While social pluralism and diversity is an important characteristic of functioning democracies, civil society and democratic institutions require citizens to feel like an integral part of society in order to function. This stems from a general sense of unity and cohesion as well as a mutual understanding of citizens that institutions and other members of society are trustworthy. While objective aspects of social embeddedness, i.e. organizational membership and inter-relational contact, are established predictors of these outcomes, perceived loneliness is rarely investigated. This study investigates whether changes in loneliness reduce levels of perceived connectedness and political and interpersonal trust beliefs. By analyzing 12 waves of panel data from the Netherlands gathered between 2008 and 2020 ($n = 41,508$), the analysis shows that intra-personal variation in loneliness predicts citizens' sense of connectedness and interpersonal trust beliefs. Regarding political trust, the relationship cannot be found with panel fixed effect.

The influence of loneliness on perceived connectedness and trust beliefs – longitudinal evidence from the Netherlands.

1. Introduction

In order to function, civil societies and political institutions rely on citizens' sense of social belonging and on citizens' mutual understanding that institutions and other members of society are trustworthy. Often discussed in the social cohesion and social capital literature (Chan, Ho Pong, and Chan 2006)¹, trust in political actors and institutions is important for their legitimacy and citizens' policy compliance, while inter-relational trust and a sense of unity and interconnectedness with other members of society are considered important sources for civic solidarity, identity and, ultimately, participation in socio-political processes (Brehm and Rahn 1997; Marien and Hooghe 2011; Welch et al. 2005).² As trust and perceived connectedness are incremental parts of social cohesion and central for functioning democracies (Chan et al. 2006; Vollhardt, Migacheva, and Tropp 2009), scholars warned that surveys detected a slow, but steady decline in these crucial societal resources (Bovens and Wille 2008; Twenge, Campbell, and Carter 2014).³

Authors in the tradition of social capital theory argue that trust and sense of social cohesion stem from activities in civic organizations, communities, and social interactions in general as they provide opportunities for cooperation, communal thinking and reinforcement of shared civic

virtues (Coleman 1988; Putnam 2000). Correspondingly, empirical studies often investigate the emergence of social cohesion, i.e. trust and sense of connectedness, with objective measures of social embeddedness, such as organizational membership, network characteristics and inter-relational contact (Fukuyama 2001; Jackson 2020; Paxton 2002). However, these operationalizations are often limited to observable aspects of social interactions. Considering the great importance of perception for the perceived social reality and social attitudes (Greifeneder, Bless, and Fiedler 2017), it is likely that subjective-perceptual aspects of relationships play an important role in the formation of trust beliefs and perceived social cohesion as well (Vollhardt et al. 2009).

This study contributes to this shortcoming by investigating the influence of *perceived loneliness* on social and political trust beliefs and perceived social connectedness. Loneliness is an emotional response to a perceived deficiency in one's own social network and has been found to influence a multitude of attitudinal and behavioral outcomes. However, sociological or political studies concerned with societal consequences of loneliness are small in numbers and mostly based on cross-sectional data (Langenkamp 2021; Schobin 2018; Yang 2019). One noteworthy study from Rotenberg and colleagues (Rotenberg et al. 2010) did investigate the relationship of generalized trust and loneliness with a 2-wave panel design in several age groups. This analysis, however, is based on comparably few observations in a very short panel, which potentially led to the reported insignificant effects of loneliness on trust. Therefore, the role of perceived loneliness in the formation of trust and cohesion can be considered underexplored.

This article tackles the issue that no study confirmed the relationship with well powered longitudinal designs so far. By utilizing 12 waves of longitudinal, representative panel data from the Netherlands gathered between 2008 and 2020, the study confirms that within-person variation

in loneliness relates to intra-personal variation in the individuals' perceived connection to others as well as their social trust beliefs. The relationship between loneliness and political trust, however, can only be found in models which rely on between-unit variation, but not with fixed effects models.

The study is structured as follows: First, the study reviews the concept of loneliness and its known consequences. Secondly, the theoretical argument why loneliness relates to perceived trust, sense of generalized connectedness and political trust is reviewed. Third, the data and analytical strategies are presented. The subsequent analysis tests the hypotheses. Implications and limitations are discussed in the conclusion.

2.1. Loneliness, what it is and what it does

Similar to hunger or thirst, loneliness is a universal human experience and, consequentially, the topic of countless philosophical and cultural writings (Svendsen 2017). Despite its cultural prominence, the notion of loneliness suffers from multiple misconceptions and gets confused with related concepts in public as well as academia. Therefore, it is important to discuss in more detail what loneliness is, how it relates to objective social relationships and activities, and what is known about its consequences.

As reliable relationships were a central resource for survival throughout history, humans have developed a strong desire to form and maintain reliable social relationships and belong to a larger social group (Baumeister and Leary 1995; Gere and Macdonald 2010). Loneliness stems from a perceived discrepancy between one's desired and actual relationships and can be understood as the emotional expression of a perceived insufficiency in the personal social relationships, either in respect of quantitative or qualitative aspects (Franklin and Tranter 2021; Perlman and Peplau 1981). The fields of psychology and neuroscience established that loneliness developed as a painful

emotional warning signal that motivates humans to re-affiliate with others in order to maintain the protective relationship network (Cacioppo and Cacioppo 2018; Qualter et al. 2015), and many scientists concerned with human motivation consider affiliation as one of the most important drivers of human action (Kovač 2016).

