RESEARCH ARTICLE

Tend-and-befriend and rally around the flag effects during the COVID-19 pandemic: Differential longitudinal change patterns in multiple aspects of social cohesion

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Abstract

The COVID-19 pandemic and its lockdowns have uniquely challenged our social lives. The current study seeks to explore changes in social cohesion on various psychological dimensions (trust, belonging, social interaction, social engagement) and social system levels (family, friends, neighbours, institutions, nations), assessed in 3522 Berlin residents before, during, and after the first lockdown, and four times during the second lockdown. The first lockdown had a consistently negative impact on psychological dimensions of social cohesion. However, the picture was more nuanced regarding social systems: micro-level cohesion with family members and neighbours, and macro-level processes of institutional trust and national and international belonging increased, particularly in women. This suggests tend-and-befriend tendencies of affiliation, and affirmation of political and national identities. However, social cohesion collapsed during the second lockdown, indicating pandemic fatigue effects. Findings suggest a multidimensional approach to social cohesion and highlight the relevance of stressor duration in times of collective crisis.

KEYWORDS
lockdown, neighbourhood cohesion, sex differences, social cohesion, tend-and-befriend

1 | INTRODUCTION

The present article describes dynamic longitudinal changes in social cohesion over the course of the COVID-19 pandemic in 2020 and 2021, specifically during two lockdowns in Germany. Social cohesion is conceptualized as a multidimensional and multilevel construct, which differentiates between psychological dimensions such as trust, belonging, social interaction and engagement, as well as different social groups these aspects refer to (e.g., family, friends, institutions, states, etc.). The primary goal was to investigate whether the global crisis of the COVID-19 pandemic, and repeated collective stressors such as lockdowns associated with social isolation and distancing, led to a breakdown of social cohesion or whether, in line with theories on threat and stress responses, aspects of social cohesion rather increased.

Social cohesion is a multidimensional and multisystem construct that broadly refers to the degree of togetherness within a social entity. It is a concept of relevance in the political and economic discourse, and while it is academically most prominently discussed in the social sciences, it is partly rooted in psychology and a topic of increasing multidisciplinary research interest and endeavour (Moustakas, 2022). Historically, in the psychological literature, the concept of social

cohesion traces back to early work on human cognition in the context of social groups, including group membership and identification, shared experiences within a group and attitudes towards a group (Festinger et al., 1950; Freud, 1921; McDougall, 1921). Social cohesion has been defined on different system levels of social networks, which span from micro systems of close relationships with family and friends, to meso systems of relationships between larger networks within society such as professional, cultural or religious groups, and macro systems that include political and economic bodies (Bottoni, 2018; Friedkin, 2004). In relation to this multilevel structure, social interactions can be divided into horizontal interpersonal relationships between individuals, and vertical relationships between the individual and public, state or federal institutions (Chan et al., 2006). While contemporary empirical analyses of social cohesion suggest a conceptualization on multiple dimensions, there is still no consensus on which dimensions exactly (Bottoni, 2018; Schiefer & van der Noll, 2017). However, on the individual level, some reoccurring indicators of social cohesion emerged, which relate to a sense of social belonging or identity (Chan et al., 2006; Fonseca et al., 2019; Schiefer & van der Noll, 2017), both interpersonal and institutional trust (Bottoni, 2018; Chan et al., 2006; Dickes et al., 2010), and patterns of social interaction and engagement or cooperation (Chan et al., 2006; Fonseca et al., 2019; Schiefer & van der Noll, 2017).

Given this growing interest in a comprehensive and multidimensional conceptualization of social cohesion (Chan et al., 2006; Fonseca et al., 2019; Schiefer & van der Noll, 2017), we have recently proposed a model of social cohesion based on psychology and related this to prevailing frameworks of psychological resilience and mental health (Silveira et al., 2022a, 2022b). In the context of the CovSocial project, which longitudinally investigated the impact of the COVID-19 pandemic in 2020 and 2021 on various biopsychosocial dimensions of vulnerability, resilience and social cohesion in a large sample of Berlin citizens, we could show that psychological aspects of social cohesion can be assessed on a time-stable trait as well as dynamic state level during the first lockdown (see Supplement 1 for a detailed project description). With regard to the latter, we found social cohesion to be best described by a hierarchical factor model with general social cohesion as a latent construct on the second-order level, and its multidimensional nature being reflected in four first-order psychological dimensions of trust, a sense of belonging, social interactions and social engagement (Figure 1). The model is further characterized by a distinction between different micro- and macro-level social systems, to which these psychological dimensions refer. More specifically, trust or belonging can, for example, refer to one's closest social circles such as family, friends or neighbours (micro-level social systems) or to institutions or even cities and nations (macro-level social systems). These social systems are reflective of the multilevel nature of social cohesion proposed in previous theoretical and empirical frameworks (Bottoni, 2018; Fonseca et al., 2019; Friedkin, 2004).

In our previous publication (Silveira et al., 2022b) we focused on relating changes in general social cohesion to changes in psychological vulnerability and resilience during the first lockdown of the COVID-19 pandemic in Germany (T1 to T3). We have, however, so far failed

to investigate longitudinal trajectories of social cohesion on both the psychological construct level as well as the social system level over the duration of two pandemic-related lockdowns in Germany in 2020/2021 (T1 to T7). To close this gap, the current study seeks to explore changes in the different dimensions and system levels of the proposed social cohesion factor model during the COVID-19 pandemic over seven measurement time points covering before (T1), during (T2) and after (T3) the first lockdown in 2020 and during the second extended lockdown at the end of 2020 and beginning of 2021 (T4 to T7). Figure 1 depicts the factor model of social cohesion, on which we base all our following analyses.

In particular, capitalizing on the multidimensional and multilevel nature of social cohesion, we were interested in testing whether the pandemic context provides evidence in support of theories, which suggest that instead of becoming more egocentric or less trusting, people show tendencies of increased altruism and cooperation (Taylor, 2006) as well as increased norm-conforming behaviours (Fincher et al., 2008), government support (Kay et al., 2008; Mueller, 1970), and affirmation of cultural and political ideologies and identities when confronted with stressors or collective crisis (Burke et al., 2013; Cohen et al., 2017; Lambert et al., 2011). In line with such views, social cohesion has been proposed to support resilience and better coping with stress (Greene et al., 2015; Townshend et al., 2015). To investigate whether such theories also apply to the particular nature of a global viral pandemic associated with social isolation and social distancing was one goal of the present study.

1.1 | Social cohesion in times of crisis

Social relationships and environments are a central part of human life, and are discussed as the strongest predictors of physical and mental health and even mortality (Snyder-Mackler et al., 2020). In times of crisis, humans are equipped with a range of biobehavioural response patterns to maintain or promote protective and rewarding social relationships (Cohen & McKay, 2020; von Dawans et al., 2012). Many different theories from the biological and social sciences support such claims, yet they highlight different social behaviours in response to stress and threats, for example caregiving (tend-and-befriend; Taylor, 2006) or guidance seeking (rally around the flag; Mueller, 1970), as well as biases to conformist ingroup values (pathogen prevalence theory; Fincher et al., 2008), support or defence of the government, religious beliefs (compensatory control theory; Kay et al., 2008), cultural worldviews and close relationships (terror management theory; Pyszczynski et al., 2015). Since most of the evidence on such stress responses is based on singular stressor exposure or cross-sectional study designs, however, the dynamic nature of social behaviour in the context of repeated and persistent stressors is largely unknown. To integrate findings of social cohesion trajectories during the pandemic, we will refer to post-disaster research that provides a useful framework to assign behavioural phenomena to specific temporal periods of disaster exposure and post-disaster recovery (Math et al., 2015).
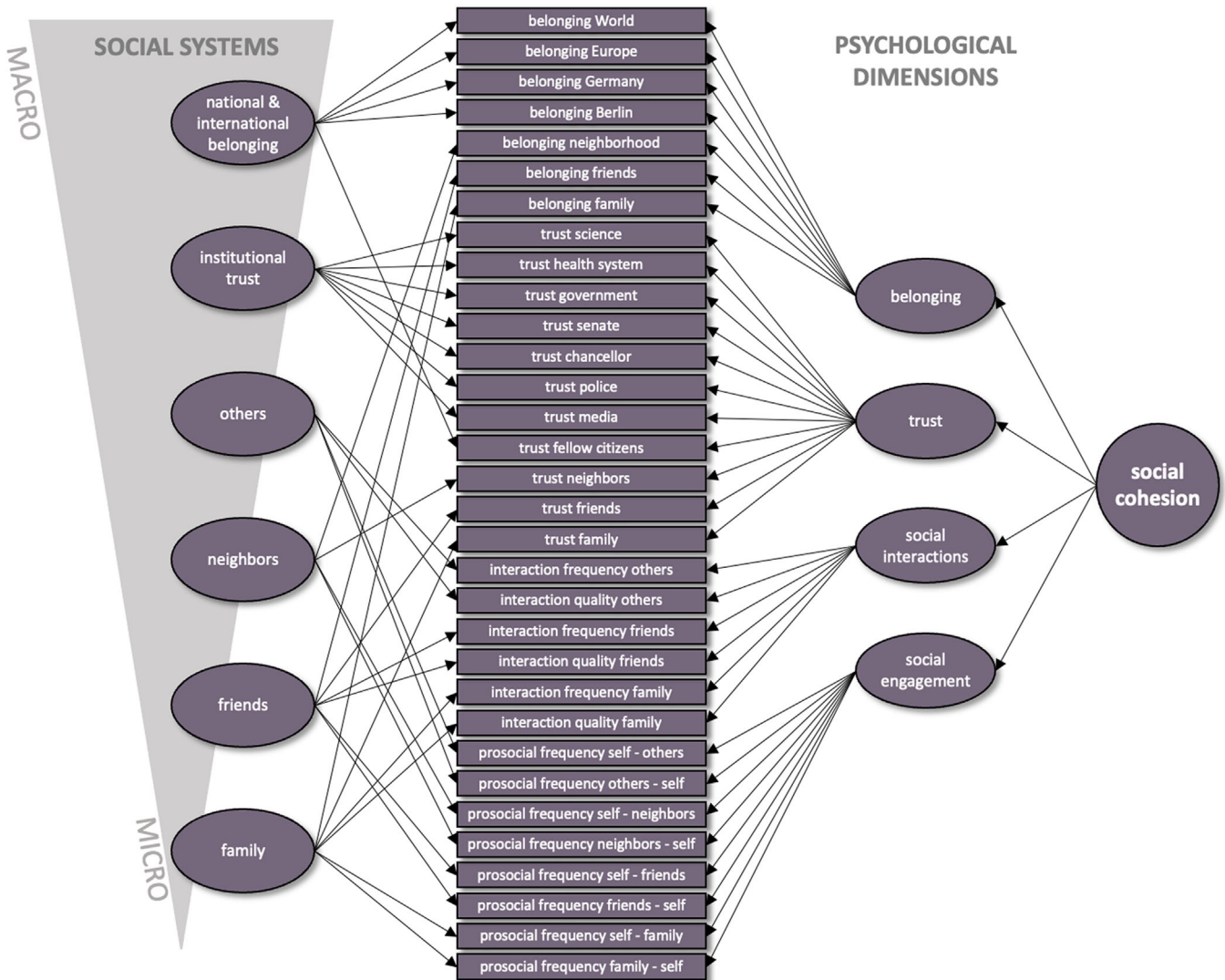
FIGURE 1 Hierarchical factor model of social cohesion adapted from Silveira et al. (2022b). Box = observed variable; circle = latent factor

The COVID-19 pandemic and related lockdowns with public health measures of social isolation and social distancing have been discussed as precursors of far-reaching and lasting impacts on societies at a global scale. Many social and behavioural scientists raised awareness that the psychological impacts on peoples' well-being are a direct repercussion not only of the physical threat of the virus, but also of the suspension of nearly all social activities (Jetten, 2020; Marmarosh et al., 2020). In this realm of research, social cohesion has been approached both as a target of the pandemic shock and its threat to society, and as a resilience-promoting factor that helps individuals and communities to better cope with the challenges faced. Yet, despite an acknowledgement of the tremendous social impacts alongside the imposed restrictions on social lives, most COVID-19 studies on social cohesion have focused on the latter. In this regard, it could be shown that particularly those communities with strong social cohesion were able to more effectively and resiliently cope with and recover from the COVID-19 pandemic (Dayrit & Mendoza, 2020; Jewett et al., 2021; Razavi et al., 2020). The relevance of social cohesion has been evidenced on psychological and

biological levels, as marked for example by higher antibody response to COVID-19 vaccination in individuals who experience higher degrees of cohesion (Stephen et al., 2022). While this line of research focuses on pre-existing ties between individuals and communities, there are many examples of how solidarity and social cohesion are actually produced and fostered in times of crisis (Calo-Blanco et al., 2017; Fan et al., 2020; Hawdon & Ryan, 2011; Uchida et al., 2014). Further supported by notions of psychosocial gains from adversity, the pandemic may thus have beneficial effects on social cohesion and the improvement of psychosocial functioning in some individuals (Mancini, 2020). Indeed, particularly at the beginning of the COVID-19 pandemic, across the globe overwhelming levels of COVID-related volunteering, mutual aid and support of vulnerable community members were reported in the media.

