Does loneliness have a causal effect on depression in older age? Evidence from the Campaign to End Loneliness in the UK

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Introduction

Loneliness, which refers to dissatisfaction with the quantity and quality of social relations (Peplau 1982; de Jong Gierveld and Havens 2004) is a common experience in older age (Dykstra 2009; Yang and Victor 2011), affecting 19.3% of the older adults in the US (Theeke 2009). Loneliness increases risks of all-cause mortality and cardiovascular diseases (see the review by Leigh-Hunt et al. 2017). There is also growing evidence indicating that loneliness predicts mental health outcomes, such as poor sleep (Cacioppo et al., 2002), cognitive impairment (Shankar et al., 2013, Kuiper et al., 2015), and depressive symptoms (Cacioppo, Hawkley and Thisted 2010). It remains unclear, however, to what extent the impact of loneliness on these outcomes is causal (Courtin and Knapp 2017). Loneliness may be reciprocally associated with mental health (Luo et al. 2012), or both mental health and loneliness may be the result of other underlying processes, such as declining physical function. Without separating these effects it is difficult to establish whether policies and programmes that aim to reduce loneliness will have any effect on the mental wellbeing of older people. So far, studies have documented a strong association between loneliness and mental health (Losada et al. 2012), but there is limited evidence on how large-scale interventions that target loneliness may have the potential to improve mental health (Gardiner, Geldenhuys and Gott 2018). Whereas previous research found that social interventions such as educational and social activity groups are effective in reducing loneliness among older people (Cattan et al 2005), we know less about the effects of these interventions on their mental wellbeing.

In this study, we estimate the potential causal effects of loneliness on the mental health of older people, using longitudinal data from the UK. We address the endogeneity of loneliness by exploiting an exogenous source of variation in the prevalence of loneliness from a large-scale anti-loneliness campaign in the UK. Launched in 2011, the Campaign to End Loneliness (CEL) is a nationwide campaign that aims to tackle issues of loneliness among older people in the UK. Based on estimates from CEL, among the nine million lonely people in the UK, four million (approximately 44%) are older people. CEL aims to ensure that a wide range of loneliness services and activities are developed and are effective in order to reach and support this vulnerable subgroup of the population. Specific areas of the campaign include evidence-based campaigning to commissioners, the building of research base, public campaigning and campaigning locally.

One feature of the strategy employed by CEL is to lobby the 152 local Health and Wellbeing Boards (HWBs) across 9 regions of England to commit to action to reduce loneliness in older people locally. There were, however, substantial variations among HWBs in the extent and pace of adopting anti-loneliness strategies. CEL identified HWBs with anti-loneliness strategies in 2013 and grouped the strategies into three categories: (1) Gold strategy, which contained measurable actions and/or targets on loneliness and social isolation, such as improving social connections, networks or relationships; (2) Silver strategy, which included no specific actions or targets, but a stated commitment to researching loneliness in local areas, such as mapping needs, designing interventions, and identifying existing services that might be useful; and (3) Bronze strategy, in which loneliness was recognised as an issue, yet neither measurable actions nor committed strategy to investigating issue were adopted (Cupitt 2013). There were also a number of HWBs that implemented no loneliness-related strategy at all. We exploit this variation across local areas in England to identify the causal effects of loneliness on mental health, by distinguishing a potential "treated" group of older people exposed to active interventions, and a "control" group of similar individuals living in areas where no measurable actions were implemented.

This study will add to the extant literature that investigates the associations between loneliness and health, through examining some of the potential causal mechanisms. By providing evidence on whether and to what extent changes in feeling of loneliness may alter subsequent health outcomes among older people, the results will also be informative to policy-makers looking to address mental health problems at older age through focusing on reducing

feeling of loneliness. This is of great significance given the prevalence of loneliness in an increasingly aging global society.

Methods

English Longitudinal Study of Ageing

Data

Data comes from waves 2 through 8 of the English Longitudinal Study of Ageing [ELSA], a representative cohort of residents of England aged 50 years and above (Steptoe et al 2012). We exclude individuals younger than 50 or who were living outside of England, and do not use data from wave 1 as loneliness was not measured. The sample consisted of 18,072 participants who were surveyed at one or more time points between 2004 (wave 2) and 2016 (wave 8).

Outcomes

Loneliness was evaluated using the 3-item University of California Los Angeles [UCLA] Loneliness scale (Russell, Peplau and Ferguson 1978). The items included in the UCLA Loneliness Scale are how often the respondent feels (1) they lack companionship, (2) left out, and (3) isolated from others. These items were scored as 1 for a response of "hardly ever or never," as 2 for "some of the time," and as 3 for "often" and then summed for a score ranging from 3 (not lonely) to 9 (very lonely). We used a binary variable that defined being lonely as a score ≥6 on the UCLA Loneliness scale (Shankar et al 2011).

