109 | 39.6 |
| Vocational education | 21 | 35.0 | 15 | 7.0 | 36 | 13.1 |
| Secondary education | 6 | 10.0 | 8 | 3.7 | 14 | 5.1 |
| Health status | | | | | | |
| Healthy | 36 | 60.0 | 196 | 91.2 | 232 | 84.4 |
| Increased risk for Cardiovascular disease | 18 | 30.0 | 15 | 7.0 | 33 | 12.0 |
| With cardiovascular disease | 5 | 8.3 | 2 | .9 | 7 | 2.5 |
| With cognitive impairment | 1 | 1.7 | 2 | .9 | 3 | 1.1 |

*Note: N* = 275 (*n* = 60 for informal caregivers and n = 215 for non-caregivers). Participants were on average 38.8 years old (SD = 16.2). Highest educational level of the participants is arranged from highest to lowest (WO, HBO, MBO, and middelbaar onderwijs in Dutch).

Scores on wellbeing, depression, and physical activity between 'before' and 'during' isolation of all respondents are compared in Table 2. The total group's wellbeing scores significantly decreased during isolation, $Z = -8.95$, $p < .001$, $r = .54$. Nevertheless, their wellbeing score during isolation (Mdn = 24) is still categorized as higher positive mental wellbeing. Similarly, the total sample responded being significantly less physically active 'during' isolation (Mdn = 1299) compared to 'before' isolation (Mdn= 1481), $Z = 3.36$, $p = .001$, $r = .20$. However, their physical activity levels can still be interpreted as moderate physical activity levels (MET-scores higher than 600 but lower than 3000 are labelled as moderate activity levels). Regarding depression scores, participants reported significantly higher depression scores 'during' isolation (Mdn = 5) than 'before' isolation (Mdn = 2), $Z = 10.09$, $p < 0.001$, $r = .61$. This increase, however, does not implicate that respondents became depressive during isolation, as scores beneath 12 points are labelled as 'no symptoms of depression'.

Table 2

*Scores on wellbeing, depression, and physical activity of the total sample*

| Variable | Before isolation | | During isolation | | | |
|---|---|---|---|---|---|---|
| | M | SD | M | SD | Z | p |
| Wellbeing | 26.15 | 2.67 | 24.03 | 3.55 | -8.95 | .001* |
| Depression | 3.33 | 4.02 | 5.86 | 4.90 | 3.36 | .001* |
| Physical activity | 1945.16 | 1682.85 | 1708.89 | 1729.55 | 10.09 | .001 |

* $p < .001$.

Table 3 illustrates differences between ‘during’ isolation scores and ‘before’ isolation scores per subgroup (informal caregivers and non-caregivers) and compares the Δ-scores on wellbeing, depression, and physical activity scores between informal and non-caregivers. Informal caregiver’s changes in physical activity (Mdn = -317) did not significantly differ from non-caregiver’s changes in physical activity (Mdn = -125), $U = 6151$, $p = .583$, $r = .03$, both remaining to display moderate physical activity during isolation. Wellbeing scores of informal caregivers (Mdn = -3), however, seemed to show significantly greater decrease than wellbeing scores of non-caregivers (Mdn = -2) during isolation, $U = 5135$, $p = .013$, $r = .15$. While this decrease is more eminent for informal caregivers than for non-caregivers, the scores on wellbeing of both groups remain in the realm of ‘higher’ mental wellbeing. Furthermore, depression reports inferred no depressive symptoms during isolation, but revealed that informal caregivers (Mdn = 3) showed significantly more increase in depression scores than non-caregivers during isolation (Mdn = 1), $Z = 8.31$, $p < .001$, $r = .57$.

In Table 4, distinction was made between informal caregivers providing care at their household and informal caregivers providing care outside their household. Changes in wellbeing ‘during’ and ‘before’ isolation did not significantly differ between informal caregivers caring at their household (Mdn = -3) and informal caregivers caring outside their household (Mdn = -3), $U = 274$, $p = .80$, $r = 0.03$. Also, physical activity changes between informal caregivers caring at their household (Mdn = -420) and informal caregivers caring outside their household (Mdn = -281) insignificantly differed, $U = 241$, $p = .38$, $r = .11$. However, depression scores significantly increased more for informal caregivers caring at their household (Mdn = 7.5) than outside their household (Mdn = 2.5), $U = 170$, $p = .03$, $r = .28$.

