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Won't You Please Talk to Me?
Social Support, Loneliness, and Self-Rated Health during the COVID-19 Pandemic

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Abstract

In the wake of the COVID-19 pandemic, many nations around the world instituted strict social distancing measures. Although necessary to deter the spread of the virus, these measures may also have had adverse health repercussions by increasing social isolation. Using a national longitudinal study, in which respondents were surveyed in March and May of 2020, we show that, at baseline, loneliness was inversely associated with self-rated health, and there was a beneficial indirect association between social support and self-rated health through lower levels of loneliness. Between March and May, social support declined and loneliness increased, with these changes independent of each other and both contributing to explaining declines in self-rated health. Baseline loneliness was also associated with declines in self-rated health. This study suggests that social distancing during the COVID-19 pandemic impaired social connectedness, thereby resulting in detriments to population health.

Keywords: Health, social support, loneliness, COVID-19, social distancing

Won't You Please Talk to Me? Social Support, Loneliness, and Self-Rated Health during the COVID-19 Pandemic

The drive for social connection is a fundamental human need that is often crucial for individual well-being (Thoits 2011; Turner and Brown 2010). Yet, in the wake of the COVID-19 pandemic, many nations across the world instituted strict social distancing measures that included advising much of the population to stay at home, as well as banning social gatherings and closing schools, places of worship, and many workplaces (Douglas et al. 2020). Although necessary to slow the spread of the virus, some health scholars also voiced concern that these social distancing measures could result in prolonged isolation that would have adverse consequences for well-being (Vieira, Franco, Restrepo, and Abel 2020).

In this paper, we address these concerns by building on a model of social support and health that locates reduced loneliness as a key mechanism for the health effects of social support (Uchino 2004). Much research documents the importance of supportive others in one's social network for individual health (Thoits 2011), and immersion in a vibrant network of supportive others has a clear tendency to deter loneliness (Rote, Hill, and Ellison, 2013). Loneliness in turn is damaging to a number of health outcomes (Cacioppo and Cacioppo 2014; Ong, Uchino, and Wethington 2016), through such mechanisms as impaired health behaviors and elevated levels of stress (Hawkey and Cacioppo 2010). The sum of the breadth of these adverse health effects will tend to be reflected in self-assessments of overall health (Doiron, Fiebig, Johar, and Suziedelyte 2015; Jarczok et al. 2015; Vie et al. 2014). As social distancing required reducing in-person social contacts and regular meetings of social groups, it is likely that the extent of supportive others availability to individuals declined, with commensurate deleterious consequences for loneliness and self-rated health.

To address these questions, we utilize a unique panel survey of Canadians, in which the first wave occurred during the early stages of the pandemic in March of 2020, shortly after social distancing measures were instituted across the nation, and a second wave was administered two months later in May. Using sequential latent change score (LCS) analysis, we assess changes in social support network resources and loneliness, as well as whether these changes were associated with changes in self-rated health. Our analyses show that, in March, loneliness was inversely associated with self-rated health, and a beneficial association between social support and self-rated health was entirely explained by a negative association between social support and loneliness. Between March and May, perceptions of social support provided within social networks shrank and loneliness expanded. Self-rated health also declined over this time period, and changes in both perceived social support and loneliness contributed to health declines, as did baseline levels of loneliness. This study therefore contributes crucial information to the study of population health during the COVID-19 pandemic by demonstrating that there was a wide-scale decrease in key markers of social connectedness, and these changes were in turn detrimentally associated with overall population health.

Background

Self-rated health most often refers to a single-item question in which respondents are asked to rate their overall health (Au and Johnson 2014). The degree to which measure is equally reflective of health across social sub-groups continues to be a matter of debate (e.g., Assari, Lankarani, and Burgard 2016; Berchick and Lynch 2017; Zajacova et al 2017), but meta-analytic evidence indicates that measures of self-rated health have a high degree of predictive validity for mortality (DeSalvo et al. 2006). Self-rated health also corresponds to a number of

objective biomarkers (Jarczok et al. 2015; Vie et al. 2014), even in apparently healthy individuals (Leshem-Rubinow et al 2015). Moreover, self-rated health is predictive of serious, chronic illnesses, as well as subsequent hospitalizations and out-of-hospital medical service use (Doiron, Fiebig, Johar, and Suziedelyte 2015). In addition, research suggests that the increasing availability of health information has led to an expansion of the accuracy individuals' self-assessments of health in recent years (Schnittker and Bacak 2014). Despite debates regarding the universal applicability of self-rated health, then, the breadth of factors and conditions encompassed by measures of self-rated health suggests that declines in overall population health during the COVID-19 pandemic are likely to be reflected in changes in self-rated health.

One factor that is likely to be critically important for health during the COVID-19 pandemic is that of loneliness. Loneliness is often framed in terms of perceived social isolation (Cacioppo and Cacioppo 2014), as loneliness is an evaluative construct that reflects the subjective evaluation of social relationships as failing to meet individual and social needs, particularly when the individual is not satisfied by the degree of intimacy in social relationships (de Jong Gierveld and Havens 2004; Hughes, Waite, Hawkley, and Cacioppo 2004). In reflecting perceived social isolation, loneliness is influenced not only by the breadth of individuals' social networks (Peterson et al. 2016), but also the quality of social relationships (Shiovitz-Ezra and Leitsch 2010), including the degree of social support in one's social relationships (Rote et al. 2013)

Notably, prior to the COVID-19 pandemic, many characterized North American and other Western nations as in the grip of an "epidemic" of loneliness (e.g., Jeste, Lee, and Cacioppo 2020; Sime and Collins 2019), leading to concerns that "forced quarantines and social distancing imposed by the COVID-19 crisis are likely to further exacerbate the loneliness

epidemic” (Sharma, Maheshwari, and Bronsther 2020:32; for similar concerns, see also Banerjee and Rai 2020; Galea, Merchant, and Lurie 2020). These concerns are supported by preliminary comparisons of cross-sectional population surveys from 2018 and during the pandemic, which indicate higher rates of loneliness during the pandemic (McGinty, Presskreischer, Han, and Barry 2020). These findings are suggestive, but also may be due to gradual increases in loneliness that were already occurring in North America and many other nations. It therefore remains an open question as to whether loneliness increased specifically during the COVID-19 pandemic.