We use the total 8-item Center for Epidemiologic Studies Depression Scale [CES-D] score to assess depressive symptoms (Radloff 1977; Melechoir et al 1993). The CES-D scale assesses interpersonal relations, positive affect, depressed affect, and somatic activity. Each item was scored as 1 if the participant has the depressive symptom, with reverse coding used for the 2 positive affect items. This resulted in a CES-D score ranging from 0 to 8.

Exposure to the campaign

We assign exposure to the anti-loneliness campaign based on the intensity in the implementation of anti-loneliness strategies by local HWBs in 2013 across 9 England regions. Although the CEL grouped the HWBs' anti-loneliness strategies into three categories, that is, the gold, silver, or bronze strategy, we only calculate HWBs with gold strategy as this is a stronger indicator of campaign exposure in local areas. We also consider the fact that the campaign was targeting at older people, the proportion of which also vary across local HWBs within and across regions. More specifically, in a given region, we calculate the proportion of older people (i.e., 50+) in the total population for each HWB with gold anti-loneliness strategy, and then sum them up to obtain an aggregated proportion as a proxy for exposure to the anti-loneliness Campaign. In addition to this continuous measurement, we also use a dummy variable that takes the value of 1 if a given region has a non-zero value for the aggregated proportion and value 0 if a region has no exposure to the Campaign at all.

Controls

We control for the following time-varying variables: age, age squared, year of interview, any limitations in the activities of daily living, any limitations in the instrumental activities of daily living, any chronic illnesses, car ownership, log net total household wealth, log equivalized household income, employment status, marital status, and region of residence.

Statistical analysis

We use a difference-in-differences (DiD) approach by exploiting variations in the intensity of campaign exposure for respondents from the 9 England regions. We compare depressive symptoms of those from affected regions (the treated group) to outcomes of those from non-affected regions (the control group). Respondents from the two groups may differ along several characteristics, and a difference in difference approach controls for these underlying differences between the treated and control groups by comparing trends rather than levels of depressive symptoms for the treated and control groups. Our assumption is that this double difference corresponds to the impact of the anti-loneliness campaign on mental health outcomes, because it captures the change in the difference between treated and control as a result of the campaign. We carried out some robustness checks that test for the common trend assumption by examining trends in loneliness prior to the reform.

Results

Results are forthcoming. Figure 1 provides an overview of the prevalence of loneliness in 9 England regions from 2004 to 2016. It is clear that between 2012 and 2014, that is, before and after the implementation of the anti-loneliness strategies among HWBs, there were substantial declines in the prevalence of loneliness across regions. This

indicates that these strategies may have had some effects on loneliness. In Figure 2, we observe variations in the prevalence of elevated depressive symptoms across regions before and after exposures to the anti-loneliness strategies. In Table 1, preliminary results from an OLS model analogous to the first stage of the pooled IV models suggest that exposures to the regional anti-loneliness strategy adopted by HWBs during the Campaign to End Loneliness predict 7.7% to 37% of the declines in the feeling of loneliness, conditioning on different measures of campaign exposure. In the next stage, we will be able to exploit the variations of campaign exposure at the sub-regional level and to analyse whether and to what extent these changes in depressive symptoms may be attributable to changes in the feeling of loneliness.