This close conceptual relationship between loneliness and social relationships led to the common misconception that loneliness is a synonym for aloneness. Although conceptually intermingled at times, loneliness and being alone are distinct empirical phenomena (Riva and Eck 2016) and loneliness is more dependent on the quality, rather than quantity, of social relationships and social activities (Gierveld, Tilburg, and Dykstra 2018). For instance, research repeatedly found statistically significant, but modest correlations between social isolation, social activity and loneliness (Coyle and Dugan 2012; Russell et al. 2012). These findings manifest themselves in an everyday observation: people can feel lonely despite being in company, but feel happy with very few contacts. In contrast, social connectedness and social embeddedness are often used interchangeably and refer to the objective social network of individuals (Reilly 2017). Simply put, aloneness and connectedness are physical states of being, but loneliness is a state of mind.

Due to its motivating function to re-affiliate, loneliness is a useful emotion in the short term. However, being unresolved, chronic loneliness has severe negative consequences. Keeping in mind that loneliness is a warning signal for seemingly insufficient or eroding social relationships, it is of little surprise that chronically lonely individuals tend to experience various negative emotions during social encounters such as anxiousness, insecurity, and risk aversion (Qualter et al. 2015; Spithoven, Bijttebier, and Goossens 2017). In their review, Spithoven and colleagues also conclude that chronically lonely individuals often show a self-preservation mind-set.

Given that social ties provide security, loneliness is associated with increased stress which results in an elevated threat sensitivity, anxiety and risk avoidance (Cacioppo and Cacioppo 2018). Mediated through these stress reactions, loneliness is known to cause reduced sleep quality and unhealthy coping behavior, which results in severe consequences for health and psychological wellbeing. Among others: dementia, depression, cardiovascular diseases, and reduced life-expectancy (Hawkley and Cacioppo 2010; Lim, Eres, and Vasan 2020). This led scientists to promote loneliness first and foremost as an issue for public health (Holt-Lunstad, Robles, and Sbarra 2017).

Despite these manifold consequences of loneliness with respect to mental and physical health, fairly little is known about how chronic loneliness is associated with other aspects of public interest. Figure 1 displays the numbers of articles registered in the webofscience.org database published between 1960 and 2020 with the term ‘loneliness’ in the title, separated by scientific field. While this can only serve as rough indicator, the graph illustrates that loneliness played just a minor role in empirical research throughout the 20th century, with particularly few publications in sociology and political science.⁴ Out of the whole corpus of 12402 articles published between 1960 and 2019, only 336 and 54 research articles, respectively, are categorized as studies from the field of sociology or political studies respectively.

[Figure 1 about Here]

In consequence, it is of little surprise that the question of whether loneliness exerts an influence on social and political trust remains underexplored and the related empirical evidence limited. This, however, might be an important shortcoming. A recent meta-studies analyzing over 449 means from 437 independent samples gathered between 1976 and 2019 suggest that loneliness grew slowly, but steadily during the last 46 years in western democracies with particularly strong growth

in the United States (Buecker et al. 2021). Furthermore, survey research indicates that loneliness has a strong prevalence in the U.S and other western democracies already before the Corona pandemic aggravated the issue (Cigna 2018; Luhmann and Hawkley 2016). These findings suggest that a potential influence of loneliness on social cohesion might be of growing importance. The next chapter reviews the theoretical mechanisms and existing evidence that links loneliness to the three considered indicators.

2.2. Loneliness, connectedness and trust believes

As reviewed in the preceding section, loneliness indicates insufficient or eroding social relationships. This is accompanied with feelings of anxiousness, insecurity, and risk aversion (Spithoven et al. 2017). Spithoven and colleagues also conclude that loneliness alters social perception and behavior as soon as it becomes a chronic state. While loneliness motivates individuals to seek out social interactions, repeated failure to alleviate their loneliness causes additional fear of negative social interactions and, ultimately, the paradox behavior that lonely individuals start to socially withdrawal (Qualter et al. 2015).

This dynamic likely radiates on the perceived sense to be part of a social community and the sense to belong in general (Pretty, Andrewes, and Collett 1994). As elaborated before, humans have a strong need for social belonging (Baumeister and Leary 1995). This does not only refer to individual contacts, but also the persons sense to fit into the broader social setting (for instance the village/city) and to be an integral part of society (Franklin and Tranter 2021). Hence, feeling lonely logically relates to increased uncertainty about the own social standing, the reliability of others, and to what degree one has a generalized perceived connection to others.⁵ Qualitative studies of loneliness in marginalized groups suggest that a sense of disconnectedness from the greater society and other people in general are part of experiencing loneliness (Bower, Conroy, and Perz 2018;

Rokach 2014). Likewise, studies investigating war veterans highlight the link between loneliness and disconnectedness from society (Stein and Tuval-Mashiach 2015). However, it is an open question whether these insights can be replicated with survey data of the general population.