If loneliness did increase, though, these changes were likely to have acute detrimental consequences for population health that would be reflected in declines in self-rated health. Recent research has documented an extensive record of pervasive deleterious health effects of loneliness (Cacioppo and Cacioppo 2014; Ong, Uchino, and Wethington 2016). The consequences of loneliness for health can be tracked through a number of biological substrata, including cardiovascular disease and diabetes (Christiansen, Larsen, and Lasgaard 2016), as well as health behaviors such as physical activity and smoking (Pels and Kleinert 2016; Shankar, McMunn, Banks, and Steptoe 2011). Moreover, because perceptions of social isolation denote a lower degree of safety in the environment, loneliness can also serve as a stressor that elevates stress hormones and has adverse effects on biologically restorative systems, such as sleep (Drake, Sladek, and Doane 2016; Hawkey and Cacioppo 2010). The risk of loneliness for health has been demonstrated with links to objective outcomes, including biomarkers of health dysfunction and mortality (Holt-Lunstad et al. 2015; Nersesian et al. 2018; Rico-Uribe et al. 2018; Whisman 2010). Not surprisingly, given the association between these objective outcomes and self-rated health, loneliness is also associated with self-rated health. Baseline levels of

loneliness are not only related to subsequent declines in self-rated health (Luo, Hawkley, Waite, and Cacioppo 2012; Tsur et al. 2019; Yu, Sessions, Fu, and Wall 2015), but changes in loneliness are also associated with subsequent self-rated health (Nummela, Seppänen, and Uutela 2011). Based on this evidence, we suggest that baseline levels of loneliness at the beginning of the COVID-19 pandemic will be inversely associated with initial levels of self-rated health. In addition, we expect that there will be increases across the population in loneliness during the COVID-19 pandemic, as well as a decline in self-rated health, and increases in loneliness will contribute to explaining declines in self-rated health.

Consequences of Shrinking Social Support

A primary contributor to increases in loneliness during the COVID-19 pandemic is likely to be decreases in perceived social support. Although the research literature varies in its approach to social support (Uchino, Bowen, de Grey, Mikel, and Fisher 2018), a common approach is from a functionalist perspective, “which is the extent to which one can access assistance and resources afforded from people in their networks” (Werner-Seidler et al. 2017:1464). This approach is useful in that it refers to both the overall availability of social support, but also encompasses the network relations that provide support, thereby integrating innovations in social support research that emphasize network connections as a key basis of social support (Berkman and Glass 2000; Pescosolido 2006). Social support can be differentiated between *perceived* and *received* social support, with perceived social support particularly beneficial by conveying that “an individual experiences being loved, valued, and able to count on others should the need arise” (Turner and Brown 2010:202). Within this

research, then, we focus on perceptions of the extent to which one's social network can provide value and experiences of care as the key indicator of social support.

Uchino (2004) proposed a conceptual model in which social support was suggested to positively influence health indirectly through a mechanism of preventing loneliness. The association between perceived social support and loneliness is clear, as relationships in which one is made to feel cared for and valued are likely to deter feelings of isolation and lack of social fulfillment. Moreover, not only has the inverse association between perceived social support and loneliness received empirical support (Rote et al. 2013; Swader 2019), but research also shows that a socially supportive social network is beneficially associated with health and well-being through reduced loneliness (Chen and Feeley 2014; Segrin and Domschke 2012). We therefore expect that, at baseline, perceptions of the extent of social support through one's social network will be positively associated with self-rated health, with this association explained by lower levels of loneliness. Furthermore, the severing of social interactions required by social distancing measures during the COVID-19 pandemic is likely to lead to a decline in perceptions of social support in one's social network; these losses will contribute to increases in loneliness, in turn leading to declines in self-rated health.

Summary of Expectations

[FIGURE 1 ABOUT HERE]

Figure 1 summarizes the primary expectations of this paper. We expect that, at baseline, higher levels of loneliness will be associated with lower self-rated health; social support will be inversely associated with loneliness, which will compose an indirect association between social support and self-rated health. Over the course of the study, we expect to observe declines in

social support, which will be reflected in increases in loneliness, and these changes will contribute to explaining declines in self-rated health; increases in loneliness will also help to explain the association between declines in social support and self-rated health, thereby constituting an additional indirect effect. We next test these expectations in a national longitudinal survey of Canadians.

Methods

Data

The data analyzed in the present study are the *Canadian Quality of Work and Economic Life Study (C-QWELS)*. The baseline C-QWELS data used in the current research are a part of a Canadian national study intended to examine social conditions and well-being among Canadians who were currently employed. Data were gathered by the study authors in cooperation with the Angus Reid Forum, a Canadian national survey research firm that maintains an ongoing national panel of Canadian respondents. The baseline data used in this survey were gathered from March 17th to March 23rd, 2020 using an online survey of 2,528 working Canadians. The response rate was 43%, but results were statistically weighted according to the most current education, age, gender and region Census data to ensure a sample representative of working Canadians. Subsequently, 44 respondents were removed because they were not working at the time of the survey, reducing the sample size to 2,484; another 28 respondents were removed because they preferred to self-describe gender, and this was too small of a response size to analyze as a separate category, resulting in a final sample size of 2,456. An attempt was made to recontact these respondents using a similar online survey that was administered from May 17th to May 23rd, 2020, resulting in a sample of 1,854 respondents (a retention rate of 75.5%). Analytic

methods used to address attrition are described in the section on methods of analysis. The timing of the first wave of these data should be underscored. At the time when the baseline data were gathered, social distancing measures had recently been put into place across Canada. This timing is useful both because it means that baseline refers to conditions during the early stages of the pandemic and, more importantly, change between March and May is specific to the changing nature of experiences during the pandemic, rather than change from prior to the pandemic to during the pandemic.

Focal Measures

Self-Rated Health. Self-rated health was measured with a frequently-used survey question which asked, “Overall, how would you describe your current state of health?” with response categories of (1) Excellent, (2) Very good, (3) Good, (4) Fair, (5) Poor, and (6) Very Poor. As a low number of respondents indicated “very poor,” responses to poor and very poor were combined, creating a five-level variable; all responses were reverse-coded so that higher values indicated better self-assessed health.

Loneliness. The measure of loneliness was adapted from validated three-item scale designed for assessing loneliness in social surveys (Hughes, Waite, Hawkley, and Cacioppo 2004). Respondents were asked how often in the past month they had felt “like you lacked companionship,” “left out,” and “isolated from other people.” Responses were on a scale of 1 (None of the time) to 5 (All of the time).¹ A principal components analysis of the items at each wave showed both strong evidence of construct validity and consistency of psychometric properties across waves. At both waves, a principal components analysis showed one component with an eigenvalue greater than 1 and loadings for each item were approximately

0.85, and accounting for 71% of the variance in the items in March and 73% of the variance in the items in May. Reliability of the scale was strong and consistent, with a Cronbach's alpha of 0.80 in March and 0.81 in May. The mean of the three items at each wave was used as the indicator of loneliness.