Figure 1 Trends in Prevalence of Loneliness for Each Region, ELSA Waves 2-8

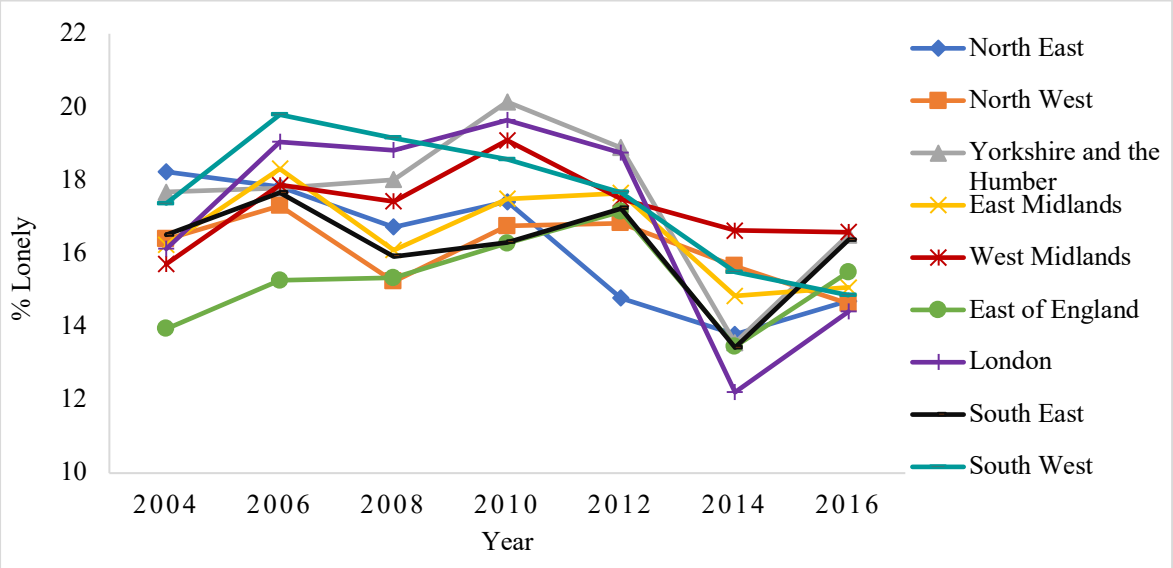

Figure 2 Trends in Prevalence of Elevated Depressive Symptoms (CESD Score ≥ 3) for Each Region, ELSA Waves 2-8

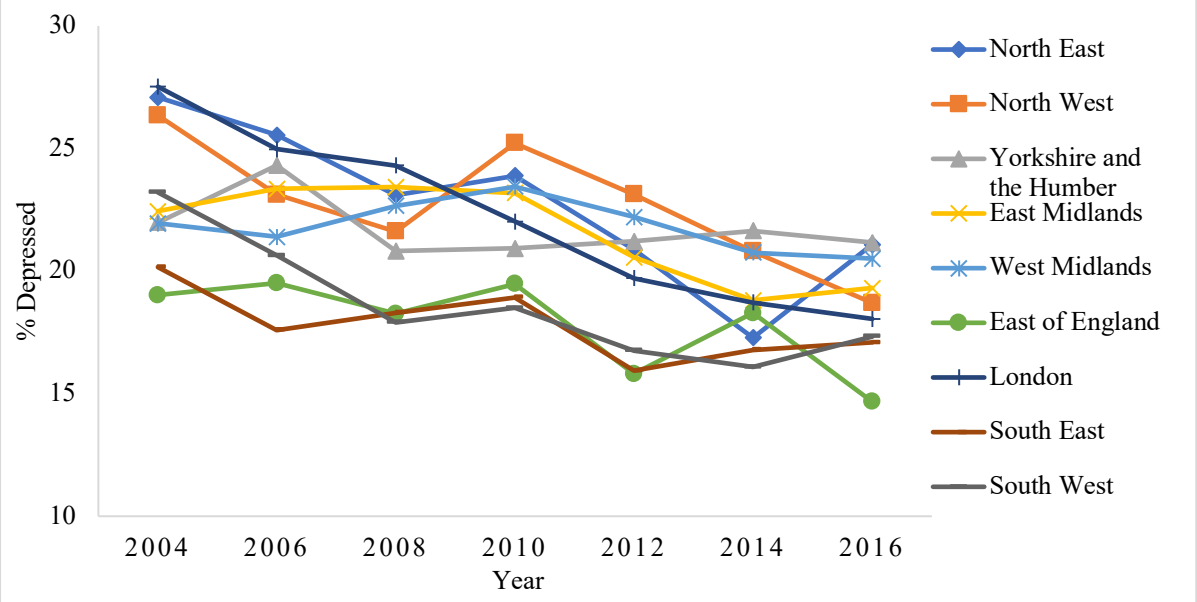

Table 1 Impact of Exposure to Campaign on Prevalence of Loneliness scale for Each Region, 1st stage 2SLS IV Model

	Model 1: Ordinary Least Squares β (95% CI)
Impact of Campaign exposure (continuous) on loneliness scale	-0.370 (-0.782 to 0.042) *
F-statistic	3.10
Impact of Campaign exposure (dummy) on loneliness scale	-0.077 (-0.150 to -0.003) **
F-statistic	4.19

Notes: *p<0.1 ** p<0.05 ***p<0.01. The estimates are based on ELSA wave 2-5 (pre-campaign periods) and wave 7-8 (post-campaign periods). Wave 6 (2012-2014) is excluded because we need more information in order to separate respondents who were exposed to the anti-loneliness strategies of HWBs (established in 2013) from those who were not.

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