In a less positive light also, overall concerns have been raised that cohesion within communities and societies may be substantially weakened due to the pandemic (Borkowska & Laurence, 2021). In our own work, we found that general social cohesion decreased during the first
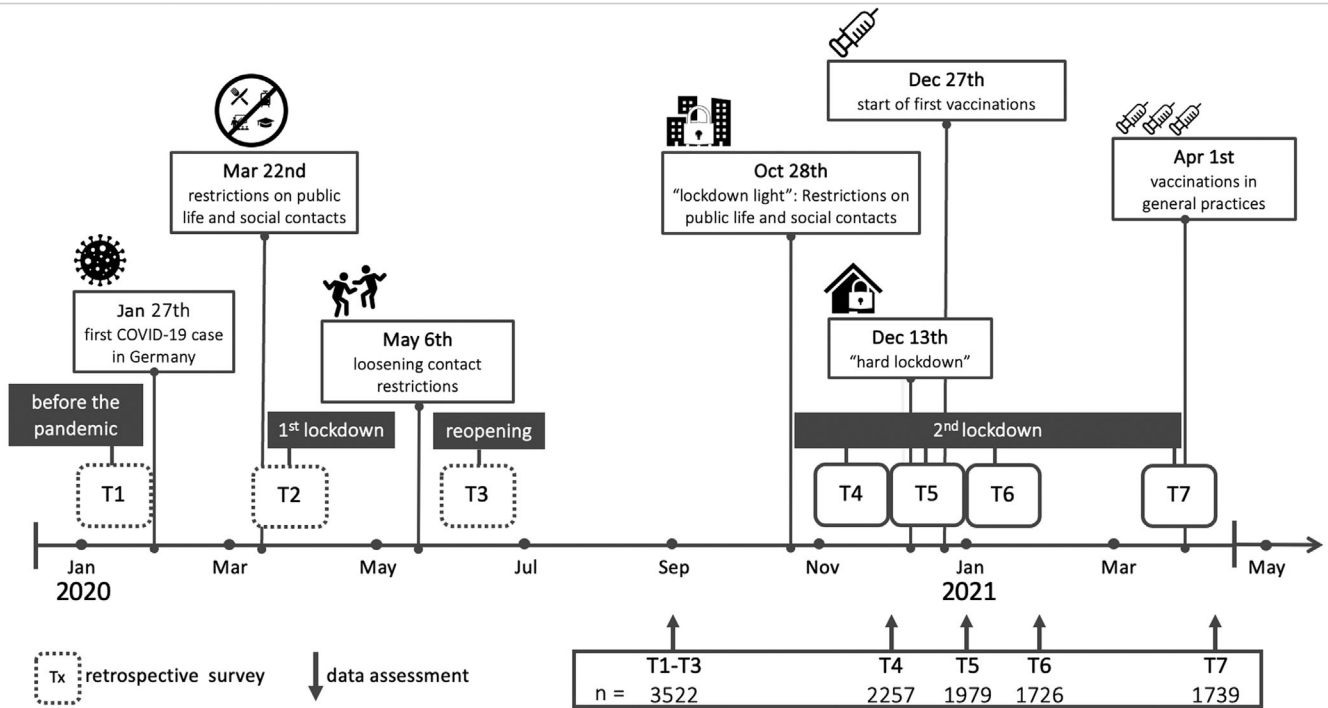
FIGURE 2 Timeline of the COVID-19 pandemic with imposed restrictions and lockdowns in Germany in 2020 and 2021 in relation to the seven measurement occasions (T1 to T7)

pandemic-related lockdown from 22 March to 4 May 2020 in Berlin, Germany, and recovered again once restrictions had been lifted in June 2020 (Silveira et al., 2022b). However, while this first lockdown was of only 1 month in duration, the subsequent course of the pandemic was characterized by extended lockdown periods over several months in 2020 and 2021 (Figure 2). The COVID-19 pandemic is thus not a singular and static stressor, and its impact on social emotion, cognition and behaviour probably shifted over time.

Indeed, post-disaster research has identified several distinct phases of stressor exposure and post-stressor recovery (Math et al., 2015). These phases follow behavioural patterns that can be related to different aspects of social cohesion (Townshend et al., 2015). The first phase after disaster expose, the so-called heroic phase, is characterized by altruistic prosocial behaviour and usually lasts for up to a few weeks. This is followed by the so-called honeymoon phase, characterized by faith and trust in promises of rehabilitation and compensation by the government and associated agencies that are conveyed by media. During the subsequent disillusionment phase, social involvement is fading, amplifying social imbalance and injustice. This phase lasts from a few months to several years until communities and societies recover from the disaster in a final restoration phase. Despite the uniqueness of the COVID-19 pandemic in reoccurrence and duration of stressor exposure, and despite fundamental similarities between both lockdown periods, different pandemic phases can be assumed, accompanied by differential effects on psychosocial functioning. In line with this, responses of solidarity and prosociality (social interactions and social engagement) might thus either have been prevalent only during the first lockdown, followed by a peak in trust in the government

(institutional trust) and then a disillusionment phase characterized by decreased levels of social cohesion on all levels over time during the second lockdown, or cycles of these phases might have been repeated with the second lockdown.

Thus, another aim was to explore whether the general decline in social cohesion observed during the first lockdown was repeated during the second extended lockdown period, starting with a partial lockdown implemented on 28 October, and transitioning into a strict lockdown on 13 December 2020, or whether social cohesion rather recovered and increased. Figure 2 depicts the different COVID-19 related measures implemented in Germany in the period from January 2020 to April 2021. Finally, we aimed to explore whether different time courses could be observed for different dimensions of social cohesion and social systems.

1.2 | Dimensions of social cohesion

There are reasons to believe that different dimensions of social cohesion may differentially be affected by the pandemic. Specifically, the current study entails the dimensions of belonging, interpersonal and institutional trust, quantity and quality of social interactions, and social engagement, which have consistently been described as core dimensions of social cohesion (Bottoni, 2018; Chan et al., 2006; Fonseca et al., 2019; Schiefer & van der Noll, 2017).

A sense of social belonging is defined as the subjective feeling of being an integral part of a social group or community (Hagerty et al., 1992). In light of evolution, the cultivation of social bonds increases

the likelihood of survival and prosperity. Thus, a sense of belonging is understood as a fundamental human need (Baumeister & Leary, 1995). While humans are innately motivated to seek social connection and belonging and to avoid social threats, this need fluctuates according to social and environmental context (Slavich et al., 2021). Particularly in times of crisis, our sense of belonging as experienced in a cohesive society is challenged. Many studies argue that the pandemic has posed threats to social belonging in its early stage, while a decline in social connection and an increase in loneliness was manifested (Folk et al., 2020; McGinty et al., 2020; Vigl et al., 2022). However, a sense of social belonging can also be sustained or even increased despite physical distance and isolation (Milman et al., 2020; Saiz et al., 2021). A suitable rationale for this is provided by the social identity theory (Tajfel & Turner, 1986). Social identity in contrast to personal identity is characterized by including others in the conceptualization of the self. Shifting focus towards shared experiences and shared goals when facing times of crisis together promotes feelings of social belonging and social identity (Allen et al., 2021). Based on social psychological theories, social belonging in the context of the pandemic might be particularly expected to increase on a macro-level of society (national and international belonging). For example, the pathogen prevalence theory states that the threat of pathogen exposure can lead to behavioural manifestations of collectivism (Fincher et al., 2008). In line with this, levels of ingroup attraction (Meleady et al., 2021) and national belonging were consistently found to be elevated during the first COVID-19 related lockdown in European countries (Wamsler et al., 2022).

Another key indicator of social cohesion is trust. Trust is conceptualized on the interpersonal and institutional levels, reflecting horizontal versus vertical social connections in micro versus macro systems (Bottoni, 2018; Chan et al., 2006). Institutional trust refers to an individual's belief in the trustworthiness, fairness and competence of the government and its federal and state institutions. Interpersonal trust on the other hand refers to trust in other people. It subsumes trust in people of different social in-groups such as family or friends, as well as general social trust towards people who are unknown (Newton & Zmerli, 2011). Trust in unknown fellow citizens is based on implicit assumptions of shared norms and value systems (Larsen, 2013). Due to its association with feelings of public safety and compliance with public health regulations, general social trust is assumed to facilitate sociopolitical cooperation in mitigating the spread of the corona virus (Min, 2020). However, it is proposed that social trust is based on frequency and quality of social interactions (Newton & Zmerli, 2011), a requirement that was curbed by the very nature of the COVID-19 pandemic. Despite a link between the different forms of trust, and their capacity to promote each other (Newton & Zmerli, 2011; Sønderskov & Dinesen, 2016), they may be differentially impacted in times of crisis. Findings on levels of trust during economic crises for example, suggest that while trust towards political institutions was weakened, the trust between individuals indeed remained unaffected (Ervasti et al., 2019). In the context of the COVID-19 pandemic, generalized trust after the first lockdown was found to be comparable to baseline levels in a Norwegian sample (Thoresen et al., 2021). Besides, several studies have already shown that particularly during early stages of the

pandemic, institutional and political trust increased (Baekgaard et al., 2020; Davies et al., 2021; Sibley et al., 2020). This well-documented and rather short-lived rally around the flag effect shows peoples' general inclination to respond to prevailing uncertainty and threats by government support and trust that governing institutions will guide them through difficult times (Lambert et al., 2011). However, during the second lockdown, previous findings in a German sample showed that while levels of interpersonal trust were similar to those before the pandemic, trust in society decreased compared to pre-pandemic levels (Burrmann et al., 2022). Based on this literature, we expected trust in institutions (institutional trust) to increase during the first lockdown in Germany, yet to decrease over the longer course of the pandemic.

With regard to social engagement and prosocial behaviour, it has long been argued that stress can evoke behavioural responses to seek social affiliation, attachment and support, and that this in turn can buffer the impacts of the stressor and facilitate recovery (von Dawans et al., 2012). The biobehavioural tend-and-befriend stress response as an alternative to the common fight-or-flight behaviour has been documented in literature on animals and humans alike (Taylor, 2006). Females in particular are found to exhibit protective behavioural patterns of affiliation and caregiving (Nickels et al., 2017; Taylor et al., 2000; Turton & Campbell, 2005). This behaviour serves to maintain and establish social bonds and is proposed to be modulated by the neuropeptide oxytocin (Campbell, 2008; Taylor, 2006). Since, in the context of the pandemic, the very nature of measures implemented to slow down the spread of the virus led to only few behavioural options of interpersonal contact and social engagement, stress responses of prosociality and social support were limited. Several studies on social engagement thus focused on prosocial motivation and tendencies as well as adherence with public health measures such as wearing masks or keeping social distance (Čavojová et al., 2022; Dinić & Bodroža, 2021; Hellmann et al., 2021; Serrano-Montilla et al., 2021). In this line of research, increased social value orientation was found at early stages of the pandemic in Germany as compared to pre-pandemic levels for both gender (Hellmann et al., 2021). Evidence also highlights that women had a higher compliance with public health measures, which may indicate a higher other-oriented prosocial motivation (Dohle et al., 2020; Galasso et al., 2020). Basing our research on these considerations, we aimed to investigate whether lockdowns were characterized by increased tend-and-befriend behaviour, that is increased effort in maintaining old or seeking new social connections (social interactions), or by increased prosocial behaviour (social engagement). With regard to social systems, pandemic related tend-and-befriend behaviour might also be observable within families and friend circles (family and friends), or other micro-level systems (neighbours and others).