In a similar fashion, the prolonged experience of feeling lonely likely fosters distrust against other people. As discussed, lonely individuals tend to grow anxious and insecure from social settings and interpret social encounters more negatively (Spithoven et al. 2017). This likely corresponds with a higher probability to experience negative social situations and, in the long run, become more distrusting. Unsurprisingly, observational studies found that loneliness correlated with interpersonal distrust in multiple countries and with various operationalizations (Nyqvist et al. 2016; Qualter et al. 2009; Rotenberg 1994). However, loneliness as well as trust believes are associated with time-invariant characteristics such as personality traits and correlations potentially due to self-selection (Buecker et al. 2020). Likewise, cross-sectional studies potentially suffer from unobserved confounding. Attempts of experimental manipulation of situational loneliness support the idea that loneliness fosters anxiety (Cacioppo et al. 2006), but given that experimental manipulation of chronic loneliness is not feasible and cross-sectional data do not observe changes within individuals, it is unclear whether within-person changes in loneliness over longer timespans affects social distrust.

Finally, if loneliness causes distrust and disconnectedness, it potentially exerts an influence on the citizens' trust towards political actors and institutions as well. If chronically lonely individuals evaluate other people more negatively and grow more distrusting in general, the idea that this might lead to generalized distrust against politicians and political organizations as well is not far-fetched. While several studies could not find a link between social and political trust (Uslaner, 2017 p.44), more recent studies found an association (Newton and Zmerli 2011). Likewise, longitudinal

evidence from Denmark suggest a bidirectional relationship between social and political trusts (Sønderskov and Dinesen 2016).⁶

All this supports the idea that loneliness potentially influences social as well as political trust. However, lonely individuals show these attitudinal changes out of a latent perceived insecurity and fear from further social exclusions. Political actors and institutions are more distant and more abstract concepts for most individuals. Whether the social distrust radiates to a general distrust against political actors and their spheres of action (i.e. political institutions) is an open empirical question. There are a couple of multinational cross-sectional studies that find the association between loneliness and political trust using the European Social Survey (Schobin 2018; Yang 2019). However, the theoretical relationship between loneliness and political distrust is less clear compared to the other two discussed considered outcomes and suffers from the same issue that empirical findings are mostly based on cross-sectional data.

Taken together, despite a strong argument why loneliness likely causes insecurity and anxiety which, in turn, cause distrust and a reduced sense of generalized connectedness, the empirical evidence is fairly limited. Therefore, this study tests the hypotheses that loneliness is associated with reduced connectedness, and political as well as social trust.

H1: Increases in loneliness are associated with a decrease in perceived generalized connectedness.

H2: Increases in loneliness are associated with a decrease in social trust believes.

H3: Increases in loneliness are associated with a decrease in political trust believes.

3.1. Data

The data utilized in this study are administered by the CentERdata Institute for Data Collection and Research, funded by the Dutch governmental organization for scientific research (NOW). The

“Longitudinal Internet Studies for the Social Sciences”, hereafter LISS, is the central panel data project of the Measurement and Experimentation in the Social Sciences (MESS) project and is openly available for scientists.⁷ The Survey is a true probability sample of the registered population in the Netherlands. Although the LISS is mainly organized as an internet survey, the institute puts emphasis on gathering data of people without internet connection. Participants without computer or internet access are provided devices so that they can participate. Therefore, the survey collection mode does not affect the representativeness of the sample. In the context of this study, this is particularly important because older age groups and low income households are less likely to have internet access and show higher probabilities to suffer from loneliness (van Deursen and van Dijk 2019; Hawkey et al. 2020).

Importantly, loneliness as well as perceived societal cohesion and trust believes are fairly stable over time (Marien 2011; Mund et al. 2020). Therefore, long running panel models are needed to track within-person variations in both. Fielded the first time in 2008, the panel gathers data annually with the most recent wave fielded in October 2020. Furthermore, the LISS continuously included a 6 item version of the Gierveld loneliness scale since the first wave. As loneliness is a complex latent construct that is best captured with specific validated scales (Marangoni and Ickes 1989), the long-running panel is uniquely suitable for the purpose of this study.

This study is based on 12 out of 13 waves gathered between 2008 and 2020. The fifth wave (2012) cannot be included in the analysis as the variables measuring loneliness varied in their operationalization in this specific wave. The panel itself is unbalanced, with permanent and temporary drop outs (average participation duration is 4.17 years). After excluding underage participants from the analysis (n=803) and list-wise deletion of missing cases, the final analysis sample contains 41,508 observations from 9,954 individuals.

3.2. Operationalization

3.2.1 Dependent variables:

Sense of connectedness is measured with a single item indicator. The participants had to answer a question asking them to what extent they feel connected to other people in general. The item is part of the personality core questionnaire and presented with other questions measuring universal values and attitudes. The rating scale displayed 7 figures of overlapping circles to visualize the degree of which the participant's feels connected with other people in general. The original item is coded from 1 to 7, where higher values indicate high connectedness. To increase the comparability of the effect size between the three considered outcome variables, the item was rescaled so it ranges from 0-10.⁸

Social trust is measured with the item: "Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?" The participants had to indicate their trust on a scale ranged from 0-10, with high values indicating high social trust.

Political trust is measured with a mean score index from 5 items (Cronbach alpha= 0.94). The participants were asked to indicate their confidence in several political actors and institutions: the government, the parliament, politicians, parties, and democracy overall. Similar to the social trust variable, all items and the resulting mean score range from 0-10, high values indicating high political trust.