Table 3

*Comparison of Δ-scores on wellbeing, depression, and physical activity between informal caregivers and non-caregivers*

| Variable | non-caregivers (*N* = 215) | | informal caregivers (*N* = 60) | | | |
|---|---|---|---|---|---|---|
| | M | SD | M | SD | Z | p |
| Wellbeing before isolation | 25.93 | 2.81 | 26.92 | 1.93 | | |
| Wellbeing during isolation | 24.05 | 3.55 | 23.97 | 3.58 | | |
| Δ Wellbeing* | -1.88 | 3.21 | -2.95 | 3.91 | -2.44 | .015 |
| Depression before isolation | 3.70 | 4.24 | 2.00 | 2.72 | | |
| Depression during isolation | 5.86 | 5.1 | 5.87 | 4.13 | | |
| Δ Depression* | 2.16 | 3.76 | 3.87 | 3.86 | -3.21 | .001 |
| Physical activity before isolation | 2035.95 | 1767.33 | 1619.84 | 1298.16 | | |
| Physical activity during isolation | 1816.99 | 1819.36 | 1323.32 | 1303.01 | | |
| Δ Physical activity** | -214.18 | 1933.28 | -296.53 | 1490.87 | -.532 | .595 |

*Note*: Δ-scores are computed by subtracting 'before' isolation scores from 'during' isolation scores within groups (e.g. informal and non-caregivers independently) and compared between groups.

*$p < .001$ for Δ-scores of informal and non-caregivers.

**$p < .05$ for Δ-scores of informal and non-caregivers.

Table 4

*Comparison of Δ-scores of wellbeing, depression, and physical activity between informal caregivers providing care either at their household or outside their household.*

| Variable | Informal caregivers 'at household' (*N* = 12) | | Informal caregivers 'outside household' (*N* = 48) | | | |
|---|---|---|---|---|---|---|
| | M | SD | M | SD | Z | p |
| Wellbeing 'before' isolation | 26.83 | 1.99 | 26.94 | 1.94 | | |
| Wellbeing 'during' isolation | 23.33 | 5.55 | 24.13 | 2.97 | | |
| Δ Wellbeing* | -3.5 | 5.45 | -2.81 | 3.49 | -.26 | .80 |
| Depression 'before' isolation | 1.08 | 1.83 | 2.23 | 2.87 | | |
| Depression 'during' isolation | 7.58 | 5.45 | 5.44 | 3.67 | | |
| Δ Depression** | 6.50 | 4.68 | 3.21 | 3.37 | -2.21 | .03 |
| Physical activity 'before' isolation | 1289.21 | 996.23 | 1702.50 | 1359.53 | | |
| Physical activity 'during' isolation | 874.04 | 1203.59 | 1435.64 | 1314.48 | | |
| Δ Physical activity*** | -415.17 | 920.99 | -266.87 | 1608.47 | -.879 | .38 |

* $p < .001$ for the Δ-score of 'outside' household; $p = .065$ for the Δ-score 'inside' household.
** $p < .05$ for Δ-scores 'outside' household and 'inside' household.
*** $p > .05$ for Δ-scores 'outside' household and 'inside' household.

# Discussion

The current findings confirmed that isolation due to COVID-19 has a significant negative effect on the total sample's wellbeing, physical activity, and depression scores. Comparing these scores between informal and non-caregivers, informal caregivers showed significantly more change in wellbeing and depression than non-caregivers, but not in physical activity. Informal caregivers having a care recipient at their household showed significantly greater change in depression scores than informal caregivers having a care recipient outside their household, while greater change in physical activity and wellbeing is not confirmed. It should be noticed, however, that respondents still reported higher mental wellbeing, moderate physical activity levels, and no depressive symptoms, even during isolation.