Perceived Social Support. The measure of the extent of social support resources was adapted from the European Social Survey (ESS) because this measure has not only previously been used specifically to measure of social support (Curtin, Galvin, and Robinson 2019), but also because the measure has been validated as a predictor of loneliness (Swader 2019). Furthermore, the measure specifically asks about the extent of one's supportive social network, thereby closely aligning with the functionalist definition of perceived social support that encompasses the network basis of support. Respondents were asked, "How many people, if any, are there with whom you can discuss intimate and personal matters?" with responses of None, 1, 2, 3, 4-6, 7-9, and 10 or more. To create a measure with more evenly-distributed categories and avoid the influence of outliers, responses two the top two categories were combined, creating a five-level measure with the top category of 7 or more.

Control Measures

Control measures focused on prominent demographic determinants of social relationships and health. Age was measured in years and coded as a set of indicator variables to take into account non-linearities in the age distribution of loneliness and health; individuals aged 18-29 were compared to categories of 30-39, 40-49, 50-64, and 65+. Gender was coded as 0=men, 1=women. As is common in Canadian research (Little 2016), racial and ethnicity minority status was measured by a dichotomous variable in which the higher value indicated a "visible

minority.”² Education was operationalized as a set of categories, in which individuals with a university degree were compared to categories of high school degree, some college/trade school/university, and college/trade school; less than 2% of weighted sample had less than a high school degree, and these respondents were grouped with those with a high school degree. Income was measured as a set of categories in which \$150,000 or more in household income was compared to less than \$25,000, \$25,000 to less than \$50,000, \$50,000 to less than \$100,000, and \$100,000 to less than \$150,000. Because individuals who do not provide income often reside in high income categories and taking non-response into account would help to control for biases in self-reports, missing income was considered as an additional analytic category. Furthermore, because baseline data focused on a working sample, we controlled for baseline work statuses with a set of dichotomous variables in which business owners or the self-employed were compared to part-time and full-time workers who were employed by others. We control for the presence of additional individuals in the home with an indicator of not living with a romantic partner (0=does not live with a partner, 1=lives with partner), and additional measure of the number of people in household other than the respondents (with a value of 0 indicating that the respondent lives alone and a top value of 5 or more additional people). Weighted sample descriptives are provided in Table 1.

[TABLE 1 ABOUT HERE]

Methods of Analysis

Our primary means of analysis in the current research is sequential latent change score (LCS) analysis (Grimm, Ram, and Estabrook 2017). The LCS model estimates two primary parameters of interest. The first is mean baseline levels of an outcome, which is represented by

the mean of an intercept factor, and the second is the mean change in the outcome over time, which is represented by the mean of a change factor. The LCS model provides several advantages in analyzing change over time (Coman et al. 2013). The first is that the LCS model integrates a random error term for each factor, thereby accommodating variation between individuals in not only baseline levels of an outcome, but also between-person variability in change over time. Second, by allowing the random error terms for the intercept and change factor to be correlated, the LCS model explicitly takes into account the degree to which baseline levels of an outcome are correlated with degree of change over time. Third, because the LCS model is estimated in a structural equation modeling (SEM) context, the LCS model affords the estimation of indirect pathways; the consequences of changes in social support for changes in self-rated health *through* changes in loneliness can therefore be estimated and tested. Fourth, SEMs can be estimated using “full information” maximum likelihood (FIML) estimation methods, which addresses missing data by using all of the information that is available for each case, thereby accounting for sample attrition (Enders 2010). The FIML estimation method does assume that data are “missing at random,” meaning that data are not missing due to the values of the missing data, but support for the missing at random assumption was bolstered by ancillary analyses showing that baseline levels of loneliness, social support, and self-rated health were not associated with attrition at follow-up when age, education, and gender were held constant; furthermore, these demographic measures are included in the main analyses, thereby further supporting the FIML assumptions.

[FIGURE 2 ABOUT HERE]

The primary LCS analyses are depicted in Figure 2. A LCS model is estimated by using an observed measure at baseline as the indicator of latent levels of the baseline construct; a

random disturbance term, denoted by “D,” affords inter-individual variation at baseline. Similarly, the observed measure at follow-up is used as an indicator of the follow-up construct. However, a disturbance term is not permitted for the latent follow-up measure. Instead, individual levels at follow-up are first modeled as entirely a function of baseline scores; as a result, residual variation at follow-up is entirely due to change over time. Residual variation at follow-up is then used as an indicator for a second latent variable; because the second latent variable is entirely indicated by the residual variation at follow, the result is that the second factor is an estimation of latent change over time. This latent change factor also includes a random disturbance term, thereby including an explicit estimation of the degree of variation between individuals in change over time. Furthermore, the baseline and latent change factors are correlated, which takes into account the extent to which baseline levels are associated with change over time.

Because the LCS model is estimated through SEM, LCS models can be estimated for multiple outcomes within the same model. As a result, as shown in Figure 2, baseline loneliness can be modeled as influenced by baseline social support, while baseline self-rated health can be modeled as influenced by both baseline social support and loneliness. Similarly, change in loneliness can be modeled as influenced by change in social support, and change in self-rated health can be modeled as influenced by change in social support and loneliness. Figure 1 also shows indirect pathways between social support and self-rated health through loneliness. These indirect pathways can be estimated as ab , which is the product of the association between social support and loneliness (a) and the association between loneliness and health (b); dividing ab by its standard error then produces a test of this indirect effect (MacKinnon 2008).³

Measures of model fit are commonly critical within an SEM context. SEM produces a chi-square test, with a non-significant chi-square test an ideal goal that indicates the model captures the underlying processes that produce the observed variance-covariances matrix (Byrne 2013). The chi-square test is often highly sensitive in large samples, though, and several additional indicators of model fit are often employed, including the RMSEA, for which values less than 0.05 are preferred, the CFI, for which values over 0.95 are preferred, and the SRMR, for which values less than 0.05 are preferred (Byrne 2013; Grimm et al. 2017).

All models are estimated using Mplus 8.3. Although both self-rated health and social support are based on an ordered response scale, each has at least five response levels. Consequently, we employ the maximum likelihood-robust estimation method that provides robust corrections for non-normality and has been shown to produce suitable estimates of latent variables when indicators contain at least five response categories (Rhemtulla, Brosseau-Liard, and Savalei 2012).