In sum, the current study extends previous research of our lab on social cohesion in the context of the CovSocial project that focused only on the first three measurement occasions around the first lockdown in early 2020 (T1 to T3; Silveira et al., 2022b). The first aim was to explore how the general factor of social cohesion identified in our multisystem and multidimensional factor model of social cohesion

(Figure 1) was impacted not only by the first but also by the second extended lockdown period from the end of 2020 to spring 2021 (T4 to T7). Second, we aimed to investigate whether trajectories of the four psychological dimensions of social cohesion differentially changed over the course of seven measurement occasions. Third, we aimed to investigate differential effects of the pandemic-related lockdowns on social cohesion in different social systems. Fourth, and inspired by the 'tend-and-befriend' hypothesis (Taylor et al., 2000), we aimed to explore gender differences in these time courses.

More specifically, we aimed to explore whether previous theories such as the tend-and-befriend hypothesis that postulates increased cooperation and prosocial behaviour (i.e., social interactions, social engagement, family, friends, neighbours and others) when confronted with stressors, especially for women, or the rally around the flag effect and compensatory control theory that suggests increased institutional trust and government support (i.e., institutional trust), or the pathogen prevalence and terror management theories that suggest increased belonging with macro-systems such as nations (i.e., national and international belonging), could be confirmed during the COVID-19 pandemic on our different markers of social cohesion. Furthermore, we were curious to test whether different phases identified in post-disaster research (Math et al., 2015) such as the heroic (i.e., social engagement), honeymoon (i.e., institutional trust) and disillusionment phases (i.e., all factors of social cohesion) could also be observed in the context of the different phases of the COVID-19 pandemic with its unique features such as social isolation measures restricting opportunities for help and social interaction or engagements.

2 | METHODS

2.1 | Sample

The study sample of 3522 participants between 18 and 65 years (mean age = 43.95 ± 12.69 years, 65.11% female) constitutes the main sample of the CovSocial project phase 1, which was initially planned as a retrospective study on the first lockdown in Berlin, Germany (T1 to T3). Due to the ongoing nature of the pandemic, this sample was invited to participate in monthly follow-up online surveys. Longitudinal sample dropout was given for the measurement occasions T4 to T7, with attrition-caused missingness of 36% at T4, 44% at T5, 51% at T6 and 51% at T7 (Figure 2). See Supplement 1 for more information on participant recruitment, exclusion, sample demographics and representativeness.

The study is in accordance with the Declaration of Helsinki and was approved by the ethical committee of the Charité – Universitätsmedizin Berlin, Germany (#EA4/172/20 and # EA1/345/20). All study participants provided written informed consent. While there was no direct financial compensation for study participation, five tablets were raffled using random selection among those participants who completed the first phase of the study.

2.2 | Study design

The study consisted of a retrospective assessment period from 11 September 2020 to 7 December 2020, during which data for the first three measurement occasions with relevance to the COVID-19 pandemic were collected, that is, before the first lockdown in Germany in January 2020 (T1), during the first lockdown from mid of March to mid of April 2020 (T2), and after the first lockdown in June 2020 (T3). Longitudinal assessment of state measures was extended to November 2020 (T4), December 2020 (T5), January 2021 (T6) and March 2021 (T7), with each assessment period taking place for a few days right after the month of reference (see Figure 2).

2.3 | Measures

State measures to assess the four psychological dimensions of social cohesion over the course of the COVID-19 pandemic were presented at all seven measurement occasions (T1-T7) and consisted of self-generated items. To account for multiple system levels of social cohesion, each item regarding a sense of belonging, trust, social interaction and social engagement was phrased in the context of a different social group.

A sense of social belonging was assessed using the Inclusion of Others in the Self Scale (IOS; Aron et al., 1992). This scale was developed to measure feelings of closeness with another person or social group indicated by the distance between a pair of circles, which can be changed from a large distance (0) to complete overlap (100). One of the circles represents the respondent ('me'), and the other circle referenced social groups on different system levels in seven items ('family', 'friends', 'neighbours', 'Berlin', 'Germany', 'Europe', 'world'). Items of belonging were rescaled to the range of items of the other scales (between 0 and 8).

Trust was assessed using a 9-point rating scale, ranging from not at all (0) to very much (8). Items included targeted both interpersonal trust ('family', 'friends', 'neighbours', 'fellow citizens') and institutional trust ('public media', 'police', 'Senate of Berlin', 'German chancellor', 'government', 'health system', 'science').

Social interactions were assessed with regard to both frequency and quality of interactions with another person or social groups including 'partner', 'family members', 'friends', 'colleagues', 'supervisors' or 'others'. Items were measured on a 9-point rating scale, with valence ratings ranged from very negative (−4) to very positive (4) and frequency ratings ranging from never (0) to very frequently (8). Valence ratings were rescaled to match the scale range of other items (0–8). Due to prevalent relationship and employment status, which may have been exacerbated by the repercussions of the pandemic, items on partners and colleagues or supervisors were not applicable in a large percentage of participants (>20%). These items were dropped from the main analyses.

Social engagement was assessed with reference to seven social groups, including 'partner', 'family members', 'friends', 'neighbours', 'colleagues', 'supervisors' and 'others'. Thereby, items were presented in

two blocks, regarding either the frequency of prosocial behaviour by themselves towards other people or the frequency of prosocial behaviour they received by others on a 9-point rating scale from never (= 0) to very frequently (= 8). Again, items referring to partners, colleagues and supervisors were excluded from further analyses. Based on a measurement model of social cohesion at T1, T2 and T3, which was established in a previous study within the CovSocial project (Silveira et al., 2022b), some of the variables that were assessed to measure social engagement, that is, social participation and political participation, are not included in the current analyses.

2.4 | Data analysis

Statistical data analyses were conducted in three steps, including missing data imputation, measurement invariance analysis, and latent change score (LCS) and latent growth curve (LGC) analyses, respectively. Analyses were performed in R (version 3.6.3; R Core Team, 2020) using the package for multiple imputation by chained equations (mice v3.13.0; van Buuren & Groothuis-Oudshoorn, 2011) as well as a structural equation modelling framework as implemented in the lavaan package (version 0.6-11; Rosseel, 2012). A significance level of $\alpha = .05$ was used for all analyses.

2.4.1 | Missing data

In the majority of missing data sets at T4, T5, T6 and T7, surveys were not completed for the respective measurement timepoint due to attrition (see Figure 2). However, a few cases ($n = 3$ at T4, $n = 3$ at T5, $n = 0$ at T6 and $n = 3$ at T7) were dropped to prevent the inclusion of unreliable data sets. Similar to the first study phase (including T1, T2 and T3), in which participants were screened based on speed thresholds ($n = 30$; see Supplement 1), monthly survey blocks of the second study phase (including T4, T5, T6 and T7) entailed eight control items each, randomly distributed among other survey questions, for example, 'please set the slider on 3″'. Data of participants who gave wrong responses on at least two control items were dropped from further analyses and thus treated as missing for that particular measurement occasion.

As a first step of missing data imputation, logged events were identified and together with control variables excluded from the imputation model. Predictor variables were selected from all variables assessed in the context of the CovSocial project phase 1 (see Supplement 1), which included demographic variables, trait variables and repeated state measures at all seven measurement occasions. A predictor variable was deemed eligible for imputation if the proportion of usable cases was at least 0.25 and its correlation with the variable to be imputed was at least $r = 0.25$, which resulted in an average of 20 predictor variables for each variable to be imputed. Multiple imputation was conducted using predictive mean matching for all numeric variables. Ten imputed data sets were created. Visual inspection of the parameter iteration plots indicated convergence (Van Buuren, 2012). Descriptive statistics of social cohesion indicators with missingness from T4 to T7

and descriptive statistics of imputed data are reported in the supplemental material for a comparative check of complete and imputed data (Supplements 2, 3).

2.4.2 | Latent change and growth curve models

The reflective measurement model of social cohesion was established in a previous study of the CovSocial project for the measurement occasions T1, T2 and T3 (Silveira et al., 2022b). It consists of four first-order latent factors of belonging, trust, social interaction and social engagement, which form a general second-order factor of social cohesion. The latent factor *belonging* is reflective of all seven items measuring a sense of belonging with family, friends, the neighbourhood, Berlin, Germany, Europe and the world. The latent factor *trust* is reflective of all 11 items measuring trust in family, friends, neighbours, fellow citizens, public media, the police, the Berlin senate, the German chancellor, the government, the health system and science. The latent factor *social interaction* is reflective of frequency and quality of social interactions with family, friends and others. The latent factor *social engagement* is reflective of prosocial behaviour towards and from family, friends, neighbours and others. In the model, items are not only clustered with regard to these four psychological factors, but also on social system levels, yet not in a completely symmetrical manner, that is, not every psychological dimension is represented within each social system. Items in the context of family formed the latent factor *family*, and same items in the context of friends formed the latent factor *friends*. Items on belonging, trust and prosocial behaviour in the context of neighbours formed the latent factor *neighbours*. Items on frequency and quality as well as prosocial behaviour in the context of others formed the latent factor *others*. Trust in all institutions, that is public media, the police, the Berlin senate, the German chancellor, the government, the health system and science, formed the latent factor *institutional trust*. Finally, items on belonging to Berlin, Germany, Europe and the world as well as trust in fellow citizens formed the latent factor of *national and international belonging*. Scalar measurement invariance of this model, which has previously been established for the measurement occasions T1 to T3 (Silveira et al., 2022b), was tested across all measurement occasions T1 to T7. Factor scores were extracted using Thurstone's regression method (Thurstone, 1935) and the reliability of these factor scores was calculated as Rel = 1 – mean(se^2)/var(factor score), where 'se' is the standard error of a factor score.

Changes in social cohesion were investigated across three time periods using structural equation modelling. The first time period addressed changes from pre-lockdown to lockdown, the second from lockdown to post-lockdown, and the third time period captured changes during the extended second lockdown. Since the second lockdown period was characterized by increasing restrictions on social lives, statistical models included a linear growth trend for this time period. However, alternative models were considered to account for non-linear stepwise changes during this second lockdown. Therefore, three models were specified, first a LCS model for the measurement occasions T1 to T3, second a LGC model to test for linear change from
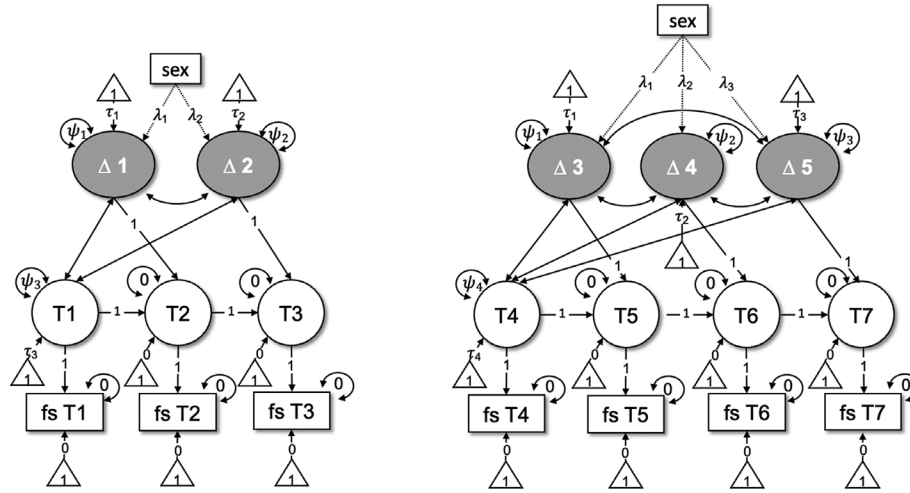
FIGURE 3 Latent change score models with latent changes from (left) T1 to T2 (△1) and T2 to T3 (△2) and (right) T4 to T5 (△3), T5 to T6 (△4) and T6 to T7 (△5). Rectangle = manifest variable, circle = latent variable, single-headed arrow = factor loading or regression coefficient or intercept, double-headed arrow = variance or residual covariance, triangle = constant, dashed line = only added when variance of latent factor is significant

measurement occasions T4 to T7, and third a LCS model to additionally test for stepwise change from T4 to T7, each separately for (a) the second-order social cohesion factor, (b) the four first-order factors representing psychological dimensions and (c) the six social system factors. This resulted in a total of nine models.

