



EMPIRICAL ARTICLE

Quaranteens: Prepandemic relationship quality and changes in adolescent internalizing problems during the COVID-19 pandemic

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Abstract

This preregistered longitudinal study examined changes in adolescents' depressive and anxiety symptoms before and during the COVID-19 pandemic using latent additive piece-wise growth models. It also assessed whether support from and conflict with mothers, fathers, siblings, and best friends explained heterogeneity in change patterns. One hundred and ninety-two Dutch adolescents (Mean age: 14.3 years; 68.8% female) completed online biweekly questionnaires for a year (November 2019–October 2020), consisting of a prepandemic, lockdown, and reopening phase. Depressive symptoms increased following the lockdown and decreased upon reopening. Anxiety symptoms showed an immediate decrease followed by a gradual increase in the reopening phase. Prepandemic family and best friend support and conflict did not explain heterogeneity in depressive and anxiety symptoms during the COVID-19 pandemic.

KEYWORDS

adolescents, COVID-19, internalizing problems, relationship quality

The COVID-19 pandemic presents an unprecedented challenge for adolescents and their families (Masten & Motti-Stefanidi, 2020; Weeland et al., 2021). Coping with the challenges and social restrictions presented by the COVID-19 pandemic may be especially difficult for adolescents because they rely heavily on peer connections for emotional support and social development (Ellis & Zarbatany, 2017). Failure to connect to peers can lead to increases in internalizing problems such as depressive and anxiety symptoms (La Greca & Harrison, 2005). Indeed, a recent study suggested an increase in depressive and anxiety symptoms due to COVID-19, especially among 12–20-year-olds (Santomauro et al., 2021).

Nevertheless, not all adolescents seem to be equally affected (Branje & Sheffield Morris, 2021). Earlier work has shown that the development of internalizing problem behavior during adolescence is related to the quality of relationships with parents (Brouillard et al., 2018; Buist et al., 2011; Ehrlich et al., 2012; McLeod et al., 2007), with best friends (Ehrlich et al., 2012; La Greca & Harrison, 2005), and with siblings (Buist et al., 2013; Kim et al., 2007; Yeh & Lempers, 2004). Moreover, Janssens et al. (2021) recently

showed that prepandemic levels of maternal and paternal relationship quality contributed significantly to changes in adolescents' irritability and daily loneliness during the first lockdown. In this preregistered longitudinal study, we want to expand these findings by examining whether overtime changes in depressive and anxiety symptoms during the first year of the COVID-19 pandemic may be explained by prepandemic levels of support from and conflict with mothers, fathers, siblings, and best friends in a community sample of adolescents.

COVID-19-AND ADOLESCENT INTERNALIZING PROBLEMS

Whereas adolescents' risk for developing internalizing problems increases between the ages of 14 and 18 (Solmi et al., 2021), studies examining normative longitudinal development of internalizing problems have shown decreases in anxious/depressive symptoms during adolescence (Bongers et al., 2003). There is some evidence that these normative

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decreases in internalizing problems during adolescence slowed down during the lockdown (Achterberg et al., 2021). Indeed, several studies, including a meta-analysis (Racine et al., 2021), examining the impact of COVID-19 and related governmental measures on adolescent internalizing problems have found increases in internalizing problems (Duan et al., 2020; Magson et al., 2021; Santomauro et al., 2021), particularly for depressive symptoms (Barendse et al., 2021; Robinson et al., 2022).

However, a longitudinal study by Breaux et al. (2021) demonstrated that an increase in adolescent depressive and anxiety symptoms in the Spring of 2020 (during stay-at-home orders) was followed by a decrease in these symptoms from the Spring of 2020 to the Summer of 2020, after stay-at-home orders were lifted. This pattern was confirmed in a recent meta-analysis of studies comparing mental health before and during the COVID-19 pandemic (Robinson et al., 2022). Taking together the results of 65 longitudinal studies, Robinson et al. (2022) found that mental health symptoms increased in the beginning of the pandemic (March–April 2020), but decreased again to prepandemic levels by July 2020, especially for anxiety symptoms. These findings suggest that adolescents' mental health partly recovered, depending on the specific situation during the pandemic and implementation and release of governmental measures during the pandemic. For some adolescents, the lockdown may even *decrease* daily stress (Bruining et al., 2021). So, as earlier work also suggests, there may be strong differences between individuals in their levels of adaptation.

In this study, we specifically examined how key sources of social support in the lives of adolescents, namely that of mothers, fathers, siblings, and best friends, may explain differences between adolescents in their patterns of change concerning depressive and anxiety symptoms during the COVID-19 pandemic. That is, we examined whether more support and less conflict in these relationships help to buffer against the potential negative impact of COVID-19 measures on adolescent depressive and anxiety symptoms.