Results

Univariate LCS Analyses

[TABLE 2 ABOUT HERE]

As a preliminary step, we estimated “empty” LCS models that did not contain predictors. These models served to provide estimates of baseline levels and overall change in social support resources, loneliness, and self-rated health, prior to examining the interrelationships between these three measures.⁴ The results for social support show a mean level of social support at baseline of 3.769 and, more importantly, a significant mean decrease in social support of -0.435 over the course of the pandemic under study. Social support network resources therefore

contracted over the course of the study. Furthermore, when standardized based on the variance of the latent change factor, the decrease in magnitude of social support resources was relatively strong, with a standardized value of -0.398. The variances of the disturbances for both factors are significant, though, indicating a significant degree of inter-individual variation in this trend.

The empty model estimates for loneliness show a similar pattern.⁵ Mean loneliness at baseline is of 2.118, and there is a significant mean increase in loneliness of 0.298. Loneliness therefore *expanded* over the course of the study. Moreover, when standardized, this mean increase was also relatively strong at 0.368. The factor variances for loneliness are also significant, though, indicating significant inter-individual variation in increases in loneliness.

Given declines in social support and psychological sense of connection, we would expect to see commensurate decreases in health. The results for self-rated health support this expectation. The empty model indicates that mean self-rated health was 3.709 at baseline, and self-rated health decreased significantly over the course of the study, with a mean of -0.136. When standardized, this decrease was moderate, at -0.189, but the breadth of health issues indicated by a decline in self-rated health suggests a substantial threat to population health during the pandemic. Moreover, given the period of only two months, this is a relatively striking change in such a short amount of time. As it appears that contracting social support and expanding loneliness are reflecting in declines in self-rated health, we next turn to the sequential LCS analyses that examine the interrelationships between these factors.

Sequential LCS Analyses

In an initial analysis, we estimated a sequential LCS model similar to that shown in figure 1, but including the demographic controls as predictors of all baseline and latent change factors.

This model fit relatively well, with a significant chi-square statistic ($\chi^2=15.864$ (df=6), $p<.05$), an RMSEA of 0.026, a CFI of 0.997, and an SRMR of 0.008. However, modification indices suggested that the model could be improved by adding a path between baseline loneliness and change in self-rated health. The association between baseline loneliness and change in self-rated health was theoretically justified and substantiated by prior evidence on the consequences of loneliness for health. Furthermore, when added, a path between baseline loneliness and self-rated health improved model fit and resulted in a non-significant model chi-square. With this additional path, the model chi-square was 9.556 ((df=5), $p>0.05$), with an RMSEA of 0.019, a CFI of 0.999, and an SRMR of 0.005. The additional path between baseline loneliness and change in self-rated health was therefore included in the final model.⁶

[FIGURE 3 AND TABLE 3 ABOUT HERE]

Figure 3 depicts the focal associations in the final sequential LCS model, while Table 3 displays the results for the associations for all demographic controls. Focusing first on the baseline measures, we see support for the hypothesized framework of interrelationships. Baseline loneliness is significantly and inversely associated with baseline self-rated health; this association is moderately strong with a standardized association of -0.217. Baseline social support is also significantly associated with higher levels of loneliness, and this association is again moderately strong at -0.210. Since baseline loneliness is significantly associated with greater loneliness, and loneliness is associated with worse baseline self-rated health, this suggests that there should be an indirect effect of social support on self-rated health through loneliness. Ancillary tests confirmed that this indirect association is significant ($ab=0.033$, $p<0.001$; standardized $ab=0.046$). Furthermore, since the direct association between baseline social support and baseline health is not significant, this is a case of “total mediation,” in which

loneliness entirely explains the association between baseline social support and baseline self-rated health (MacKinnon 2008).

Focusing next on the analyses of change, we see that changes in social support are not significantly associated with changes in loneliness. A lack of association between the two measures of change is unexpected, but likely reflects the degree to which there was a large-scale downward shift in a sense of isolation in the public that occurred irrespective of social support resources. The lack of association between change in social support and change in loneliness means, however, that each is significantly associated with change in self-rated health. Change in social support is positively associated with change in self-rated health, thereby indicating that contractions in social support during the pandemic are significantly associated with declines in self-rated health. Independent of changes in social support, change in loneliness is also significantly and negatively associated with change in self-rated health, showing that the expanding sense of loneliness that accompanied the pandemic is associated with further declines in self-rated health. Furthermore, baseline loneliness is also negatively associated with change in self-rated health. Thus, even when we take the population increase in loneliness into account, we see that individuals who were lonelier at baseline were more susceptible to declining health during the pandemic. Ancillary analyses showed similar standardized associations with changes in self-rated health, with a standardized value of 0.071 for social support, -0.082 for loneliness, and -0.072 for baseline loneliness. Although these associations are weaker than for the baseline associations, it should be emphasized that each of these factors was independently associated with changes in self-rated health; consequently, the dual and statistically distinct population changes in social support and loneliness combined for a stronger effect on population declines in self-rated health than each factor in isolation.

Finally, some mention should be made of the associations with the control variables, because there is an important pattern revealed across these associations. While this paper did not hypothesize specific associations between the measures of change and the demographic controls, it is notable almost none of the control measures are associated with the change factors for any of the outcomes. This suggests that what we are observing in change in social support, loneliness, and self-rated health during the COVID-19 pandemic is a quintessential example of a “period effect,” in which members of a society across social circumstances are affected similarly by large-scale social change (Alwin 2009). We will expand on this point in the discussion section.

Discussion

The onset of the COVID-19 pandemic resulted in large-scale social distancing measures that required the cessation or diminution of social interactions and gatherings. These measures were necessary for slowing the spread of the virus, but they also raised concerns among many scholars about the adverse health effects of decreased social contact. The results of our research support these concerns. Although our initial observation point occurred just after social distancing measures were put into place, we observe substantial declines in perceived social support and increases in loneliness over the course of the study. We also observe notable declines in self-rated health, and changes in both social support and loneliness contributed to explaining these health declines.