In the LCS models (see Figure 3), the amount of average change on all latent factors from T1 to T2 and T2 to T3, as well as for stepwise change from T4 to T5, T5 to T6 and T6 to T7 was captured by the means of two (△1 and △2) and three (△3, △4 and △5) distinct latent change factors respectively. In the LGC model (see Supplement 4), average linear change over time from T4 to T7 was represented by the mean of a linear latent slope (s) defined by factor loadings of 0 at T4, 1 at T5, 2 at T6 and 4 at T7 (due to time intervals of 1 month between T4, T5 and T6, and of 2 months between T6 and T7). In addition, the LGC models included a latent intercept factor with factor loadings of 1 for the manifest variables at each measurement occasion. LCS and LGC models included covariances between latent growth components. In the LGC models, negative slope variances, so called Heywood cases, occurred in some cases (i.e., social cohesion, trust, social interactions, family, others). In all those cases, confidence intervals included 0, with upper and lower interval bounds close to 0. These slope variances were therefore constrained to 0.

For all models, we report results from the χ^2 goodness-of-fit test (χ^2 value, df, and p value) and the descriptive goodness-of-fit measures CFI, TLI, and RMSEA. For T4-T7, we compared the LCS model to a LGC model, which are not nested. We based this comparison on the CFI, TLI and RMSEA and additionally also on the Akaike information criterion (AIC) and Bayesian information criterion (BIC). As the LGC models turned out to fit worse than the LCS models, results of LGC change analyses are reported in the supplementary material (Supplement 5). To investigate sex differences in lockdown related changes, all latent change factors and latent slopes with significant variances were regressed on participants' sex as defined by a dummy coded variable (1 = male, 0 = female). Sex differences were only interpreted in adequately fitting models.

All models were estimated for each of the 10 imputed data sets. Robust maximum likelihood estimation was used to account for potential non-normal item and scale distributions. Model fit and standardized parameter estimates were pooled across the analyses from multiple imputations using Rubin's rule (Rubin, 1987). Model fit indices include root mean square error of approximation (RMSEA), comparative fit index (CFI) and Tucker-Lewis index (TLI), and were considered acceptable with an RMSEA < 0.10, and a CFI and TLI > 0.90 (Bentler & Bonett, 1980), and relatively good with an RMSEA < 0.06 and a CFI and TLI > 0.95 (Hu & Bentler, 1999). Additionally, pooled chi-square (χ^2) statistics and degrees of freedom (df) are reported for each model. Study materials, extracted latent factor scores of the used ten multiple imputed data sets, and R code of statistical analyses have been made publicly available at the project's Open Science Framework page and repository (osf.io/uv5ns).

3 | RESULTS

3.1 | Measurement invariance and factor score reliability

Scalar measurement invariance was given across all measurement occasions, $\chi^2 = 58{,}285.28$, $df = 23{,}061$, $p < .001$, CFI = 0.95, TLI = 0.95, RMSEA = 0.021[0.021, 0.021], as determined using a CFI difference test to a metric measurement invariance model, $CFI_{diff} = 0.002$ (Cheung & Rensvold, 2002). Internal reliabilities of factor scores, that is, 1 – mean(se^2)/var(factor score), across measurement occasions and multiple imputations were reasonably high for the psychological dimensions belonging (0.66–0.76), trust (0.71–0.81) and social engagement (0.70–0.83), and for the social systems family (0.83–0.86),

friends (0.72–0.80), neighbours (0.73–0.83), institutional trust (0.90–0.94) and national and international belonging (0.73–0.85). Reliabilities for general social cohesion (0.29–0.64), social interactions (0.01–0.50) and others (0.45–0.67) were rather low.

3.2 | Changes in social cohesion during the first lockdown

All parameter estimates of LCS and LGC models are reported in the Supplemental Material 5–9. The LCS model of general social cohesion had an acceptable pooled model fit, $\chi^2 = 23.40$, $df = 1$, $p < .001$, CFI = 0.98, TLI = 0.90, RMSEA = 0.083 [0.057; 0.113]. Variances (Figure 3 ψ_1–ψ_2) and means (Figure 3 τ_1–τ_2) were significant for both latent change factors, with negative average change for $\triangle1$ and positive average change for $\triangle2$ (Figure 4a). Participants' sex explained both change factors significantly, with stronger decrease in $\triangle1$ and stronger increase in $\triangle2$ in women (Figure 5a).

In the LCS model including all first-order factors belonging, trust, social interaction and social engagement, $\chi^2 = 293.01$, $df = 36$, $p < .001$, CFI = 0.92, TLI = 0.84, RMSEA = 0.045 [0.040, 0.050], all means of $\triangle1$ change factors (Figure 3 τ_1) were significantly negative and means of $\triangle2$ change factors (Figure 3 τ_2) were significantly positive except for trust, which did not show any average change in $\triangle2$ (Figure 4b). Variances of all change factors (Figure 3 ψ_1–ψ_2) were significant and regressions of change factors on participants' (Figure 3 λ_1–λ_2) sex revealed gender differences in $\triangle1$ and $\triangle2$ of social interaction, showing a stronger decrease in $\triangle1$ and a stronger increase in $\triangle2$ in women (Figure 5c).

The LCS model including all social systems factors had an acceptable model fit, $\chi^2 = 1676.51$, $df = 78$, $p < .001$, CFI = 0.99, TLI = 0.97, RMSEA = 0.076 [0.073, 0.079]. Change factors $\triangle1$ means (Figure 3 τ_1) were significantly positive for family, neighbours and institutional trust, and significantly negative for friends and others. Means of $\triangle2$ change factors (Figure 3 τ_2) were significantly positive for friends and significantly negative for neighbours, institutional trust and national and international belonging (Figure 4b,d). All change factors had significant variances (Figure 3 ψ_1–ψ_2) indicating between-person differences in the change from T1 to T2 and from T2 to T3. Sex differences were found for $\triangle1$ of neighbours, institutional trust and national and international belonging, highlighting a higher increase on those factors in women (Figure 5b,d). Also $\triangle2$ changes on factors of neighbours and national and international belonging were more pronounced in women. See Supplemental Material for more detailed information on parameter estimates (Supplement 6, 7), and between-factor correlations of change factors (Supplement 8, 9).

3.3 | Changes in social cohesion during the second lockdown

For the LCS model with three separate latent change factors, the model fit, $\chi^2 = 0.38$, $df = 1$, $p = .535$, CFI = 1.00, TLI = 0.99, RMSEA = 0.000 [0.000, 0.038], AIC = 10,865.39, BIC = 10,970.23, was better than for the LGC model fit, $\chi^2 = 29.82$, $df = 7$, $p < .001$, CFI = 0.82, TLI = 0.85, RMSEA = 0.030 [0.020, 0.042], AIC = 13,638.83, BIC = 13,682.00 (Supplement 5). The mean of latent change factor $\triangle4$ (Figure 3 τ_4) was significantly negative, and the mean of $\triangle5$ (Figure 3 τ_5) was significantly positive (Figure 4a). All change factors had significant variances (Figure 3 ψ_3–ψ_5). Change factors were not associated with participants' sex (Figure 3 λ_3–λ_5).

The LCS model with three separate change factors, $\chi^2 = 84.54$, $df = 40$, $p < .001$, CFI = 0.99, TLI = 0.99, RMSEA = 0.018 [0.012, 0.023], AIC = −33,663.13, BIC = −32,873.78, had a better fit than the LGC model, $\chi^2 = 436.56$, $df = 118$, $p < .001$, CFI = 0.95, TLI = 0.95, RMSEA = 0.028 [0.025, 0.030], AIC = −30,593.87, BIC = −30,384.20 (Supplement 5). None of the means of $\triangle3$ (Figure 3 τ_3) was significant. $\triangle4$ means (Figure 3 τ_4) were significantly negative for social interaction and social engagement. $\triangle5$ means (Figure 3 τ_5) were significantly positive for belonging, social interaction and social engagement (Figure 4b,c). All change factor variances (Figure 3 ψ_3–ψ_5) were significant, yet none of the change factors was predicted by participants' sex (Figure 3 λ_3–λ_5).

The LCS model with three separate latent factors for changes in social systems from T4 to T7, $\chi^2 = 150.69$, $df = 96$, $p < .001$, CFI = 0.99, TLI = 0.98, RMSEA = 0.013 [0.009, 0.016], AIC = 30,727.68, BIC = 32,281.71, had a better fit than the LGC model, $\chi^2 = 827.83$, $df = 279$, $p < .001$, CFI = 0.93, TLI = 0.92, RMSEA = 0.024 [0.022, 0.026], AIC = 48,927.78, BIC = 49,353.29 (Supplement 5). The means of $\triangle3$ (Figure 3 τ_3) were significantly negative for friends, neighbours, others, and institutional trust, and significantly positive for family. $\triangle4$ means (Figure 3 τ_4) were significantly negative for family, neighbourhood and institutional trust. $\triangle5$ means (Figure 3 τ_5) were significantly negative for institutional trust and national and international belonging, and significantly positive for neighbours and others (Figure 4b,d). All change factor variances (Figure 3 ψ_3–ψ_5) were significant. None of the change factors was explained by participants' sex (Figure 3 λ_3–λ_5). All parameter estimates (Supplement 6, 7), as well as between-construct correlations of change factors (Supplement 8, 9) are reported in the Supplemental Material.