QUALITY OF FAMILY AND PEER RELATIONSHIPS AND ADOLESCENT INTERNALIZING PROBLEMS

The COVID-19 pandemic represents a multisystemic risk to adolescents (Masten & Motti-Stefanidi, 2020). Having nurturing and sensitive caregivers as well as close relationships with significant others may help adolescents to avoid negative outcomes during these challenging times. According to the *stress-buffering effect model*, stressful circumstances have a weaker effect on maladjustment when perceived support from significant others is high, whereas stressful circumstances have a stronger effect when perceived social support is low (Aba et al., 2019). Support from others may prevent immediate or continued stress reactions to the stressor and/or increase an individual's perceived ability to cope with the stressor (Cohen, 2004; Cohen & Wills, 1985). Masten and

Motti-Stefanidi (2020) have argued that the buffering effects of close relationships with significant others that have been found under relatively “ordinary stressful circumstances” can be generalized to the extraordinary multisystemic threat of the COVID-19 pandemic, with such extensive and globally pervasive consequences.

During adolescence, family as well as friends are important socializing agents and sources of support which may help to cope with problems in times of stress (Thoits, 1995). Ecological models, such as the bioecological model (Bronfenbrenner & Ceci, 1994) indeed conceptualize developments in adolescents' behavior as the outcomes of continuous interactions between individual characteristics and socio-contextual factors. Within these models, the most important proximal systems surrounding the adolescent are the family and peer system. So, examining the family and peer system when studying adolescent functioning during the COVID-19 pandemic is essential. Regarding the family system, most previous studies either focus on the family as a whole or on the specific relationship between a parent and an adolescent child. There are indications, however, that the quality of relationships between specific family members affect adolescent problem behavior in different ways. For example, Buist et al. (2011) found that different family subsystems (i.e., mother–child, father–child, and sibling relationship) all have distinct effects on adolescent problem behavior. Therefore, it seems crucial to include not only relationships with peers, mothers, and fathers, but also sibling relationships when studying problem behavior during the COVID-19 pandemic.

Several empirical studies have indeed found buffering effects during the COVID-19 pandemic. The quality of the parent–child relationship *before* the start of the pandemic was predictive of how well adolescents coped during the first lockdown, showing that relationship quality buffered against the increase in loneliness (Janssens et al., 2021). In addition, more positivity, and less negativity in parent–adolescent relationships—especially in the relationship with mothers—*during* the pandemic was linked to fewer depressive symptoms (Campion-Barr et al., 2021). Likewise, regarding peer relationships, adolescents who perceived more support from their friends before the COVID-19 pandemic reported significantly lower levels of internalizing problems (Bernasco et al., 2021). Additionally, positivity and negativity in the sibling relationship assessed at the start of the pandemic were linked to anxiety symptoms 6 months into the pandemic, but these links were dependent on the level of COVID-19-related stress the adolescents experienced (Campion-Barr et al., 2021). However, even though these studies suggest that relevant others in the lives of adolescents may help to show resilience during lockdowns and to recover more rapidly, an integrated examination with fine-grained measures of adolescent adjustment before the onset, and during lockdowns and reopening phase is still missing.

Our study adds to existing knowledge about adolescent adjustment during the COVID-19 pandemic by examining the dynamic processes of normative as well as

COVID-19-related adjustment, including individual differences in these processes. The unique intensive longitudinal design of our study allowed us to examine short-term as well as long-term adolescent adjustment during different phases of the COVID-19 pandemic. This study also adds to existing knowledge by including two relatively understudied social partners: fathers and siblings. More profound insights into these adjustment processes and the impact of social support can inform potential intervention efforts to ameliorate the situation of adolescents negatively affected by the COVID-19 pandemic.

THIS STUDY

This study's first aim was to examine mean-level change of depressive and anxiety symptoms during the different phases of the COVID-19 pandemic in the Netherlands, as well as the heterogeneity between adolescents therein. We used longitudinal data, spanning one full year with biweekly assessments, to describe and test the changes in adolescent depressive and anxiety symptoms. The assessments include nine measurements before the pandemic (prelockdown phase) and 16 measurements during different phases of the pandemic during which schools were closed and other social distancing restrictions were in place (eight measurements; lockdown phase) or partially lifted (eight measurements; reopening phase). See Figure 1 for an overview of data collection and government restrictions.

We preregistered (<https://osf.io/2zkat>) the following hypotheses (see also Table 1 for an overview): Generally, we expected an increased level of depressive symptoms (H1a1) and anxiety symptoms (H1a2) during the pandemic phase compared to the overall level and a decreased level of depressive

symptoms (H1b1) and anxiety symptoms (H1b2) during the reopening phase compared to the overall and pandemic level. Moreover, based on earlier work, we expected that there would be individual differences between adolescents in their change patterns (between-person heterogeneity) in depressive symptoms (H1c1) and anxiety symptoms (H1c2).

Our second aim was to examine whether perceived support from and conflict with mothers, fathers, siblings, and best friends shortly before the COVID-19 pandemic would explain heterogeneity in these longitudinal change patterns. Concerning support, we expected that adolescents who perceived more support from (a) mothers, (b) fathers, (c) siblings, and/or (d) best friends would report less pronounced increases in mean levels of depressive symptoms (H2a1) and anxiety symptoms (H2a2) during the pandemic phase compared to adolescents who perceived less support. We also explored, without a priori hypotheses, whether changes in adolescent depressive symptoms (H2b1) and anxiety symptoms (H2b2) during the reopening phase were correlated with support from (a) mothers, (b) fathers, (c) siblings, and/or (d) best friends.