3.2.2 Independent variable:

Loneliness was measured with the shortened 6-item version of the Gierveld loneliness scale (Cronbach alpha= 0.79). The wording and scaling of the items are reported in appendix table A1. The Gierveld loneliness scale is a validated and widely used instrument to measure loneliness (de

Jong Gierveld and van Tilburg 2010). Given that a loneliness variable generated from factor scores resulted in the same results as a simple sum score (both measures are interrelated with .98), but is less intuitive to interpret, all reported results are based on a simple additive measure. The final loneliness item ranges from 0-12, with high values indicating high loneliness.

3.2.3 Control variables

As elaborated in the theory section, many studies attempt to explain trust and perceived connectedness with measures of objective social inclusion. To ensure that the observed relationship between loneliness and the outcomes are not mere symptoms of limited social contacts, I control for membership in civic organizations as well as interaction frequency with family and friends, both measured on a 7-point scale. Other potential confounders are life events such as divorces (Van Tilburg, Aartsen, and Van Der Pas 2015). To account for major life events that trigger loneliness, I include dummies indicating, widowhood, divorce, being separated from a partner, being married, and whether a person lives with their partner in the same household.

Furthermore, the analysis accounts for several socio-demographic variables. First, the study controls for gender (male versus female) and level of education (“primary school”, “intermediate secondary education/junior high school”, “higher secondary education”, “intermediate vocational education/junior college”, “university”). Furthermore, to account for age effects, the models control for the age groups "18-24 years", "25 - 34 years", "35 - 44 years", "45 - 54 years", "55 - 64 years", and "65 years and older". Also, as loneliness is correlated with health, I include a self-reported measure of general health, ranging from 1 to 5, with high values indicating good health. Likewise, financial hardship can increase political and social distrust and is a predictor of social exclusion. To account for this, I include a variable measuring subjective satisfaction with the personal financial situation. The subjective measure was preferred over self-reported income

because income measures tend to have very high proportions of missing values and also to be biased due to social desirability. Moreover, financial satisfaction captures financial hardship better, as it accounts for household size, changing living standards, and other social forces such as social comparisons.

Finally, longitudinal data might show period effects, due to specific events in time. This is often tackled by including arbitrary time dummies, but this can cause biases and introduce issues in respect of effect interpretation (Kropko and Kubinec 2020). Following recommendations from the literature (Brüderl and Ludwig 2014), the analysis does not rely on arbitrary time dummies, but includes specific, theory-driven period events.

First, during the survey period, the European Union experienced the so-called refugee crisis as well as the European sovereign debt crisis. Both events are in a way ongoing and it may be difficult to clearly define an official start and end to them. However, the Netherlands, similar to most other European countries, experienced record numbers of asylum seekers during 2015/16 (Tolsma, Laméris, and Savelkoul 2021). This is mirrored by the frequency of related media articles published in print media, which were highest in 2015 and 2016 (Czymara and Klingerer 2021). To account for this, a dummy indicating the years 2015 to 2016 is included. In respect of the debt crisis, the sovereign debt crisis is typically considered to have started in 2010 and ended with the introduction of the central banks Outright Monetary Transactions (OMT) program that effectively ended immediate concerns about speculations against the currency (Ehrmann and Fratzscher 2017). Furthermore, the Netherlands elected their parliament twice times during this period.⁹ As election periods are often accompanied by negative media reports and aggressive campaigns, scholars suspect that this affects trust believes (Bovens and Wille 2008). To account for this, the analysis

contains a dummy variable indicating whether an observation was gathered during an election year. Table 1 provides an overview of the descriptive statistics of all variables.

[Table 1 near here]

4.1. Analysis

For the analysis, I estimate between-effects (BE) as well as fixed-effects (FE) panel models. To investigate the hypotheses, the analyses will mainly focus on FE models, which are controlled for unobserved heterogeneity. However, as an additional analytical step BE models are calculated as well. This is done for several reasons: First, comparisons between individuals are better suited to describe differences between sociodemographic groups, while FE models are preferable for causal inference (Brüderl and Ludwig, 2014 p.353). As loneliness and trust believes are fairly robust over time, BE are especially useful to describe more permanent differences between the most and least lonely parts of the population. Also, given that most previous research is based on cross-sectional data, i.e. between-person comparisons, the BE models can be seen as replications of these results. However, BE models suffer from issues of self-selection and confounding from unobserved individual characteristics (Andreß, Golsch, and Schmidt 2013). As FE models only use within-person variation to estimate coefficients, they are particularly useful to account for these shortcomings. Therefore, to show the dynamic part of the relationship and to ensure that the relationship is not biased by time-invariant confounders, FE models are calculated. Please note that time-invariant variables such as gender are omitted in the FE models by design.¹⁰ The FE models are calculated with cluster robust standard errors. Figure 2 summarized the key effects of interest out of 6 regression models. The full regression tables can be found in appendix Table A2 and Table A3.