Reynolds et al. (2008) investigated the psychosocial effects of the similar SARS outbreak and found negative effects of isolation on individual's wellbeing, including higher depression and anxiety scores. At risk groups, including health care workers or professional caregivers, were more affected by isolation, implying that wellbeing and depression scores could decrease more for these groups (Reynolds et al., 2008). Comparing the preliminary findings of the current COVID-19 outbreak to the investigation of the SARS outbreak, similarity is found in the psychological effects of isolating a population and isolation of individuals providing care. However, the effect of isolation on professional caregivers in particular remains undetermined in the current study, as they were included in the non-caregiver's group. Additionally, Wang et al. (2020) already investigated possible psychosocial effects of COVID-19 on the Chinese population and found equivalent results: respondents inferred moderate to severe negative psychological effects of quarantine, with one-third of the respondents reporting some form of anxiety and over 15% reporting moderate to severe depressive symptoms. As the isolation in the Netherlands was 'intelligent' and maintained some preservation of daily activities compared to China's total lockdown, the

similarity of findings is remarkable but confirm the massive impact of any COVID-19 isolation. So, Reynolds et al. (2018) and Wang et al. (2020) confirmed the current findings of negative effects of isolation on depression and wellbeing and explained that workers in the healthcare 'branch' could be more affected by these quarantine regulations and require more attention. As physical activity differences between informal caregivers and non-caregivers remained unconfirmed in the current study, Hall, Laddu, Phillips, Lavie, and Arena (2020) explain an alternate view on the interaction between physical activity and COVID-19. They state that physical inactiveness and sedentary behaviour, spending much time seated, should be viewed as a pandemic itself. They elaborate that physically inactive people tend to stay inactive during quarantine, which leaves them more vulnerable to social isolation, including psychological symptoms such as depression and decreased wellbeing. Relating the theory of Hall et al. (2020) to the current findings, it may be that a proportion of informal caregivers fall within the lower physically active group as suggested by Haskell et al. (2009) and therefore displayed more vulnerability to wellbeing and depression changes during isolation. However, the current sample mostly included moderately active informal caregivers, who cannot confirm these suggestions. Though, the maintenance of physical exercise during isolation should be encouraged by online workout classes (Mattioli, Puviani, Nasi, & Farinetti, 2020; Hall et al., 2020) and could be positively received by informal caregivers, according to King and Brassington (1997). At last, informal caregivers living in the same household as their caretakers only distinguished from informal caregivers living outside their caretaker's household based on increased depression scores, while McGee, Meraz, Myers, and Davie (2020) suggest that restriction of going outside during isolation could also negatively affect the wellbeing of informal caregivers and caretakers at home. Therefore, McGee et al. (2020) proposed that informal caregivers and caretakers might develop a need for psychological support during COVID-19, which is partly supported by the increase of

depression scores in the current study. Due to the isolation measures, ICT-based solutions providing mental support might be most suitable in this case (McGee et al., 2020).

Although this study demonstrated its added value by focussing on mental and physical wellbeing of informal caregivers in contrast to non-caregivers, the results should be interpreted with at least some caution. First, the explorative nature of the study and time pressure involved made inclusion criteria less prioritized, with the goal to gather as many participants as possible. This resulted in a highly educated sample, with around 80% having at least a bachelor's degree compared to just above 30% of the Dutch population (Centraal Bureau Statistiek [CBS], 2020). Also, CBS (2019) reported an equal gender distribution of the Dutch population with both males and females representing around 50% of the total population, while this study's respondents are mostly female (74%). What these differences might imply is that the sample lacks representativeness of the Dutch population, consequently providing altered estimates of wellbeing, depression, physical activity scores.

Second, the inclusion of professional caregivers in the non-caregiver's sample might have impacted the size of effects found between non-caregivers and informal caregivers. To elaborate, as Reynolds et al. (2008) proposed, healthcare workers seemed to display lower assessments of wellbeing and higher scores on depression during the SARS isolation. Subsequently, COVID-19 could have similar effects on healthcare workers, meaning that the inclusion of professional caregivers in the non-caregiver's sample could have nuanced the differences in wellbeing and depression scores found between informal and non-caregivers.

Third, the focus on negative psychological effects during isolation (depression) might limit the findings as positive assessment of psychological states could have emphasized other aspects of participants instead. For instance, investigating if individuals flourished, with use of the Flourishing Scale (Diener et al., 2010), could have exposed positive mental aspects of individuals during COVID-19.

Last, scoring participant's physical activity using the IPAQ-SF could have attenuated the results. To explain, Bauman et al. (2009) reviewed the IPAQ-SF and found that the threshold of being 'Moderately' physically active is too low if all daily activities are counted, including background activities such as work, home chores and raising duties, resulting in the vast majority of participants reporting moderate activity levels. Moreover, the outcome of the IPAQ-SF cannot be distinguished into separate MET-values, which excludes the opportunity to examine walking, moderate exercise, and vigorous exercise outcomes independently (Bauman et al., 2009). In relation to this study, it would have been valuable to check whether insignificant differences in physical activity scores could be put into perspective, as walking scores most probably could have increased during isolation, opposite to ceased vigorous activities.