Much research has documented the adverse consequences of loneliness for health, and scholars have suggested that North America is in the grip of an epidemic of loneliness (Jeste et al. 2020). The current study adds to this body of work in two ways. First, it shows that, during the COVID-19 pandemic, there was a substantial exacerbation of this putative loneliness

epidemic, with a strong increase in loneliness occurring similarly across multiple demographic categories. Whether or not the increase in loneliness persists or has long-term effects on well-being remains to be seen, but these findings indicate that a societal affliction of subjective isolation accompanied the COVID-19 pandemic. These findings therefore support and amplify concerns about the degree to which individuals are commonly facing feelings of loneliness in North America.

Second, although the health effects of loneliness have previously been demonstrated, the current study represents an important contribution in showing that increases in population loneliness over a relatively short time-frame are nevertheless associated with decrements in self-rated health. The current research therefore underscores the potency of loneliness for health, as well as illustrates the importance of considering loneliness as a key social determinant of population health. Furthermore, as self-rated health is reflective of a broad panoply of health conditions, the moderate declines in self-rated health resulting from loneliness are likely indicative of health effects spread across a number of health outcomes. The health consequences of loneliness are especially a concern because impaired self-rated health has been linked to increased risk of mortality (DeSalvo et al. 2006), and loneliness has been associated with life-threatening conditions such as heart disease and stroke (Ong et al. 2016). Additional attention should therefore be given to the way that specific life-threatening conditions may have increased in prevalence during the pandemic, as well as the contribution of loneliness to these increased risks. This is especially the case because creating programs to address loneliness may be one way to combat increased health risks as the pandemic continues.

It is also notable baseline levels of loneliness contributed to changes in self-rated health, over and above increases in loneliness. This finding coheres with previous research showing that

baseline levels of loneliness are associated with subsequent changes in health (Luo et al. 2012; Tsur et al. 2019; Yu et al. 2015). Yet, that we observe this influence over only a two-month period suggests that the initial months of the COVID-19 pandemic composed a period of particular vulnerability for population health. As people experienced a loss of social resources due to social distancing, they were likely more vulnerable to the negative health effects of social stressors. Much of the discussion regarding the adverse effects of social distancing have emphasized the negative effects of specific stressors experienced due to these measures, but our findings illustrate how the pandemic response may also have created adverse impacts for health by leaving individuals at greater risk for additional effects of pre-existing health-threatening conditions. Subsequent research into the health effects of the COVID-19 response should take care to consider how antecedent stressful conditions may have had further health effects due to increased vulnerabilities created by social distancing measures.

The findings of this research also have relevance for theoretical models of social support and health. Uchino (2004) proposed a mediating model of social support and health in which loneliness was suggested to provide a crucial role as a mechanism for the effects of social support on health. Our results partially support this model. At baseline, the consequences of perceived social support for loneliness entirely explained the beneficial association between social support and health. However, changes in social support and loneliness were not significantly associated with each other, resulting in independent effects on changes in self-rated health. The baseline results likely reflect the consequences of social support that preceded the COVID-19 pandemic. Consequently, low levels of perceptions of social support had time to wear on the individual and accrue into feelings of loneliness that adversely affected health. Conversely, decreases in perceived social support and loneliness reflected the external broad

influence of social distancing during the pandemic that influenced a number of different aspects of social well-being simultaneously.

This interpretation is supported by the finding that the demographic controls largely did not predict changes in any of the outcomes under study in this paper. The changes observed here therefore appear to exemplify a “period effect,” which “are the result of widespread environmental changes, the ubiquitous, population-wide exposures that occur at a circumscribed point in time” (Keyes et al. 2010:1101). Central to a period effect is that it is pervasive in its effects across social location. As Alwin (2009) describes, “the effects occur regardless of age or social circumstances—the idea is that for the most part, by definition, a period effect influences just about every member of a given society” (pg. 13). We see here decreases in social support and loneliness that occurred relatively consistently across a number of demographic characteristics. This pattern of results demonstrates how social distancing in response to the COVID-19 pandemic was a broad societal event, for which a large majority of individuals experienced some level of diminished social relationships. In this context, it is not surprising that changes in social support and loneliness independently influenced health, as both of these changes were largely reflective of the large-scale social event that constituted the period effect, rather than being a case in which only social support was directly influenced by the period effect. This period effect is also largely the reason we observe such clear population declines in health—the large majority of the population experienced social declines, producing clear overall consequences for health.

That decreases in social support influenced health independent of loneliness suggests that additional factors likely explain this association. Uchino’s (2004) model of social support and health also suggests that social support will enhance health through a positive sense of self,

including self-esteem and sense of control, and research supports the positive health effects of both aspects of a positive sense of self (Mirowsky and Ross 2003; Orth, Robins, and Widaman 2012). It is likely that these aspects of the self were impacted by the pandemic as well. In particular, a loss of sense of control was likely to be common during a large-scale social event in which there was broad diminutions in supportive social networks, with additional potent effects for health.

Several weaknesses to this paper should also be noted. First, this paper did not take into account financial stresses that may have occurred during the course of the study. In ancillary analyses, we controlled for economic hardship in previous month reported in the May follow-up, and the focal associations reported in the current analyses were not substantially altered with the inclusion of this control. We do not report these findings here, though, because these ancillary analyses required the inclusion of a number of additional associations between the demographic controls and economic hardship that did not contribute to focus of the current study. In addition, our primary measure of social support is centered on emotional support, and research on social support and health has also examined instrumental and material support (Turner and Brown 2010). Due to the prevention of social contact, however, these sources of support were less relevant, and for these reasons we focused on emotional support. However, if assistance for daily tasks or other common activities were curtailed as a result of social distancing, this may have affected health as well, and would also likely help to contribute to explaining health declines. The contributions of instrumental support would, however, be unlikely to negate those of the measure of social support observed in the current research, especially as this emotional support conveys the primary message of feeling cared for and valued.

Conclusion

The COVID-19 pandemic has generated sweeping social transformations in a relatively short period of time. By some accounts, prior to the pandemic, there were already deep concerns about social dislocation associated with pervasive feelings of loneliness in society. The fact that a major challenge to social bonds has emerged in this context presents unique opportunities to understand the processes that fuel feelings of loneliness, and ultimately impacts on health. A fundamental human need is connection to others. As the pandemic continues, many governments have been hesitant to lift social distancing requirements, and those that have relaxed these measures have observed rises in infection rates. These measures may therefore be necessary to curtail the spread of the virus, but also are likely to leave people desiring social connection. It is this unfilled yearning for social connection that is exemplified by the plea, “Won’t you please talk to me?” Bereft of this connection, we are likely to see additional negative impacts on population health.