4 | DISCUSSION

This study investigated changes in different aspects of social cohesion during the COVID-19 pandemic in 2020 and 2021 in Germany. More specifically, capitalizing on our recently developed multidimensional and multisystem model of social cohesion and extending findings on general social cohesion during the first lockdown (Silveira et al., 2022b), lockdown-related changes were explored (a) in a general second-order factor of social cohesion during the second lockdown, (b) in the four first-order psychological dimensions belonging, trust, social interactions and social engagement, and (c) in social cohesion referring to different social groups, including family, friends, neighbours, others, institutions, national and international groups. Additionally, an effect of sex on pandemic-related changes
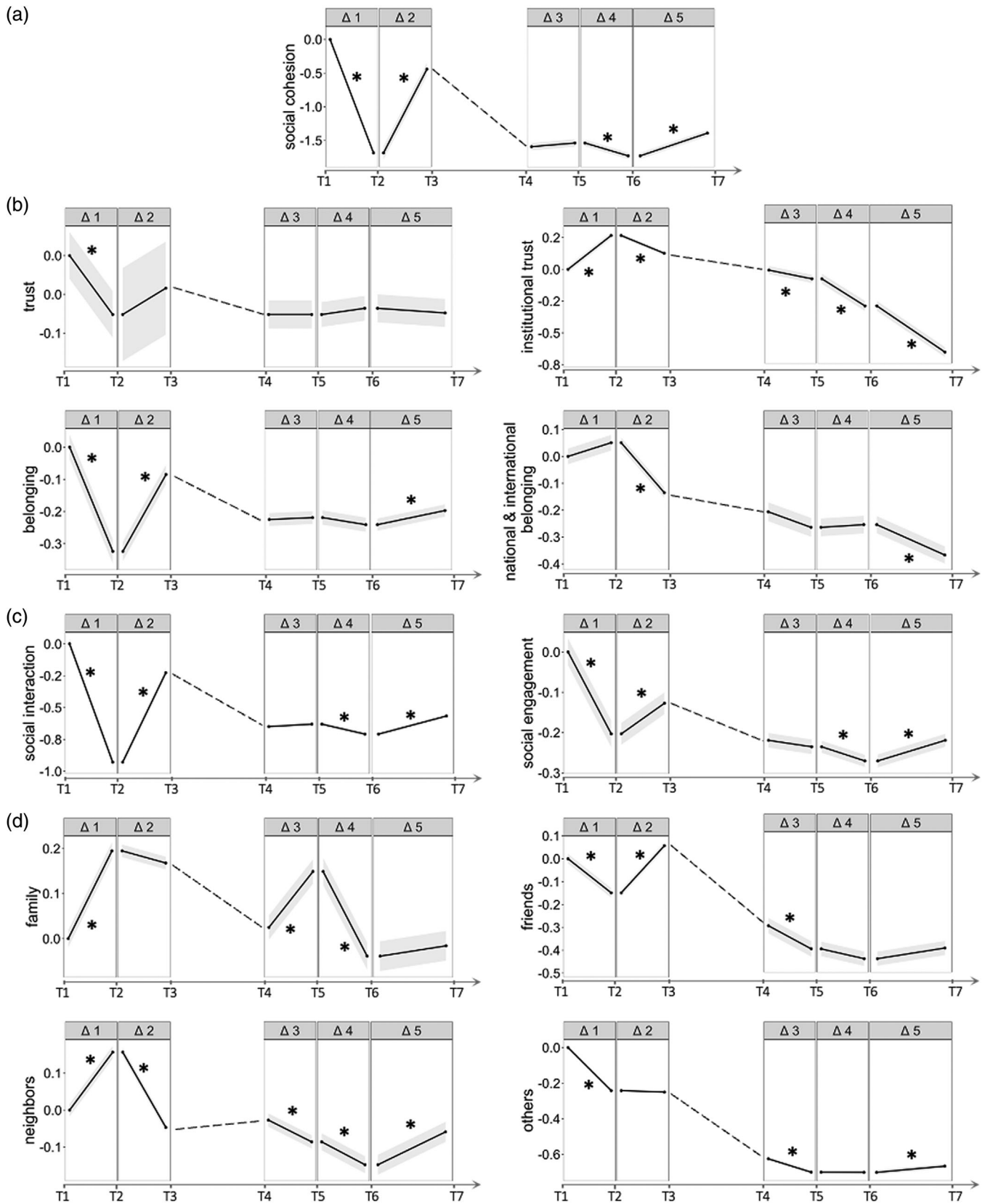
FIGURE 4 Successive latent change scores (Δ1–Δ5) of (a) general social cohesion, (b) general versus macro level processes of trust and belonging, (c) behavioural dimensions of social cohesion and (d) social cohesion on micro system level. Average change derived from latent change score models; grey area = standard error of latent change factors; * = significant average change with $p < .05$
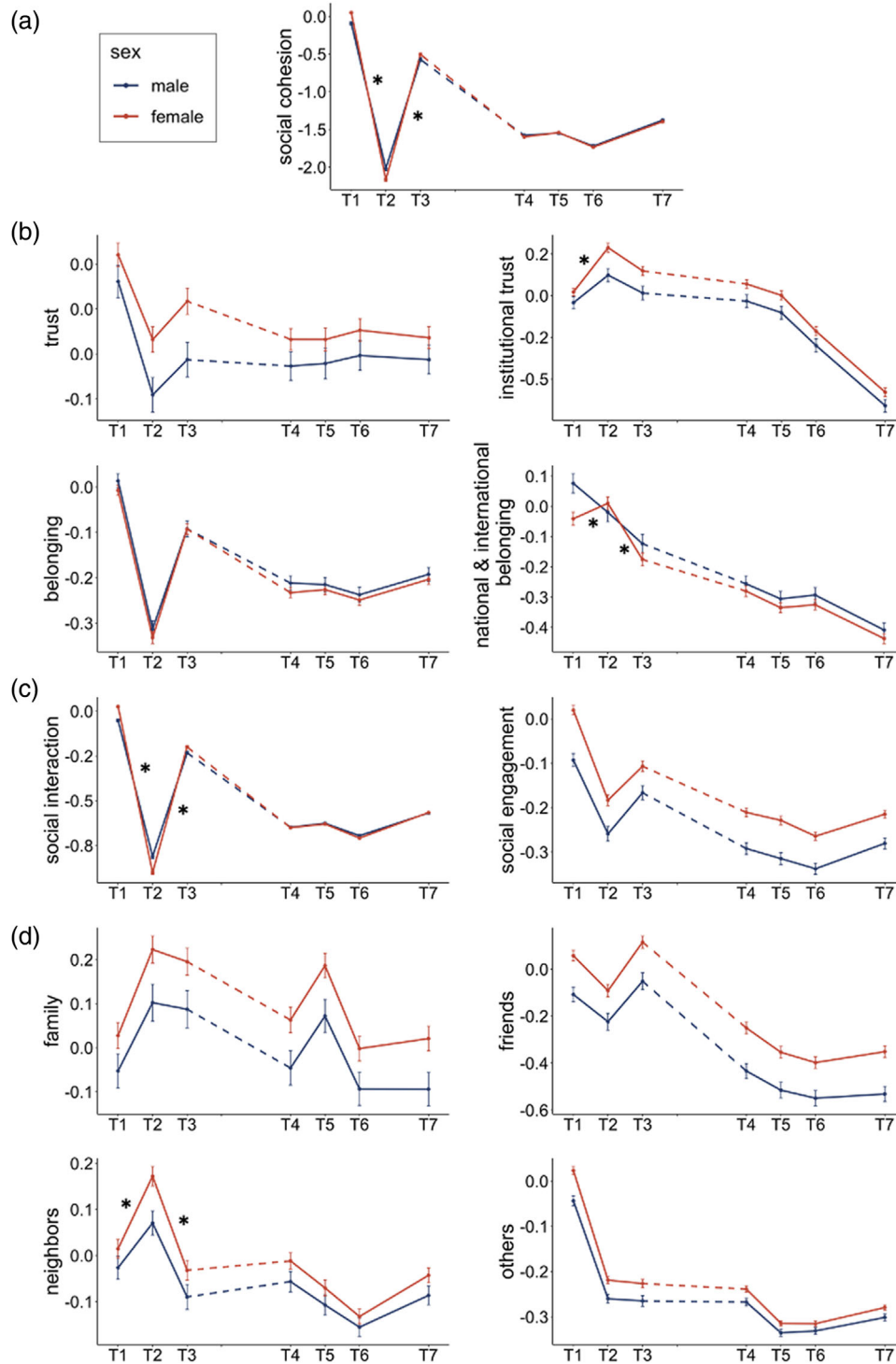
FIGURE 5 Longitudinal trajectories of (a) general social cohesion, (b) general versus macro level processes of trust and belonging, (c) behavioural dimensions of social cohesion and (d) social cohesion on micro system level in men and women. Means and standard errors of extracted latent factor scores pooled across multiple imputations at each measurement occasion T1–T7; * = significant sex difference in change with $p < .05$

in all these different aspects of social cohesion was explored. The main goals were to explore whether during the COVID-19 pandemic there was evidence for 'tend-and-befriend' or 'rally around the flag' effects, suggesting that people (particularly females) react with more social engagement and cooperation, as well as increased affirmation of political, institutional or national ideologies. Overall, the complex pattern of findings highlights that different aspects of the multilevel construct of social cohesion were differentially affected by the two major lockdowns in Germany in 2020 and 2021.

On a general level, when focusing on the second-order factor, social cohesion was found to be distinctly impacted by the two lockdowns. These differential levels of cohesion between T1 to T3 and T4 to T7 might be due to changes in assessment from retrospective (i.e., several months in the past) to concurrent (i.e., past month). Participants were therefore asked to report on experienced difficulties in recalling the time periods T1 to T3. Their evaluations (mean = 2.92 ± 1.72; range = 0 [not difficult at all]–8 [very difficult]) indicated that they could distinguish between the retrospective time periods. While the first lockdown in March/April 2020 led to a massive decrease in general social cohesion, which recovered almost back to normal after reopening in June 2020 (Silveira et al., 2022b), the second lockdown was characterized by initially stable cohesion, which significantly decreased once the period extended into a hard lockdown, and slightly recovered again in the last lockdown period from January to March/April 2021. The increase during the last part of the second lockdown may relate to the availability of vaccinations from 27 December 2020 onward, however, restrictions regarding work places, schools and public gatherings remained intact during the entire period and vaccine eligibility extended to the general public not before 1 April 2021. It has been found that the distribution of vaccines to fellow citizens had an overall positive effect on peoples' mental health and well-being (Nguyen, 2021). In line with notions of a behavioural immune system, people are particularly motivated to pathogen avoidance in times of high risk of infection (Fincher et al., 2008). While it has been discussed in how far the pathogen prevalence theory is applicable to the context of the COVID-19 pandemic (Ackerman et al., 2021), higher levels of experienced cohesion after the availability of vaccinations indicate that besides lockdown measures, observed effects could relate to aspects of the virus, its spreading and curtailing. While pandemic lockdowns and outbreak can thus not be fully parsed, results indicate that social cohesion among Berliners mostly suffered during ecologically valid stress situations defined by federal lockdown periods in 2020 and 2021, with a clear massive drop during the first short lockdown and a marked fatigue effect during the longer second lockdown (Petherick et al., 2021).

When focusing on the four distinct first-order factors trust, belonging, social interaction and engagement, the overall pattern of change observed for general social cohesion was mirrored by the two dimensions of social interactions and social engagement (see Figure 4c). These similarities do not come as a surprise considering that the very nature of the pandemic and public health measures curbed behavioural options to interact and engage with others. Interestingly, social interactions slightly increased during the extended second lockdown, specifically driven by an increase at the last stage of this period. This result might point to a behavioural shift towards disregarding imposed social distancing measures, which has been previously reported and discussed in the context of pandemic fatigue (Haktanir et al., 2022; Petherick et al., 2021). As proposed by the World Health Organization, pandemic fatigue might have led to decreasing motivation to comply with mandated restrictions and protective behaviours (WHO, 2020). Apart from restrictions on individual degrees of freedom and the need for social connection, the phenomenon of pandemic

fatigue is suggested to relate to the false belief that the threat of the COVID-19 pandemic is reduced (Harvey, 2020).

The two other psychological dimensions of trust and belonging showed a slightly different pattern. Although both were negatively impacted by the first lockdown as well, the sense of belonging increased significantly both at reopening in June 2020 and then again at the end of the second lockdown period from January to March/April 2021, while trust remained consistently low. Interestingly, however, in the specific cases of trust and belonging, the multi-level-matrix of the proposed factor model allowed for more differential insights. Several items referring to trust on a macro level such as trust in the police, media, science, the health system or the government were found to additionally form a separate factor of 'institutional trust', while items regarding feelings of belonging to Berlin, Germany, Europe or the world, formed a distinct factor of 'national and international belonging' (see Figure 1). The latter also included an item on general social trust in fellow citizens, which due to its established association with shared values and norms will be interpreted as a part of national belonging and national identity on a macro level of social systems (Larsen, 2013).