Nevertheless, the psychological effects of the COVID-19 are investigated in the current study and might suggest that parts of the Dutch population are at risk for developing depression symptoms and degenerated wellbeing, with informal caregivers being most vulnerable. As isolation measures could be apparent for some time, it would be interesting to investigate to what extent the regular support for informal caregivers and caretakers can be replaced by online healthcare assistance, as McGee et al. (2020) proposed. Ultimately, as put by Hall et al. (2020), increased physical inactivity of informal caregivers due to COVID-19 remains to be investigated but might form a stand-alone problem that could be tackled by online workout programs. Hence, examining whether online exercises do alleviate the 'physical inactivity pandemic' during COVID-19 would matter for the population and informal caregivers in particular.

Essentially, the societal 'impact of COVID-19' cannot be underestimated: informal caregivers, but also non-caregivers, are displaying mental and physical declines which should be handled accordingly.

# Reference list

Armitage, R., & Nellums, L. B. (2020). COVID-19 and the consequences of isolating the elderly. The Lancet Public Health.

Bauman, A., Ainsworth, B. E., Bull, F., Craig, C. L., Hagströmer, M., Sallis, J. F., ... & Sjöström, M. (2009). Progress and pitfalls in the use of the International Physical Activity Questionnaire (IPAQ) for adult physical activity surveillance. *Journal of Physical Activity and Health*, *6*(s1), S5-S8.

Berglund, E., Lytsy, P., & Westerling, R. (2015). Health and wellbeing in informal caregivers and non-caregivers: a comparative cross-sectional study of the Swedish general population. Health and Quality of Life Outcomes, 13(1), 109.

Blikman, T., Stevens, M., Bulstra, S. K., van den Akker-Scheek, I., & Reininga, I. H. (2013). Reliability and validity of the Dutch version of the International Physical Activity Questionnaire in patients after total hip arthroplasty or total knee arthroplasty. *Journal of orthopaedic & sports physical therapy*, *43*(9), 650-659.

Centraal Bureau Statistiek. (2020). *Bevolking; Onderwijsniveau; Geslacht, leeftijd en migratieachtergrond*. Retrieved from: https://opendata.cbs.nl/statline/#/CBS/nl/dataset/82275NED/table?fromstatweb

Chen, P., Mao, L., Nassis, G. P., Harmer, P., Ainsworth, B. E., & Li, F. Coronavirus disease (COVID-19): The need to maintain regular physical activity while taking precautions.

J Sport Health Sci 2020; 9 (2): 103-4.

Chou, K. L., Yeung, S., & Chi, I. (2001). Does physical distance make a difference in caregiving?. Journal of Gerontological Social Work, 35(1), 21-37.

Collins, J., Gibson, A., Parkin, S., Parkinson, R., Shave, D., & Dyer, C. (2012). Counselling in the workplace: How time-limited counselling can effect change in well-being. Counselling and Psychotherapy Research, 12(2), 84-92.

Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., ... & Oja, P. (2003). International physical activity questionnaire: 12-country reliability and validity. Medicine & science in sports & exercise, 35(8), 1381-1395.

Densley, K., Davidson, S., & Gunn, J. M. (2013). Evaluation of the Social Participation Questionnaire in adult patients with depressive symptoms using Rasch analysis. Quality of Life Research, 22(8), 1987-1997

Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, D. W., Oishi, S., & Biswas-Diener, R. (2010). New well-being measures: Short scales to assess flourishing and positive and negative feelings. *Social indicators research*, *97*(2), 143-156.

European Centre for Disease Prevention and Control (ECDC). (2020). COVID-19 situation update worldwide, as of 7 June 2020. Retrieved from: https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases

Evita Zorg. (2017). Hoeveel mantelzorgers zijn er in Nederland? Retrieved from: https://www.evitazorg.nl/faq-items/hoeveel-mantelzorgers-nederland/#:~:text=E%C3

%A9n%20op%20de%20drie%20Nederlanders,dan%20acht%20uur%20per%20week.

Hall, G., Laddu, D. R., Phillips, S. A., Lavie, C. J., & Arena, R. (2020). A tale of two pandemics: How will COVID-19 and global trends in physical inactivity and sedentary behavior affect one another?. *Progress in Cardiovascular Diseases*.