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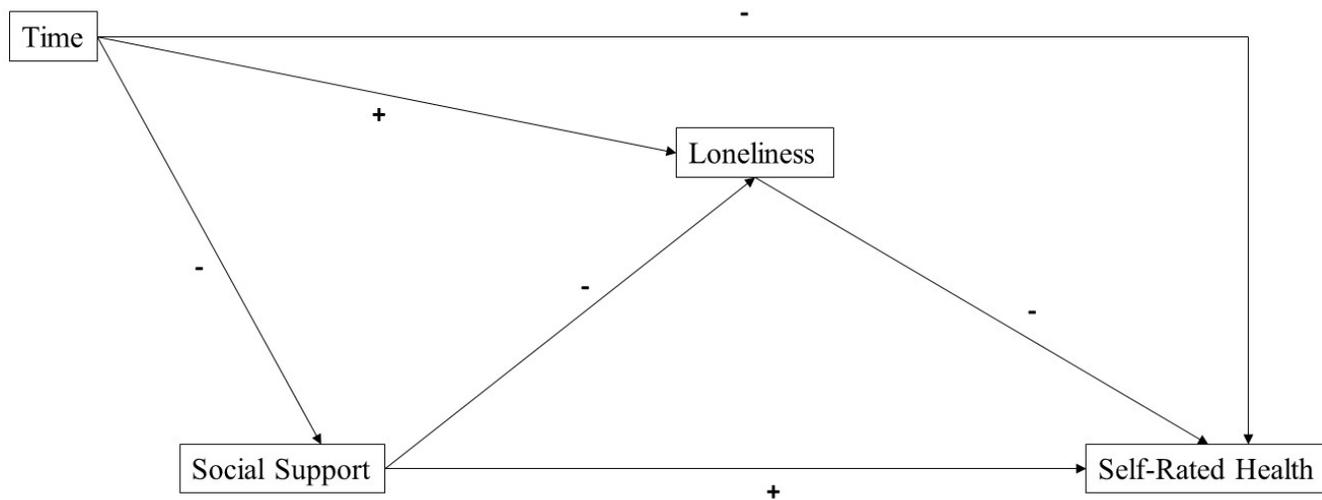


Figure 1. Conceptual model of the indirect associations between social support, loneliness, and self-rated health, adapted from Uchino (2004) and integrating expected changes during the COVID-19 pandemic.

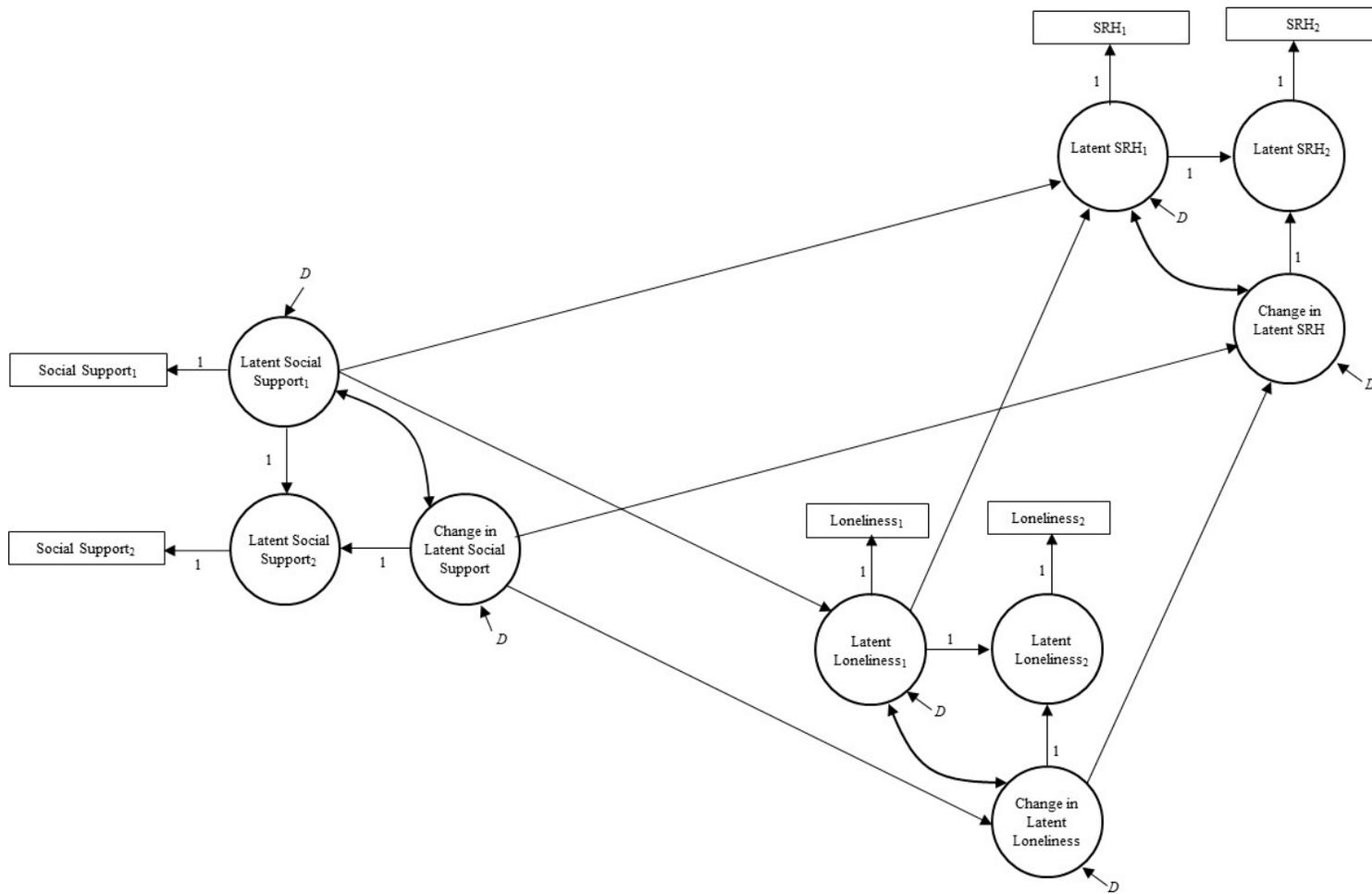


Figure 2: Sequential Latent Change Score Model of Social Support, Loneliness, and Self-Rated Health During the COVID-19 Pandemic