Interestingly, changed patterns of trust and belonging referring to macro-level systems differ from changes of trust and belonging including micro-level social groups such as family, friends or neighbours (see Figure 4b). Thus, while social trust and institutional or political trust are evidently related to each other (Newton & Zmerli, 2011), they were differentially impacted by the pandemic. More specifically, in the case of institutional trust, levels initially increased during the first lockdown. This result corroborates other findings of increased trust in the government and political institutions, particularly in the early stages of the pandemic (Baekgaard et al., 2020; Davies et al., 2021; Sibley et al., 2020). Such evidence for rally effects as response to a collective crisis is also in line with post-disaster research that reports a similar phenomenon during the so-called honeymoon phase, in which individuals tend to believe that governmental guidance will resolve prevailing threats and burdens and restore economic balance (Math et al., 2015). It has been argued that political support in periods of intense crisis is triggered by a sense of threat entailed by the uncertainty of the unprecedented situation (Pyszczynski et al., 2015, 2021) and can serve as a compensatory mechanism in face of a perceived loss in personal control (Kay et al., 2008). It is well documented, however, that this effect is only short lived (Davies et al., 2021). Accordingly, after reopening, institutional trust decreased in this Berlin sample, and kept decreasing drastically throughout the second lockdown as well, which in light of theories on terror management and compensatory control would speak to lower levels of existential threat and loss of control at later stages of the pandemic, and corroborates notions of pandemic fatigue on macro-levels of social cohesion.

Similarly, and in contrast to the lockdown-related decrease in a general sense of belonging, feelings of national and international belonging remained stable during the first lockdown, or even increased for female participants. Thus, our data partly support previous suggestions that social belonging and identity can be promoted by the shared experience of a crisis (Allen et al., 2021; Wamsler et al., 2022). Similar to institutional trust, however, initial increases did not last and

macro-level belonging decreased during the second lockdown in winter 2020/21.

When focusing on social cohesion on the micro-level of social systems, differential pandemic-related change patterns occurred for cohesion with family, friends and neighbours (see Figure 4d). Due to its low reliability and lack of conceptual clarity, social cohesion with 'others' will not be discussed in detail. Based on the proposed factor model, the factors reflecting cohesion with family, friends and neighbours are not fully symmetrical, in that quality and quantity of social interaction with neighbours were not assessed. However, all factors are formed by items on trust, belonging and the frequency of received and given social support. While the first lockdown was associated with a decrease in cohesion with friends, cohesion with family and neighbours increased significantly. Levels of family cohesion remained stable after reopening, whereas cohesion with neighbours decreased again. For families, an additional 'Christmas effect' was found, with cohesion peaking around Christmas time during the second lockdown. While levels of cohesion with both family and neighbours returned to baseline at the end of the second lockdown, cohesion with friends recovered only briefly after the first lockdown yet stagnated on a low level during the entire second lockdown period. Supporting findings of a decreased sense of friendship due to social distancing (Philpot et al., 2021), friendships were thus particularly compromised by the restrictions of the lockdowns.

The general increase in social cohesion with family and neighbours during the first lockdown in March/April 2020 can be seen as indicative of a biobehavioural pattern of tending and befriending to reduce distress and promote safety (Taylor, 2006; von Dawans et al., 2012). Tend-and-befriend behaviour includes caregiving or nurturing and affiliative expressions. The finding of affiliative stress responses with neighbours but not friends can be seen as indicative of a unique availability context during lockdown periods. Thus, local proximity seems to have been a crucial determinant in social affiliation during the COVID-19 pandemic. The lockdown-specific increase of cohesion with neighbours might be seen as compensatory response for friendship cohesion. This tend-and-befriend effect, however, only occurred during the first lockdown. It is possible that during the second lockdown, after getting used to the new normality, other avenues were found to access and exploit social networks. Particularly, online connections have been proposed to effectively buffer mental health impacts of the pandemic (Moore & March, 2022; Ruggieri et al., 2020). Since the current study did not include behaviours in online social networks, these aspects are not captured in the social cohesion changes reported.

Finally, our last goal focused on investigating whether gender effects postulated in the literature, especially in the context of the tend-and-befriend hypothesis (Taylor et al., 2000), could be observed in longitudinal change patterns of social cohesion. More specifically, in both animal and human literature, females have been found to show cooperative and prosocial behaviour, and seek or create socially supportive networks to cope with stress more consistently than males (Nickels et al., 2017; Taylor, 2006; Turton & Campbell, 2005). In line with this, we found an increase in social cohesion with neighbours to be particularly pronounced in women. Accordingly, previous stud-

ies have found that females become more other-oriented and more prone to display cooperation with non-kin under stress (Nickels et al., 2017; Steinbeis et al., 2015; Tomova et al., 2014). In the particular context of the COVID-19 pandemic, these prosocial tendencies have been ascribed to the higher compliance with health measures in women (Dohle et al., 2020; Galasso et al., 2020).

Another gender specific effect highlights that women showed more initial increase in feelings of belonging to national and international entities (Berlin, Germany, Europe, world) during the first lockdown. Thus, in response to this collective stressor at an early stage, females experienced national and international groups as a more integral part of themselves. Interestingly, this gender effect was found on both macro-level factors alike. The context of the first pandemic-related lockdown, its decrease in immediate social connection, paired with a need for belonging in times of crisis (Baumeister & Leary, 1995; Slavich et al., 2021), may have instilled a sense of national and global community in women.

In sum, our findings show that the investigation of social cohesion during a collective crisis such as the COVID-19 pandemic necessitates a complex, multidimensional and multilevel view on the construct of social cohesion. This allows us to differentiate between several psychological aspects of social cohesion, including more objective markers such as the frequency of social interaction and prosocial behaviours on the one hand, and more subjective markers such as feelings of trust and belonging on the other. In addition, it does not suffice to focus only on these psychological dimensions, since our results highlight that time courses of social cohesion vary between the different social groups to which they refer. Accordingly, regarding social interactions and engagement, the lockdowns had rather detrimental overall effects. However, on the micro system level and for institutional trust, national and international belonging, at least during the first lockdown, well-known effects of tending and befriending as well as rallying around the flag were observable, and this especially in females. Further, social cohesion particularly increased towards neighbours, a pandemic-relevant social in-group which remained accessible despite social isolation measures implemented in both lockdowns.

4.1 | Limitations

One of the limitations of the current study concerns sample selection. While with regard to most socio-demographic characteristics, the sample can be evaluated as representative of the Berlin population, exclusion criteria limited people to German-speakers. However, experiences of migrants who are not fluent in the local language are crucial for meso-level processes of social cohesion, which include integration, equality, prejudice or openness towards foreign citizens (Bottoni, 2018). Related to this, the current study is less representative on a meso-system level, for example, regarding different cultural or religious groups of society, than on micro and macro levels. Besides, the proposed factor model (Silveira et al., 2022b) is limited to a primary focus on subjective perceptions of social cohesion, while disregarding objective attributes of social cohesion such as peoples' manifest

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behaviours, or economic inequalities and other conditions (Chan et al., 2006).

Another limitation concerns the representation of national and international belonging on one factor. Thus, nationalist identity could not be differentiated from feelings of global belonging. Despite the COVID-19 pandemic itself being an example of contemporary globalization processes, many findings of other studies paint a different picture, highlighting raised levels of xenophobia, racism, nationalism and an exacerbation of pre-existing social, racial or ethnic injustices and disparities, particularly affecting migrants and minority groups (Devakumar et al., 2020; Elias et al., 2021).

Furthermore, given the low reliability of factor scores for general social cohesion, social interaction and others, results obtained using those factors in latent change and latent growth analyses have to be interpreted with caution, since low reliabilities are indicative that the latent constructs are not well represented by the estimated factor scores. Despite low reliability of the second-order factor, previous theoretical and empirical hierarchical conceptualizations of social cohesion (Bottoni, 2018; Friedkin, 2004) as well as an acceptable fit of the hierarchical factor model in our data provide support for the general multilevel structure of social cohesion. Therefore, only an inclusion of social system factors led to acceptable model fit, which is in line with our theoretical expectations (see Supplement 10). It remains an endeavour of future research to identify further relevant dimensions to capture this higher-order concept in its complexity. All other factor scores had substantial reliabilities of ≥0.70. Besides, due to the non-linearity of social cohesion changes on several dimensions and social system levels from T4 to T7, fit of LGC models was generally lower than fit of LCS models with stepwise latent change. Despite the challenges of such latent approaches in the structural equation modelling framework, we believe that the chosen analytical strategy is suitable to address longitudinal change in multiple temporal segments in a multidimensional and multilevel construct such as social cohesion in its complexity. This study reports on a total of 110 inference tests, which were not adjusted for multiple testing due to the exploratory nature of the study. Caution is thus advised due to alpha error inflation.

Furthermore, it is a limitation of this study that retrospective data assessment at the first three measurement occasions (T1 to T3) referred to time periods several months in the past. This study design is conditional upon the unpredictable outbreak of the pandemic. To facilitate recall of time periods before, during and after the first lockdown, retrospective surveys entailed brief reminders, that is, text paragraphs with relevant information about socio-political conditions at that time. While memory bias cannot be ruled out for retrospective findings, reported difficulties in recalling were low, and differential intra-individual change patterns show that trajectories on the different dimensions and group levels are not consistently biased in the same direction.

Lastly, due to high rates of attrition-caused multivariate missingness at T4 to T7 (36% at T4, 44% at T5, 51% at T6 and 51% at T7), further limitations in imputation of these data points need to be considered. Yet, while listwise deletion would have resulted in an overall loss of 64%

in sample size, multiple imputation was chosen to minimize bias. Relatedly, it remains to be acknowledged that the difference in assessment as well as missing data for the time periods of the first (T1 to T3) and second (T4 to T7) lockdown limits direct comparability of results. While we thus advise caution in the interpretation of differential findings, reports on data of both time periods may nevertheless provide valuable insights into subjectively experienced social togetherness during these two relevant phases of the COVID-19 pandemic.

5 | CONCLUSION

This study reports on subjectively perceived changes in different aspects of social cohesion during the COVID-19 pandemic in Berlin, Germany. Findings highlight differential impacts of the pandemic both on different psychological dimensions such as trust, belonging and social interaction and engagement and on different social system levels such as the micro-level groups of family, neighbours and friends, and the macro-level processes of institutional trust and national and international belonging. Specifically, during the first lockdown, social cohesion fell apart with regard to trust, belonging, social interaction and social engagement when generalized across different social groups. Yet, when exploring levels of cohesion within different social groups, results show that cohesion on the micro level with families and neighbours, and cohesion on the macro level indicated by institutional trust, national and international belonging indeed initially increased, particularly in women. Thus, well-established theories proposing tend-and-befriend, rally around the flag or compensatory behaviours to existential threats, loss of control or pathogen prevalence, or different phases of disaster recovery, which predict increases in social cooperation and government support after an acute stressor or collective crisis, could be supported by our findings during the first pandemic shock, that is, the first lockdown in March 2020. These patterns that were observed during the first pandemic-related lockdown, however, were not repeated during the second lockdown with prolonged stressor exposure over several months in 2020/21. In contrast, with the exception of a peak in family cohesion around Christmas, the second lockdown was characterized by a continuous decline or stagnation of social cohesion on all levels until January 2021. While, after that, overall levels of social cohesion, including a general sense of belonging, social interaction and engagement increased, macro-level processes of social cohesion kept drifting downward, thereby highlighting the tremendous long-term repercussions the pandemic had on a macro level of society. Taken together, findings of this study emphasize the relevance of investigating social cohesion in its complexity by taking into account both different psychological dimensions as well as the different social groups to which these social feelings and behaviours refer. Furthermore, we showed how important it is to account for the specific nature of the collective crisis or stressor exposure over time to better understand the differential time courses of social cohesion in its various aspects. In light of the COVID-19 pandemic, and all its implications on social lives, using such a nuanced approach to social cohesion helped us gain insights into how a collective crisis impacts social cohesion on

different levels of society at different times of stressor exposure and post-stressor recovery, which can guide new approaches to sustain and regain collective solidarity.

CONFLICT OF INTEREST STATEMENT

We have no conflicts of interest to disclose.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in Open Science Framework at https://osf.io/uv5ns.