Hampton, M. M., & Newcomb, P. (2018). Self-efficacy and Stress Among Informal Caregivers of Individuals at End of Life. Journal of Hospice & Palliative Nursing, 20(5), 471-477.

Haskell, W. L., Blair, S. N., & Hill, J. O. (2009). Physical activity: health outcomes and importance for public health policy. Preventive medicine, 49(4), 280-282.

Hawryluck, L., Gold, W. L., Robinson, S., Pogorski, S., Galea, S., & Styra, R. (2004). SARS control and psychological effects of quarantine, Toronto, Canada. Emerging Infectious Diseases, 10(7), 1206.

Jiloha, R. C. (2020). COVID-19 and Mental Health. Epidemiology International (E-ISSN: 2455 7048), 5(1), 7-9.

Johal, S. S. (2009). Psychosocial impacts of quarantine during disease outbreaks and interventions that may help to relieve strain.

King, A. C., & Brassington, G. (1997). Enhancing physical and psychological functioning in older family caregivers: The role of regular physical activity. Annals of Behavioral Medicine, 19(2), 91-100.

Kuscu, M. K., Dural, U., Önen, P., Yaşa, Y., Yayla, M., Basaran, G., ... & Bekiroğlu, N.

(2009). The association between individual attachment patterns, the perceived social support, and the psychological well-being of Turkish informal caregivers. *Psycho Oncology: Journal of the Psychological, Social and Behavioral Dimensions of Cancer*, *18*(9), 927-935.

Maheswaran, H., Weich, S., Powell, J., & Stewart-Brown, S. (2012). Evaluating the responsiveness of the Warwick Edinburgh Mental Well-Being Scale (WEMWBS): Group and individual level analysis. Health and Quality of Life Outcomes, 10(1), 156.

Mattioli, A. V., Puviani, M. B., Nasi, M., & Farinetti, A. (2020). COVID-19 pandemic: the effects of quarantine on cardiovascular risk. *European Journal of Clinical Nutrition*, 4.

McGee, J. S., Meraz, R., Myers, D. R., & Davie, M. R. (2020). Telehealth services for persons with chronic lower respiratory disease and their informal caregivers in the context of the COVID-19 pandemic. *Practice Innovations*, *5*(2), 165.

Ng Fat, L., Scholes, S., Boniface, S., Mindell J., & Stewart-Brown S. (2017) Evaluating and establishing the national norms for mental well-being using the short Warwick Edinburgh Mental Well-being Scale (SWEMWBS): findings from the Health Survey for England. Quality of Life Research, 26(5), 1129-1144.

Reynolds, D. L., Garay, J. R., Deamond, S. L., Moran, M. K., Gold, W., & Styra, R. (2008). Understanding, compliance and psychological impact of the SARS quarantine experience. *Epidemiology & Infection*, *136*(7), 997-1007.

Rijksinstituut voor Volksgezonheid en Milieu. (2020b). *Aanpak bestrijding*. Retrieved from https://www.rivm.nl/coronavirus-covid-19/aanpak-bestrijding

Rijksinstituut voor Volksgezonheid en Milieu. (2020a). *Actuele informatie over het nieuwe coronavirus (COVID-19)*. Retrieved from https://www.rivm.nl/coronavirus-covid 19/actueel

Rijksoverheid. (n.d.). *Mantelzorg.* Retrieved, July 1, from https://www.rijksoverheid.nl/onderwerpen/mantelzorg#:~:text=Vraag%20en%20antwoord-,Mantelzorg,vrijwilliger%20of%20beroepskracht%20(respijtzorg).

Rijksoverheid. (n.d.) *Vragen over het coronavirus en gehandicaptenzorg.* Retrieved, July 12, From https://www.rijksoverheid.nl/onderwerpen/coronavirus/covid19/ zorg/gehandicaptenzorg

Thabrew, H., Stasiak, K., Bavin, L. M., Frampton, C., & Merry, S. (2018). Validation of the Mood and Feelings Questionnaire (MFQ) and Short Mood and Feelings Questionnaire (SMFQ) in New Zealand help-seeking adolescents. International Journal of Methods in Psychiatric Research, 27(3), 1–9.

Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S., & Ho, R. C. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International journal of environmental research and public health*, *17*(5), 1729.