The first three coefficients report the between-effect of loneliness on sense to connectedness, social trust, and political trust. On average, every additional point of loneliness is associated with a lower perceived connectedness of roughly 0.2 points ($p \leq 0.001$). Over the full range of the loneliness scale, this accumulates to a difference of roughly 2.39 points on a 10 point scale between the most and the least lonely individuals. Likewise, loneliness is negatively associated with social trust (coef. = -0.153; $p \leq 0.001$) as well as political trust (coef. = -0.059; $p \leq 0.001$). Considering the scale of the variables, this accumulates to a difference between the most and the least lonely of 1.824 and 0.708 respectively. This confirms the previously found relationships: lonely individuals are, substantially more likely to feel disconnected and to be socially and politically distrusting.

[Figure 2 near Here]

However, these effects are still confounded by self-selection and time-invariant unobserved confounders. This is especially important in the context of loneliness as personality characteristics such as extraversion, agreeableness, conscientiousness, neuroticism, and openness are known predictors for loneliness (Buecker et al. 2020). To account for this, the last three coefficients reported in Figure 2 are based on panel fixed effects which are not biased by time-invariant unobserved confounders.

The within-person effects shrink considerably in size compared to the between effect coefficients, but remain statistically significant in two out of three models. With respect to the effect size, every increase in loneliness is, on average, associated with a decrease in perceived connectedness by roughly 0.059 ($p \leq 0.001$), accumulating to a potential effect of -0.708 on a 10 point scale between the most and the least lonely. With respect to trust believes, every additional point in loneliness is associated with a reduction in social trust of 0.034 ($p \leq 0.001$). The effect of loneliness on political trust, however, is no longer statistically significant ($p=0.393$).

With that, the analysis supports hypotheses 1 and 2: Loneliness erodes social trust and perceived connectedness. In contrast, the analysis finds only limited support for hypothesis 3. While it is still a possibility that the effect of loneliness on political trust is too small to be detected on a within-person level, the significant between effects and insignificant fixed effects suggest that the relationship between loneliness and political trust might stem from self-selection or unobserved confounders.¹¹

4.2. Robustness – alternative model specifications

To get a better understanding of the robustness of the results, I calculated several alternative model specifications. First, the reported results are based on adults only. Including the excluded underage participants does not change the results. Secondly, the last wave was fielded in October 2020, a time the COVID-19 pandemic likely had a strong exogenous effect on loneliness as well as perceived social solidarity and political trust. However, removing this wave from the analysis does not change the results either.

Third, while panel fixed effects are powerful tools for inference statistics, they can be biased if the exogeneity assumption is not met. Intuitively speaking, if unobserved traits such as maturation or learning effects do influence the effect of loneliness on the outcome of interest, these estimates can be biased (Wooldridge 2010). The potential issue that the effect of loneliness on beliefs and perceived connectedness might change based on the duration/chronicity of loneliness stands to reason. Fixed effects with individual slopes relax the exogeneity assumption and serve as a remedy of this problem (Brüderl and Ludwig 2014). Using the STATA program XTFEIS (Ludwig 2019), repeating the analysis using panel fixed effects with individual slopes leads to the same conclusions.

All robustness tests are available in the online appendix.

4.3. Issue of reverse causality

The results and robustness tests presented so far suggest that rising loneliness causes reduced trust and a diminished sense of connectedness. However, one issue deserves particular attention. In contrast to experimental designs, observational data struggle inherently with issues related to reverse causality (Leszczensky and Wolbring 2019). To be more specific, it is plausible that not only loneliness affects trust beliefs and sense of connectedness, but that the individuals' loneliness is itself influenced by the latter two variables. That is, a person growing less trusting is likely becoming lonelier; likewise, a person that feels disconnected might become lonelier as well. In order to establish that loneliness actually causes the outcome variables, this potential reciprocal dependency needs to be accounted for.

Traditionally, this issue is approached with cross-lagged panel models. However, these models came under criticism for their strict model assumptions and the, consequentially, often biased estimates (Allison, Williams, and Moral-Benito 2017; Mund and Nestler 2019). Luckily, recent advances in statistical inference allow to control for the issue of reverse causality by combining panel fixed effect estimation with cross-lagged panel models (Allison et al. 2017; Leszczensky and Wolbring 2019). With that, the estimates control for the effect of the outcome variable on the dependent variable, i.e. loneliness.

The Stata command `xtdpdml` allows to compute linear dynamic panel-data models using full information maximum likelihood and robust standard errors (Williams, Allison, and Moral-Benito 2018). This approach combines the advantages of fixed effect estimation (accounts for unobserved heterogeneity) with cross-lagged panel models (solves the issue of reverse causality between x and y).

[Table 2 near here]

As summarized in table 2, within person variation of loneliness at t and at t-1 predicts social trust beliefs statistically significant. With respect to perceived connectedness, loneliness at t has a significant negative effect, while the coefficient of loneliness at t-1 shows the expected direction but is not significant. Substantially, this indicates that the effect of loneliness on the outcomes is robust even under consideration of a reverse influence from the outcomes on loneliness. The effect of loneliness on social trust seems to be particularly strong and lasting, given that loneliness exerts a statistically significant influence on social trust up to two years later. This supports the idea that that loneliness does indeed exert a causal influence on both outcomes.