ETHICS STATEMENT

The study is in accordance with the Declaration of Helsinki and received approval by the ethical committee of the Charité—Universitätsmedizin Berlin, Germany (#EA4/172/20 and #EA1/345/20). All study participants provided written informed consent.

TRANSPARENCY STATEMENT

Further information on preregistered hypotheses and study material is available at the project's Open Science Framework page (osf.io/jvb98). Data and code are available at osf.io/uv5ns.

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REFERENCES

Ackerman, J. M., Tybur, J. M., & Blackwell, A. D. (2021). What role does pathogen-avoidance psychology play in pandemics? *Trends in Cognitive Sciences*, 25(3), 177–186. https://doi.org/10.1016/j.tics.2020.11.008

Allen, K. A., Kern, M. L., Rozek, C. S., McInerney, D. M., & Slavich, G. M. (2021). Belonging: A review of conceptual issues, an integrative framework, and directions for future research. *Australian Journal of Psychology*, 73(1), 87–102. https://doi.org/10.1080/00049530.2021.1883409

Aron, A., Aron, E. N., & Smollan, D. (1992). Inclusion of other in the self scale and the structure of interpersonal closeness. *Journal of Personality and Social Psychology*, 63(4), 596–612. https://doi.org/10.1037/0022-3514.63.4.596

Baekgaard, M., Christensen, J., Madsen, J. K., & Mikkelsen, K. S. (2020). Rallying around the flag in times of COVID-19: Societal lockdown and trust in democratic institutions. *Journal of Behavioral Public Administration*, 3(2), 1–12. https://doi.org/10.30636/jbpa.32.172

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117(3), 497–529. https://doi.org/10.4324/9781351153683-3

Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, 88(3), 588–606. https://doi.org/10.1037/0033-2909.88.3.588

Borkowska, M., & Laurence, J. (2021). Coming together or coming apart? Changes in social cohesion during the Covid-19 pandemic in England. *European Societies*, 23(S1), S618–S636. https://doi.org/10.1080/14616696.2020.1833067

Bottoni, G. (2018). A multilevel measurement model of social cohesion. *Social Indicators Research*, 136(3), 835–857. https://doi.org/10.1007/s11205-016-1470-7

Burke, B. L., Kosloff, S., & Landau, M. J. (2013). Death goes to the polls: A meta-analysis of mortality salience effects on political attitudes. *Political Psychology*, 34(2), 183–200. https://doi.org/10.1111/pops.12005

Burrmann, U., Mutz, M., Sielschott, S., & Braun, S. (2022). Social capital trends in Germany in the face of the Covid-19 pandemic: A research note. *Frontiers in Political Science*, 4, 1–7. https://doi.org/10.3389/fpos.2022.814943

Calo-Blanco, A., Kovářík, J., Mengel, F., & Romero, J. G. (2017). Natural disasters and indicators of social cohesion. *PLoS ONE*, 12(6), 13–15. https://doi.org/10.1371/journal.pone.0176885

Campbell, A. (2008). Attachment, aggression and affiliation: The role of oxytocin in female social behavior. *Biological Psychology*, 77(1), 1–10. https://doi.org/10.1016/j.biopsycho.2007.09.001

Čavojová, V., Adamus, M., & Ballová Mikušková, E. (2022). You before me: How vertical collectivism and feelings of threat predicted more socially desirable behaviour during COVID-19 pandemic. *Current Psychology*, 0123456789. https://doi.org/10.1007/s12144-022-03003-3

Chan, J., To, H. P., & Chan, E. (2006). Reconsidering social cohesion: Developing a definition and analytical framework for empirical research. *Social Indicators Research*, 75(2), 273–302. https://doi.org/10.1007/s11205-005-2118-1

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling*, 9(2), 233–255. https://doi.org/10.1207/S15328007SEM0902_5

Cohen, F., Solomon, S., & Kaplin, D. (2017). You're hired! Mortality salience increases Americans' support for Donald Trump. *Analyses of Social Issues and Public Policy*, 17(1), 339–357. https://doi.org/10.1111/asap.12143

Cohen, S., & McKay, G. (2020). Social support, stress and the buffering hypothesis: A theoretical analysis. In S. E. Taylor, J. E. Singer, & A. Baum (Eds.), *Handbook of psychology and health (Volume IV)*. Routledge.

Davies, B., Lalot, F., Peitz, L., Heering, M. S., Ozkececi, H., Babaian, J., Davies Hayon, K., Broadwood, J., & Abrams, D. (2021). Changes in political trust in Britain during the COVID-19 pandemic in 2020: Integrated public opinion evidence and implications. *Humanities and Social Sciences Communications*, 8(1), 1–9. https://doi.org/10.1057/s41599-021-00850-6

Dayrit, M. M., & Mendoza, R. U. (2020). Social cohesion vs COVID-19. *International Journal of Health Governance*, 25(3), 191–203. https://doi.org/10.1108/IJHG-03-2020-0022

Devakumar, D., Shannon, G., Bhopal, S. S., & Abubakar, I. (2020). Racism and discrimination in COVID-19 responses. *The Lancet*, 395(10231), 1194. https://doi.org/10.1016/S0140-6736(20)30792-3

Dickes, P., Valentova, M., & Borsenberger, M. (2010). Construct validation and application of a common measure of social cohesion in 33 European countries. *Social Indicators Research*, 98(3), 451–473. https://doi.org/10.1007/s11205-009-9551-5

Dinić, B. M., & Bodroža, B. (2021). COVID-19 protective behaviors are forms of prosocial and unselfish behaviors. *Frontiers in Psychology*, 12, 1–8. https://doi.org/10.3389/fpsyg.2021.647710

Dohle, S., Wingen, T., & Schreiber, M. (2020). Acceptance and adoption of protective measures during the COVID-19 pandemic: The role of trust in politics and trust in science. *Social Psychological Bulletin*, 15(4), 1–23. https://doi.org/10.32872/spb.4315

Elias, A., Ben, J., Mansouri, F., & Paradies, Y. (2021). Racism and nationalism during and beyond the COVID-19 pandemic. *Ethnic and Racial Studies*, 44(5), 783–793. https://doi.org/10.1080/01419870.2020.1851382

Ervasti, H., Kouvo, A., & Venetoklis, T. (2019). Social and institutional trust in times of crisis: Greece, 2002–2011. *Social Indicators Research*, 141(3), 1207–1231. https://doi.org/10.1007/s11205-018-1862-y

Fan, C., Jiang, Y., & Mostafavi, A. (2020). Emergent social cohesion for coping with community disruptions in disasters. *Journal of the Royal Society Interface*, 17(164), 20190778. https://doi.org/10.1098/rsif.2019.0778

Festinger, L., Schachter, S., & Back, K. (1950). *Social pressures in informal groups; a study of human factors in housing*. Harper.

Fincher, C. L., Thornhill, R., Murray, D. R., & Schaller, M. (2008). Pathogen prevalence predicts human cross-cultural variability in individualism/collectivism. *Proceedings of the Royal Society B: Biological Sciences*, 275(1640), 1279–1285. https://doi.org/10.1098/rspb.2008.0094

Folk, D., Okabe-Miyamoto, K., Dunn, E., & Lyubomirsky, S. (2020). Did social connection decline during the first wave of COVID-19?: The role of extraversion. *Collabra: Psychology*, 6(1), 1–13. https://doi.org/10.1525/collabra.365

Fonseca, X., Lukosch, S., & Brazier, F. (2019). Social cohesion revisited: A new definition and how to characterize it. *Innovation: The European Journal of Social Science Research*, 32(2), 231–253. https://doi.org/10.1080/13511610.2018.1497480

Freud, S. (1921). *Massenpsychologie und Ich-Analyse*. Internationaler Psychoanalytischer Verlag.

Friedkin, N. E. (2004). Social cohesion. *Annual Review of Sociology*, 30, 409–425. https://doi.org/10.1146/annurev.soc.30.012703.110625

Galasso, V., Pons, V., Profeta, P., Becher, M., Brouard, S., & Foucault, M. (2020). Gender differences in COVID-19 attitudes and behavior: Panel evidence from eight countries. *Proceedings of the National Academy of Sciences of the United States of America*, 117(44), 27285–27291. https://doi.org/10.1073/pnas.2012520117

Greene, G., Paranjothy, S., & Palmer, S. R. (2015). Resilience and vulnerability to the psychological harm from flooding: The role of social cohesion. *American Journal of Public Health*, 105(9), 1792–1795. https://doi.org/10.2105/AJPH.2015.302709

Hagerty, B. M. K., Lynch-Sauer, J., Patusky, K. L., Bouwsema, M., & Collier, P. (1992). Sense of belonging: A vital mental health concept. *Archives of Psychiatric Nursing*, 6(3), 172–177. https://doi.org/10.1016/0883-9417(92)90028-H

Haktanir, A., Can, N., Seki, T., Kurnaz, M. F., & Dilmaç, B. (2022). Do we experience pandemic fatigue? Current state, predictors, and prevention. *Current Psychology*, 41(10), 7314–7325. https://doi.org/10.1007/s12144-021-02397-w

Harvey, N. (2020). Behavioral fatigue: Real phenomenon, naïve construct, or policy contrivance? *Frontiers in Psychology*, 11, 589892. https://doi.org/10.3389/fpsyg.2020.589892

Hawdon, J., & Ryan, J. (2011). Social relations that generate and sustain solidarity after a mass tragedy. *Social Forces*, 89(4), 1363–1384. https://doi.org/10.1093/sf/89.4.1363

Hellmann, D. M., Dorrough, A. R., & Glöckner, A. (2021). Prosocial behavior during the Covid-19 pandemic in Germany. The role of responsibility and vulnerability. *Heliyon*, 7(9), e08041. https://doi.org/10.1016/j.heliyon.2021.e08041

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1–55. https://doi.org/10.1080/10705519909540118

Jetten, J. (2020). *Together apart: The psychology of COVID-19*. SAGE Publications.

Jewett, R. L., Mah, S. M., Howell, N., & Larsen, M. M. (2021). Social cohesion and community resilience during COVID-19 and pandemics: A rapid scoping review to inform the United Nations Research Roadmap for COVID-19 recovery. *International Journal of Health Services*, 51(3), 325–336. https://doi.org/10.1177/0020731421997092

Kay, A. C., Gaucher, D., Napier, J. L., Callan, M. J., & Laurin, K. (2008). God and the government: Testing a compensatory control mechanism for the support of external systems. *Journal of Personality and Social Psychology*, 95(1), 18–35. https://doi.org/10.1037/0022-3514.95.1.18

Lambert, A. J., Schott, J. P., & Scherer, L. (2011). Threat, politics, and attitudes: Toward a greater understanding of rally-'round-the-flag effects. *Current Directions in Psychological Science*, 20(6), 343–348. https://doi.org/10.1177/0963721411422060

Larsen, C. A. (2013). *The rise and fall of social cohesion: The construction and de-construction of social trust in the US, UK, Sweden and Denmark*. Oxford University Press.

Mancini, A. D. (2020). Heterogeneous mental health consequences of COVID-19: Costs and benefits. *Psychological Trauma: Theory, Research, Practice, and Policy*, 12, S15–S16. https://doi.org/10.1037/tra0000894

Marmarosh, C. L., Forsyth, D. R., Strauss, B., & Burlingame, G. M. (2020). The psychology of the COVID-19 pandemic: A group-level perspective. *Group Dynamics*, 24(3), 122–138. https://doi.org/10.1037/gdn0000142

Math, S., Nirmala, M., Moirangthem, S., & Kumar, N. (2015). Disaster management: Mental health perspective. *Indian Journal of Psychological Medicine*, 37(3), 261–271. https://doi.org/10.4103/0253-7176.162915

McDougall, W. (1921). *The group mind: A sketch of the principles of collective psychology*. Prabhat Prakashan.