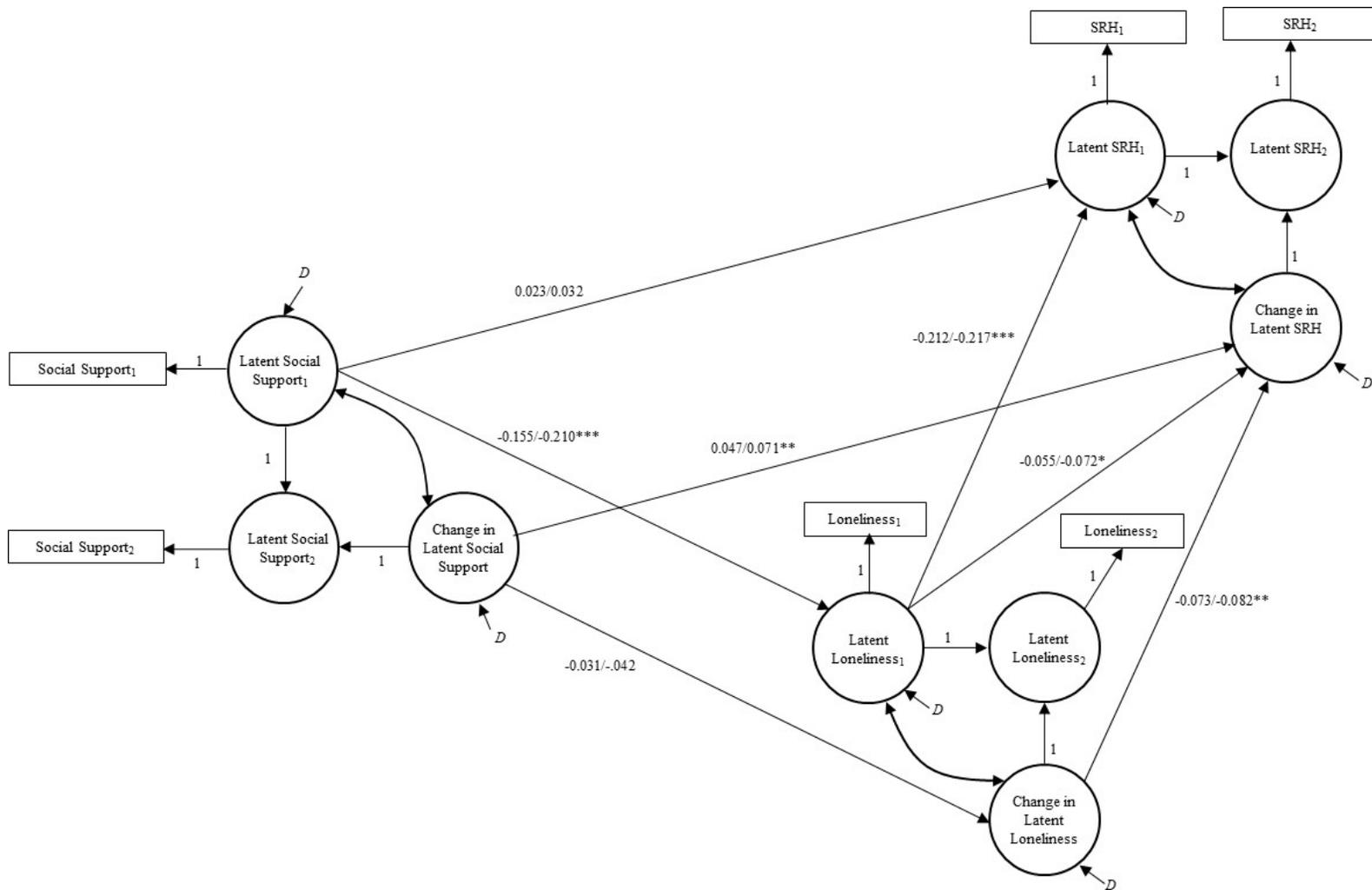


Figure 3: Results of Latent Change Score Model of Social Support, Loneliness, and Self-Rated Health. Metric and then standardized coefficients are presented. * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$.

TABLE 1
Weighted Sample Means

Age	
18-29	0.202
30-39	0.283
40-49	0.187
50-64	0.274
65-85	0.054
Women	0.486
Visible Minority	0.137
Education	
High School	0.122
Some University or College/Trade School	0.217
College/Trade School	0.230
University Degree	0.432
Income	
Under \$25,000	0.069
\$25,000 to Less than \$50,000	0.136
\$50,000 to Less than \$100,000	0.303
\$100,000 to Less than \$150,000	0.229
\$150,000 and Over	0.163
Missing Income	0.100
Baseline Work Statuses	
Full-Time Employment	0.655
Part-Time Employment	0.184
Business Owner/Self-Employed	0.162
Lives with Romantic Partner	0.647
Number of Others in Household	1.686

N=2,456.

TABLE 2
Univariate LCS Models of Social Support, Loneliness, and Self-Rated Health

	Perceived Social Support				Loneliness				Self-Rated Health			
	<i>b</i>	SE	β^*	<i>p</i>	<i>b</i>	SE	β^*	<i>p</i>	<i>b</i>	SE	β^*	<i>p</i>
Baseline Latent Mean	3.769	0.027	2.928	***	2.118	0.020	2.226	***	3.709	0.019	3.998	***
Mean Latent Change	-0.435	0.026	-0.398	***	0.298	0.020	0.368	***	-0.136	0.017	-0.189	***
Baseline and Change Covariance	-0.580	0.033	-0.413	***	-0.258	0.018	-0.336	***	-0.256	0.019	-0.382	***

N=2,456. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$ (Two-tailed tests).

TABLE 3
Relationships with Control Variables in Sequential LCS Model of Social Support, Loneliness, and Self-Rated Health