5. Conclusions

The central goal of this study was to investigate whether perceived loneliness erodes people's generalized sense of social cohesion/connectedness and political and social trust beliefs. In accordance with the hypotheses 1 and 2, the results show that rising loneliness is indeed negatively associated with social trust and perceived cohesion, a relationship that was neglected previously. In respect of political distrust, the results are mixed as the relationship can be found in between-person comparisons, but not in fixed-effects models. Substantially this means that lonely individuals are, on average, less trusting towards politicians and political institutions, compared to not lonely individuals. However, an effect of increasing loneliness on political distrust could not be found within persons, either because the effect is too small to be detected or because it is not present at all. This potentially indicates that the negative influence of loneliness on trust is not generalizable to political actors and institutions.¹²

The results have important implications for existing as well as upcoming empirical research concerned with social capital, social cohesion, and political attitudes formation. The analysis suggests that loneliness potentially exerts an influence on political attitudes and behavior, at least

partially mediated through the three investigated outcomes. For instance, studies have found that loneliness is associated with a reduced sense of duty to vote and lower self-reported voter turnout (Langenkamp 2021). Assuming lonely individuals feel less connected to other people and therefore not as an incremental part of society, this potentially explains a reduced perceived moral obligation to participate in the democratic process. Likewise, findings that loneliness is associated with a higher probability to sympathize with conservative beliefs and more xenophobic attitudes might directly relate to the enhanced distrust and anxiety of lonely individuals (Floyd 2017). Furthermore, a strong sense of social connectedness is associated with pro-social behavior and contributing to public goods such as activity in pro-environmental organizations (Cojuharencu, Cornelissen, and Karelaia 2016) and higher salience of social values and cooperation (Triandis 2018; Utz 2004). Hence, loneliness potentially threatens these societal resources as well. Upcoming research might investigate whether a potential negative influence of loneliness on these outcomes is mediated through social trust and the sense to connectedness.

In the greater theoretical picture, the study speaks to the debate of how (and which) emotions and social relationship characteristics influence social behavior and cognition. Research established that objective social interaction, social organizations, and network characteristics foster trust, beliefs and cohesion. This contribution speaks to these research fields and suggests that loneliness plays an independent role in predicting indicators of social capital/social cohesion and is a useful additional measurement complementing these more established constructs.

However, the results and conclusions of this study have to be interpreted in light of some limitations. First, while the within-person analysis ensures that the effects are not confounded by time-invariant variables, the threat of time-variant confounders remains. To reduce this risk, the analysis took major life events such as changes in family life, unemployment, and changes in

financial satisfaction into account. Still, confounding remains an inherent issue of any observational analysis. Secondly, loneliness is a stigmatized and painful emotional state. Therefore, social desirability might pose a bias to the analysis that is difficult to assess. Third, while the study tried to establish that loneliness exerts an influence on social trust beliefs and sense of connectedness, the reverse effect was not tested, just controlled for. This means that the study does not give any information about a potential bi-directional feedback loop between loneliness and the considered outcomes.

In response to these potential shortcomings, I like to add that research does not happen in a vacuum and results need to be interpreted in the context of the literature. For instance, eye-tracking studies indicate that lonely children have enhanced hypervigilance for social threats and studies using a Prisoners dilemma paradigm found that lonely individuals grow less trusting faster if they get crossed in the game (Qualter et al. 2013; Rotenberg 1994). This supports the conclusion of this study that lonely individuals become distrusting based on experiences faster compared to non-lonely individuals. Likewise, attempts to manipulate state loneliness experimentally suggest that loneliness causes anxiety, anger and fear of negative evaluation (Cacioppo et al. 2006). Other methodological approaches come to similar results. Qualitative research suggests that feeling disconnected from society is part of the loneliness experience, for marginalized groups in particular (Rokach 2014; Stein and Tuval-Mashiach 2015). These and other studies support the idea that loneliness fosters distrust and alienation which make reverse causality unlikely.

In respect of the threat of social desirability bias, one has to keep in mind that the used loneliness scale measures loneliness indirectly and was developed with that issue in mind. Furthermore, the scale is one of the most broadly validated scales in the field (de Jong Gierveld and van Tilburg 2010). These and similar findings support the general conclusions of the present study.

Taken together, while all the mentioned limitations of this study have to be taken seriously, this study in conjunction with the empirical context allows us to conclude with some confidence that loneliness causes a reduction in social connectedness and shrinking social trust believes. With that, loneliness likely has serious implications for political attitude formation and behavior.

Notes

1. Social capital and social cohesion are ambiguous concepts with various definitions depending on the field of study. For extensive reviews of the concepts, compare Bhandari and Yasunobu (2009) and Chan et al. (2006).

2. “Sense of cohesion” and “sense of connectedness” are used interchangeably throughout the document. Both concepts refer a person’s perception to be interconnected with other members of society in general. This is not to be confused with the term “social connectedness” which typically refers to the objective social embeddedness of a person (Cojuharenco et al. 2016).

3. The practical relevance of trust and perceived social unity can be nicely exemplified with protest movements during the corona pandemic. Studies found that individuals who protested containment policies are characterised by very low levels of institutional trust and a perceived division in society (Devine et al. 2021; Frei, Schäfer, and Nachtwey 2021).

4. The number of registered articles vary depending on the used database. However, a similar argument has been made by Yang in respect of the JSTOR database (Yang 2019). As he puts it more bluntly: “since its birth sociology rarely taken emotions, feelings or any other state and processes seriously. It would be pretentious to claim otherwise.”(Yang, 2019 p.24).