McGinty, E. E., Presskreischer, R., Han, H., & Barry, C. L. (2020). Psychological distress and loneliness reported by US adults in 2018 and April 2020. *JAMA - Journal of the American Medical Association*, 324(1), 93–94. https://doi.org/10.1001/jama.2020.9740

Meleady, R., Hodson, G., & Earle, M. (2021). Person and situation effects in predicting outgroup prejudice and avoidance during the COVID-19 pandemic. *Personality and Individual Differences*, 172, 110593. https://doi.org/10.1016/j.paid.2020.110593

Milman, E., Lee, S. A., & Neimeyer, R. A. (2020). Social isolation and the mitigation of coronavirus anxiety: The mediating role of meaning. *Death Studies*, 46(1), 1–13. https://doi.org/10.1080/07481187.2020.1775362

Min, J. (2020). Does social trust slow down or speed up the transmission of COVID-19? *PLoS ONE*, 15(12), 1–19. https://doi.org/10.1371/journal.pone.0244273

Moore, K. A., & March, E. (2022). Socially connected during COVID-19: Online social connections mediate the relationship between loneliness and positive coping strategies. *Journal of Stress, Trauma, Anxiety, and Resilience*, 1(1), 1–20. https://doi.org/10.55319/js.v1i1.9

Moustakas, L. (2022). A bibliometric analysis of research on social cohesion from 1994–2020. *Publications*, 10(1), 1–19. https://doi.org/10.3390/publications10010005

Mueller, J. E. (1970). Presidential popularity from Truman to Johnson. *The American Political Science Review*, *64*(1), 18–34.

Newton, K., & Zmerli, S. (2011). Three forms of trust and their association. *European Political Science Review*, *3*(2), 169–200. https://doi.org/10.1017/S1755773910000330

Nguyen, M. (2021). The psychological benefits of covid-19 vaccination. *Advances in Public Health*, *2021*, 1–9. https://doi.org/10.1155/2021/1718800

Nickels, N., Kubicki, K., & Maestripieri, D. (2017). Sex differences in the effects of psychosocial stress on cooperative and prosocial behavior: Evidence for 'flight or fight' in males and 'tend and befriend' in females. *Adaptive Human Behavior and Physiology*, *3*(2), 171–183. https://doi.org/10.1007/s40750-017-0062-3

Petherick, A., Goldszmidt, R., Andrade, E. B., Furst, R., Hale, T., Pott, A., & Wood, A. (2021). A worldwide assessment of changes in adherence to COVID-19 protective behaviours and hypothesized pandemic fatigue. *Nature Human Behaviour*, *5*(9), 1145–1160. https://doi.org/10.1038/s41562-021-01181-x

Philpot, L. M., Ramar, P., Roellinger, D. L., Barry, B. A., Sharma, P., & Ebbert, J. O. (2021). Changes in social relationships during an initial "stay-at-home" phase of the COVID-19 pandemic: A longitudinal survey study in the US. *Social Science & Medicine*, *274*, 113779.

Pyszczynski, T., Lockett, M., Greenberg, J., & Solomon, S. (2021). Terror management theory and the COVID-19 pandemic. *Journal of Humanistic Psychology*, *61*(2), 173–189. https://doi.org/10.1177/0022167820959488

Pyszczynski, T., Solomon, S., & Greenberg, J. (2015). Thirty years of terror management theory: From genesis to revelation. *Advances in Experimental Social Psychology*, *52*, 1–70. https://doi.org/10.1016/bs.aesp.2015.03.001

R Core Team. (2020). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing.

Razavi, S., Behrendt, C., Bierbaum, M., Orton, I., & Tessier, L. (2020). Reinvigorating the social contract and strengthening social cohesion: Social protection responses to COVID-19. *International Social Security Review*, *73*(3), 55–80. https://doi.org/10.1111/issr.12245

Rosseel, Y. (2012). lavaan: An R package for structural equation modeling and more. *Journal of Statistical Software*, *48*(2), 1–36. https://econpapers.repec.org/article/jssjstsof/v_3a048_3ai02.htm%0A;http://www.jstatsoft.org/v48/i02/ https://doi.org/10.18637/jss.v048.i02

Rubin, D. B. (1987). *Multiple imputation for nonresponse in surveys*. John Wiley & Sons.

Ruggieri, S., Ingoglia, S., Celeste, R., & Lo, G. (2020). The role of online social comparison as a protective factor for psychological wellbeing: A longitudinal study during the COVID-19 quarantine. *Personality and Individual Differences*, *171*, 110486. https://doi.org/10.1016/j.paid.2020.110486

Saiz, J., González-Sanguino, C., Ausín, B., Castellanos, M. Á., Abad, A., Salazar, M., & Muñoz, M. (2021). The role of the sense of belonging during the alarm situation and return to the new normality of the 2020 coronavirus pandemic (COVID-19) in Spain. *Psychological Studies*, *66*(3), 326–336. https://doi.org/10.1007/s12646-021-00612-z

Schiefer, D., & van der Noll, J. (2017). The essentials of social cohesion: A literature review. *Social Indicators Research*, *132*(2), 579–603. https://doi.org/10.1007/s11205-016-1314-5

Serrano-Montilla, C., Alonso-Ferres, M., Navarro-Carrillo, G., Lozano, L. M., & Valor-Segura, I. (2021). Assessment of the effects of health and financial threat on prosocial and antisocial responses during the COVID-19 pandemic: The mediating role of empathic concern. *Personality and Individual Differences*, *178*, 110855. https://doi.org/10.1016/j.paid.2021.110855

Sibley, C. G., Greaves, L. M., Satherley, N., Wilson, M. S., Overall, N. C., Lee, C. H. J., Milojev, P., Bulbulia, J., Osborne, D., Milfont, T. L., Houkamau, C. A., Duck, I. M., Vickers-Jones, R., & Barlow, F. K. (2020). Effects of the COVID-19 pandemic and nationwide lockdown on trust, atti-

tudes toward government, and well-being. *American Psychologist*, *75*(5), 618–630. https://doi.org/10.1037/amp0000662

Silveira, S., Hecht, M., Adli, M., Voelkle, M., & Singer, T. (2022a). Exploring the sturcture and interrelations of time-stable psychological resilience, psychological vulnerability and social cohesion. *Frontiers in Psychiatry*, *13*, 804763. https://doi.org/10.3389/fpsyt.2022.804763

Silveira, S., Hecht, M., Matthaeus, H., Adli, M., Voelkle, M. C., & Singer, T. (2022b). Coping with the COVID-19 pandemic: Perceived changes in psychological vulnerability, resilience and social cohesion before, during and after Lockdown. *International Journal of Environmental Research and Public Health*, *19*(6), 3290. https://doi.org/10.3390/ijerph19063290

Slavich, G. M., Roos, L. G., & Zaki, J. (2021). Social belonging, compassion, and kindness: Key ingredients for fostering resilience, recovery, and growth from the COVID-19 pandemic. *Anxiety, Stress and Coping*, *35*(1), 1–8. https://doi.org/10.1080/10615806.2021.1950695

Snyder-Mackler, N., Burger, J. R., Gaydosh, L., Daniel, W., Noppert, G. A., Campos, F. A., Yang, Y. C., Aiello, A. E., O'Rand, A., Harris, K. M., Shively, C. A., Alberts, S. C., & Tung, J. (2020). Social determinants of health and survival in humans and other animals. *Science*, *368*, 6493. https://doi.org/10.1126/science.aax9553.Social

Sønderskov, K. M., & Dinesen, P. T. (2016). Trusting the state, trusting each other? The effect of institutional trust on social trust. *Political Behavior*, *38*(1), 179–202. https://doi.org/10.1007/s11109-015-9322-8

Steinbeis, N., Engert, V., Linz, R., & Singer, T. (2015). The effects of stress and affiliation on social decision-making: Investigating the tend-and-befriend pattern. *Psychoneuroendocrinology*, *62*, 138–148. https://doi.org/10.1016/j.psyneuen.2015.08.003

Stephen, G., Siobhán, H., Muldoon Orla, T., & Whittaker Anna, C. (2022). Social cohesion and loneliness are associated with the antibody response to COVID-19 vaccination. *Brain, Behavior, and Immunity*, *103*(January), 179–185. https://doi.org/10.1016/j.bbi.2022.04.017

Tajfel, H., & Turner, J. C. (1986). The social identity theory of intergroup behaviour. In S. Worchel & W. G. Austin (Eds.), *Psychology of intergroup relations* (pp. 7–24). Nelson-Hall.

Taylor, S. E. (2006). Tend and befriend: Biobehavioral bases of affiliation under stress. *Current Directions in Psychological Science*, *15*(6), 273–277. https://doi.org/10.1111/j.1467-8721.2006.00451.x

Taylor, Shelley E., Klein, L. C., Lewis, B. P., Gruenewald, T. L., Gurung, R. A. R., & Updegraff, J. A. (2000). Biobehavioral responses to stress in females: Tend-and-befriend, not fight-or-flight. *Psychological Review*, *107*(3), 411–429. https://doi.org/10.1037/0033-295X.107.3.411

Thoresen, S., Blix, I., Wentzel-Larsen, T., & Birkeland, M. S. (2021). Trusting others during a pandemic: Investigating potential changes in generalized trust and its relationship with pandemic-related experiences and worry. *Frontiers in Psychology*, *12*, 1–9. https://doi.org/10.3389/fpsyg.2021.698519

Thurstone, L. L. (1935). *The vectors of mind*. University of Chicago Press.

Tomova, L., Von Dawans, B., Heinrichs, M., Silani, G., & Lamm, C. (2014). Is stress affecting our ability to tune into others? Evidence for gender differences in the effects of stress on self-other distinction. *Psychoneuroendocrinology*, *43*, 95–104. https://doi.org/10.1016/j.psyneuen.2014.02.006

Townshend, I., Awosoga, O., Kulig, J., & Fan, H. (2015). Social cohesion and resilience across communities that have experienced a disaster. *Natural Hazards*, *76*(2), 913–938. https://doi.org/10.1007/s11069-014-1526-4

Turton, S., & Campbell, C. (2005). Tend and befriend versus fight or flight: Gender differences in behavioral response to stress among university students. *Journal of Applied Biobehavioral Research*, *10*(4), 209–232. https://doi.org/10.1111/j.1751-9861.2005.tb00013.x

Uchida, Y., Takahashi, Y., & Kawahara, K. (2014). Changes in hedonic and eudaimonic well-being after a severe nationwide disaster: The case of

the Great East Japan Earthquake. *Journal of Happiness Studies*, *15*(1), 207–221. https://doi.org/10.1007/s10902-013-9463-6

Van Buuren, S. (2012). Convergence. In *Flexible imputation of missing data* (p. 142–146). CRC Press.

van Buuren, S., & Groothuis-Oudshoorn, K. (2011). mice: Multivariate imputation by chained equations in R. *Journal of Statistical Software*, *45*(3), 1–67. https://doi.org/10.18637/jss.v045.i03

Vigl, J., Strauss, H., Talamini, F., & Zentner, M. (2022). Relationship satisfaction in the early stages of the COVID-19 pandemic: A cross-national examination of situational, dispositional, and relationship factors. *PLoS ONE*, *17*(3), 1–16. https://doi.org/10.1371/journal.pone.0264511

von Dawans, B., Fischbacher, U., Kirschbaum, C., Fehr, E., & Heinrichs, M. (2012). The social dimension of stress reactivity: Acute stress increases prosocial behavior in humans. *Psychological Science*, *23*(6), 651–660. https://doi.org/10.1177/0956797611431576

Wamsler, S., Freitag, M., Erhardt, J., & Filsinger, M. (2022). The pandemic and the question of national belonging: Exposure to covid-19 threat and conceptions of nationhood. *European Journal of Political Research*, *62*(2), 510–529. https://doi.org/10.1111/1475-6765.12515

WHO. (2020). *Pandemic fatigue—reinvigorating the public to prevent COVID-19*: *Policy framework for supporting pandemic prevention and management* Copenhagen.

SUPPORTING INFORMATION

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