	Perceived Social Support								Loneliness								Self-Rated Health								
	Baseline				Latent Change				Baseline				Latent Change				Baseline				Latent Change				
	<i>b</i>	SE	β^*	<i>p</i>	<i>b</i>	SE	β^*	<i>p</i>	<i>b</i>	SE	β^*	<i>p</i>	<i>b</i>	SE	β^*	<i>p</i>	<i>b</i>	SE	β^*	<i>p</i>	<i>b</i>	SE	β^*	<i>p</i>	
Age (18-29 is Reference)																									
30-39	-0.077	0.083	-0.027		-0.045	0.082	-0.018		-0.090	0.063	-0.043		-0.012	0.072	-0.007		-0.160	0.060	-0.078	**	-0.112	0.063	-0.070		
40-49	-0.348	0.088	-0.105	***	-0.089	0.089	-0.032		-0.329	0.067	-0.135	***	-0.015	0.075	-0.007		-0.425	0.066	-0.179	***	-0.138	0.065	-0.075	*	
50-64	-0.606	0.087	-0.210	***	-0.134	0.087	-0.055		-0.469	0.064	-0.220	***	-0.013	0.072	-0.007		-0.405	0.065	-0.195	***	-0.174	0.062	-0.107	**	
65-85	-0.511	0.146	-0.090	***	-0.165	0.138	-0.034		-0.615	0.094	-0.146	***	0.054	0.100	0.015		-0.426	0.106	-0.104	***	-0.057	0.087	-0.018		
Women	0.170	0.052	0.066	**	0.099	0.052	0.045		0.040	0.038	0.021		0.039	0.040	0.024		-0.081	0.038	-0.043	*	0.049	0.035	0.034		
Visible Minority	-0.161	0.078	-0.043	*	-0.028	0.082	-0.009		0.183	0.058	0.066	*	-0.085	0.062	-0.036		-0.023	0.057	-0.008		0.066	0.048	0.032		
Education (University Degree is Reference)																									
High School	-0.378	0.088	-0.096	***	-0.002	0.098	-0.001		0.145	0.065	0.050	*	-0.096	0.072	-0.039		-0.290	0.070	-0.102	***	0.108	0.069	0.049		
Some University or College/Trade School	-0.281	0.071	-0.090	***	-0.021	0.073	-0.008		-0.059	0.050	-0.026		0.113	0.053	0.057	*	-0.153	0.050	-0.068	**	0.015	0.046	0.008		
College/Trade School	-0.278	0.067	-0.091	***	0.072	0.065	0.028		-0.082	0.047	-0.037		-0.010	0.049	-0.005		-0.179	0.047	-0.081	***	0.008	0.043	0.005		
Income (\$150,000 and Over is Reference)																									
Under \$25,000	-0.180	0.139	-0.035		0.003	0.152	0.001		0.287	0.104	0.076	**	-0.230	0.116	-0.072	*	-0.345	0.100	-0.094	**	0.067	0.090	0.023		
\$25,000 to Less than \$50,000	-0.214	0.106	-0.057	*	0.141	0.109	0.044		0.208	0.075	0.075	**	0.012	0.079	0.005		-0.328	0.072	-0.121	***	-0.045	0.066	-0.021		
\$50,000 to Less than \$100,000	-0.263	0.081	-0.094	**	0.194	0.082	0.081	*	0.065	0.055	0.032		-0.083	0.059	-0.047		-0.165	0.056	-0.082	**	-0.030	0.052	-0.019		
\$100,000 to Less than \$150,000	-0.141	0.083	-0.046		0.085	0.082	0.033		0.048	0.055	0.021		0.015	0.060	0.008		-0.109	0.056	-0.049		-0.009	0.053	-0.005		
Missing Income	-0.357	0.111	-0.083	**	0.148	0.106	0.041		0.158	0.075	0.050	*	0.026	0.076	0.010		-0.160	0.077	-0.052	*	0.015	0.067	0.006		
Baseline Work Statuses																									
(Business Owner/Self-Employed is Reference)																									
Full-Time Employment	-0.146	0.077	-0.054		-0.089	0.077	-0.039		-0.026	0.052	-0.013		0.062	0.054	0.036		0.011	0.056	0.006		0.043	0.051	0.028		
Part-Time Employment	-0.047	0.097	-0.014		-0.106	0.097	-0.037		0.026	0.068	0.010		0.021	0.072	0.010		-0.087	0.071	-0.036		0.034	0.062	0.018		
Lives with Romantic Partner	0.036	0.066	0.013		-0.047	0.068	-0.021		-0.377	0.049	-0.190	***	-0.065	0.051	-0.038		-0.025	0.048	-0.013		0.054	0.047	0.036		
Number of Others in Household	-0.028	0.024	-0.026		0.021	0.027	0.023		0.010	0.018	0.012		-0.023	0.018	-0.034		0.008	0.017	0.011		0.006	0.016	0.010		
Intercept	4.476	0.133	3.478	***	-0.445	0.141	-0.407	**	3.066	0.115	3.230	***	0.347	0.104	0.428	**	4.650	0.128	5.014	***	0.015	0.101	0.020		
Baseline and Change Covariance	-0.590	0.033	-0.436	***					-0.244	0.016	-0.353	***					-0.262	0.018	-0.419	***					
R2	0.065				0.011				0.174				0.019				0.106				0.026				

N=2,456. *p<0.05. **p<0.01. ***p<0.001 (Two-tailed tests).

Endnotes

¹ Our measure uses the same questions as Hughes et al. (2004), but they asked “how often you feel that way” (pg. 660). We changed the reference to the previous month to specify experiences of loneliness during the Covid-19 pandemic. Hughes et al. (2004) also used a more restricted response format of 1 (hardly ever) to 3 (often), but we increased the response categories to allow for greater precision in the degree of variation in loneliness across the pandemic.

² Although studies from the United States often use more detailed measures of race and ethnicity, the “visible minority” category is relied-upon by Statistics Canada as the primary indicator of minority race and ethnicity

((<https://www23.statcan.gc.ca/imdb/p3Var.pl?Function=DEC&Id=45152>), with the result that survey research in Canada typically follows the standard set by Statistics Canada. For this reason, as a part of the Angus Reid panel, participants were asked, “Would you say you are a member of a visible minority here in Canada (in terms of your ethnicity/race)?” and responses to this question were used to determine visible minority status. As “visible minority” is the common means of referring to designations of minority race and ethnicity in Canadian research, we follow this convention in using the “visible minority” label.

³ Although bootstrapping is also often used to test indirect effects, bootstrapping is primarily necessary in sample sizes of less than 1,000 (MacKinnon 2008), and since our sample has over twice that size, bootstrapping is not necessary.

⁴ Within the current analyses, the univariate LCS models are “just-identified,” meaning that the full set of possible associations are estimated, leaving no additional information with which to create estimates of model fit (Kline, 2005). However, measures of indicators fit can be obtained

in the sequential LCS model and, as will be shown, these measures demonstrate very strong model fit, generally substantiating the suitability of the univariate LCS models as well.

⁵ The analyses of loneliness were missing one respondent who did not indicate loneliness at any wave, but this respondent was included in both the self-rated health and social support analyses, and therefore in the sequential LCS analyses described in the next section.

⁶ We also investigated adding a path between baseline social support and change in self-rated health, but this path was not significant and model fit was degraded with its addition.