5. Remember: While the individuals connectedness refers to the personal network, the sense of generalized connectedness reflects a more general perceived unity and interdependence with others (compare Cojuharenco et al., 2016). A lack of feeling connected with friends while feeling lonely is trivial, the question whether lonely individuals feel disconnected from wider society is less so.

6. In the particular case of Denmark, political trust seems to influence social trust to a greater extent than the other way around.

7. In order to access to data, users have to register. This is why the data used in this study cannot be shared directly in the supplementary material. However, the supplementary material contains the STATA syntax with explanations how to derive the data for replication purposes. Likewise, the code for the analysis can be found there.

8. The wave specific questionnaires can be found at

https://www.dataarchive.lissdata.nl/study_units

9. The Netherlands experienced a third election in 2012. However, as explained in the description of the dataset, this wave had to be dropped due to inconsistent measurement of loneliness. Therefore, the event is not mentioned here.

10. Strictly speaking, gender identity can change of course. However, the cases where gender truly changed are rare and most variations in panel Surveys stem from measurement errors.

11. Note: one might wonder whether the effect of loneliness might be heterogeneous for the 5 indicators of political trust. For instance, it might be the case that distrust spreads to politicians, but not the institutions. However, the pattern for all 5 measures is the same as for the index: Between-person differences are significant (all with $p \leq 0.001$), but all fixed effects are insignificant (all with $p \geq 0.1$)

12. It is noteworthy that out of the three outcome variables considered in this study, political trust has the lowest within variation across the observed time-period (std. dev. = 0.86). Hence, the relationship between loneliness and political trust may be simply too small to be detected.

6. Literature

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Table 1. Descriptive Statistics (Pooled)

n=9,954; N= 41508	mean	Std. dev	min	max
Social trust	6.14	2.13	0	10
Political trust	5.44	1.77	0	10
Sense of connectedness	6.02	2.52	0	10
Loneliness	2.84	2.40	1	13
Female	0.51	-	0	1
Age categories				
18-24	0.07	-	0	1
25-34	0.11	-	0	1
35-44	0.14	-	0	1
45-54	0.19	-	0	1
55-64	0.23	-	0	1
65+	0.27	-	0	1
Education				
Primary	0.07	-	0	1
Secondary	0.23	-	0	1
Higher secondary	0.11	-	0	1
Vocational	0.23	-	0	1
Higher vocational	0.25	-	0	1
University	0.10	-	0	1
Contact friends	3.60	1.46	1	7
Contact family	4.44	1.41	1	7
Financial satisfaction	6.89	1.73	0	10
Health	3.12	0.76	1	5
Couples living together				
yes	0.73	-	0	1
Civic status				
Never been married (ref)	-	-	0	1
Being widowed	0.06	-	0	1
Being divorced	0.10	-	0	1
Being separated	0.01	-	0	1
Being married	0.59	-	0	1
Group membership	0.07	-	0	1
Time periods				
Election year	0.17	-	0	1
Refugee crisis	0.18	-	0	1
Fiscal crisis	0.18	-	0	1

Note: values are displayed to the second decimal;

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Table 2. cross-lagged fixed effect Regression using full maximum likelihood

	Connected	Connected	Social Trust	Social Trust
Explanatory variable				
Loneliness	-0.056***	-0.063***	-0.033***	-0.037***
Loneliness t-1	-0.005	-0.006	-0.027**	-0.249**
Loneliness t-2		-0.008		-0.017*
Auto-regressive effect on outcome				
connectedness	0.089***	0.079***	-	-
social trust	-		0.159***	0.156***
BIC:	344904	327762	323023	307473

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; robust standard errors are used. Note: these models are computationally demanding and run into problems to converge if they include too many covariates, especially with panels exceeding 10 time points. To keep the model as parsimonious as possible, the models are run without additional covariates. Together with the autoregressive error term (the effect of loneliness on the outcomes is under statistical control of the Outcome at T-1) and the fixed effects, the models are still very conservative estimates.

Figure 1. Number of articles with loneliness in title by year and field

Note: data derived from webofscience.org (23.10.2021; blue=articles overall; red=articles categorized in sociology; green=articles categorized as political science)

688 **Figure 2.** Effect of loneliness on trust and sense of connectedness

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690 Note: BE= between effects; FE=fixed effects; FE models use cluster robust standard errors;
691 confidence intervals displayed at .99 and .95

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694 **7. Appendix**

Table A1. Gierveld loneliness scale

Question	Range	Mean
Can you indicate for each statement to what degree it applies to you, based on how you are feeling at present?		
I have a sense of emptiness around me	1-3	1.22
There are enough people I can count on in case of a misfortune	1-3	1.28
I know a lot of people that I can fully rely on	1-3	1.50
There are enough people to whom I feel closely connected	1-3	1.36
I miss having people around me	1-3	1.31
I often feel deserted	1-3	1.16

Original coding categories 1= yes; 2=more or less; 3=no. All items were recoded so that high values indicate high loneliness

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Table A2. Between Effect Regression Models

	Sense of connectedness	Social trust	Political trust
Loneliness	-1.99 (0.01)	-0.153*** (0.009)	-0.059*** (0.008)
Age (18-24=ref.)	.	.	.
25-34	-0.030 (0.098)	-0.109 (0.084)	-0.223** (0.071)
35-44	0.068 (0.099)	0.110 (0.085)	-0.237** (0.073)
45-54	0.551*** (0.104)	0.288** (0.089)	-0.300*** (0.076)
55-64	0.814*** (0.106)	0.380*** (0.091)	-0.303*** (0.078)
65+	1.185*** (0.109)	0.562*** (0.093)	-0.245** (0.079)
Sex (Male=ref)	.	.	.
Female	0.621*** (0.041)	0.092** (0.035)	0.064* (0.030)
Education (primary=ref)	.	.	.
Secondary education	0.022 (0.088)	0.036 (0.076)	-0.039 (0.065)
Higher secondary	-0.163 (0.100)	0.512*** (0.086)	0.433*** (0.073)
Vocational education	-0.001 (0.090)	0.271*** (0.078)	0.210** (0.066)
Higher vocational education	-0.095 (0.090)	0.675*** (0.078)	0.590*** (0.066)
University	-0.434*** (0.103)	0.901*** (0.089)	0.862*** (0.075)
Contact friends	0.228*** (0.018)	0.148*** (0.016)	0.034* (0.014)

Contact family	0.122*** (0.018)	-0.034* (0.016)	0.011 (0.013)
Financial satisfaction	0.013 (0.014)	0.239*** (0.012)	0.266*** (0.010)
Health	0.023 (0.032)	0.283*** (0.028)	0.146*** (0.024)
Living with partner	0.228*** (0.064)	0.104 (0.055)	-0.040 (0.047)
Being widowed	0.490*** (0.112)	0.146 (0.096)	-0.059 (0.082)
Being divorced	0.283** (0.086)	-0.034 (0.074)	-0.169** (0.063)
Being separated	0.520 (0.426)	-0.368 (0.367)	-1.640*** (0.312)
Being married	0.267*** (0.069)	-0.124* (0.059)	-0.178*** (0.050)
Group membership	0.269* (0.106)	0.372*** (0.091)	0.284*** (0.078)
Election year	-0.173 (0.116)	-0.100 (0.099)	-0.145 (0.084)
Refugee crisis	-0.307*** (0.089)	-0.130 (0.077)	-0.306*** (0.065)
Fiscal crisis	0.370*** (0.096)	0.140 (0.082)	0.085 (0.070)
Constant	3.919*** (0.208)	2.913*** (0.179)	3.252*** (0.152)
n	9954	9954	9954
N	41508	41508	41508

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; brackets = std. error

Table A3. Fixed Effect Regression Models

	Sense of connectedness	Social trust	Political trust
Loneliness	-0.059*** (0.008)	-0.034*** (0.006)	-0.004 (0.005)
Age (18-24=ref.)	.	.	.
25-34	-0.417*** (0.102)	0.070 (0.072)	0.089 (0.058)
35-44	-0.707*** (0.129)	0.215* (0.097)	0.125 (0.080)
45-54	-1.166*** (0.145)	0.113 (0.108)	0.039 (0.092)
55-64	-1.410*** (0.154)	0.040 (0.116)	0.070 (0.099)
65+	-1.574*** (0.161)	0.104 (0.122)	0.063 (0.103)
Education (primary=ref)	.	.	.
Secondary	-0.093 (0.175)	0.018 (0.146)	-0.053 (0.097)
Higher secondary	-0.317 (0.162)	0.116 (0.120)	0.121 (0.106)
Vocational	-0.445* (0.179)	-0.044 (0.130)	-0.057 (0.108)
Higher vocational	-0.422* (0.178)	0.155 (0.124)	0.082 (0.114)
University	-0.169 (0.191)	0.423** (0.150)	0.189 (0.130)
Contact friends	0.058*** (0.011)	0.007 (0.008)	-0.008 (0.006)

Contact family	0.024*	0.000	-0.005
	(0.011)	(0.008)	(0.006)
Financial satisfaction	0.011	0.057***	0.066***
	(0.011)	(0.008)	(0.007)
Health	0.034	0.027	0.004
	(0.022)	(0.017)	(0.013)
Living with partner	0.029	0.070	-0.052
	(0.072)	(0.053)	(0.043)
Being widowed	-0.479*	0.126	0.232*
	(0.189)	(0.141)	(0.110)
Being divorced	-0.030	0.041	0.072
	(0.182)	(0.131)	(0.105)
Being separated	-0.235	-0.291	0.065
	(0.301)	(0.222)	(0.197)
Being married	-0.187	-0.114	0.078
	(0.098)	(0.086)	(0.067)
Group membership	0.021	-0.008	0.021
	(0.041)	(0.031)	(0.023)
Election year	-0.191***	0.084***	-0.231***
	(0.026)	(0.019)	(0.014)
Refugee crisis	-0.168***	0.040*	-0.180***
	(0.024)	(0.018)	(0.014)
Fiscal crisis	-0.082**	0.048*	0.313***
	(0.029)	(0.022)	(0.018)
Constant	8.201***	5.302***	4.260***
	(0.461)	(0.363)	(0.508)
n	9954	9954	9954
N	41508	41508	41508

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; brackets = std. error

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