Concerning conflict, our hypotheses were that adolescents who would perceive more conflict with (a) mothers, (b) fathers, (c) siblings, and/or (d) best friends would report more pronounced increases in mean levels of depressive symptoms (H2c1) and anxiety symptoms (H2c2) during the pandemic phase than adolescents who perceived less conflict. Additionally, we explored, without a priori hypotheses, whether changes of adolescent depressive symptoms (H2d1) and anxiety symptoms (H2d2) during the reopening phase were correlated with conflict with (a) mothers, (b) fathers, (c) siblings, and/or (d) best friends. We also explored, without a priori hypotheses, whether support from and conflict with mothers, fathers, siblings, and best friends would differ in

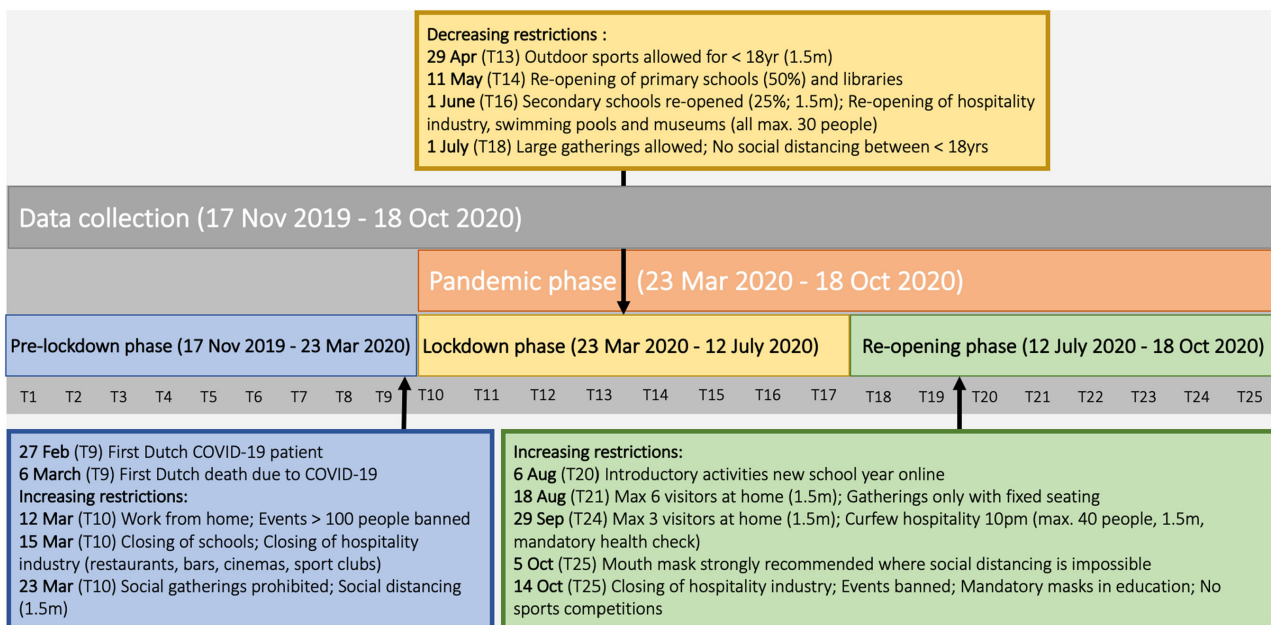


FIGURE 1 Timeline of data collection and COVID-19-related government restrictions in the Netherlands.

TABLE 1 Overview preregistered hypotheses.

Predictors	Depressive symptoms	Anxiety symptoms
	H1a1 L2 positive; S2 <i>exploratory</i>	H1a2 L2 positive; S2 <i>exploratory</i>
	H1b1 L3 negative; S3 <i>exploratory</i>	H1b2 L3 negative; S3 <i>exploratory</i>
	H1c1 Significant variance L2, S2 Significant variance L3, S3	H1c2 Significant variance L2, S2 Significant variance L3, S3
Maternal support Time 1	H2a1a L2 negative; S2 <i>exploratory</i>	H2a2a L2 negative; S2 <i>exploratory</i>
Paternal support Time 1	H2a1b L2 negative; S2 <i>exploratory</i>	H2a2b L2 negative; S2 <i>exploratory</i>
Sibling support Time 1	H2a1c L2 negative; S2 <i>exploratory</i>	H2a2c L2 negative; S2 <i>exploratory</i>
Best friend support Time 1	H2a1d L2 negative; S2 <i>exploratory</i>	H2a2d L2 negative; S2 <i>exploratory</i>
Maternal support Time 1	H2b1a L3 <i>exploratory</i> ; S3 <i>exploratory</i>	H2b2a L3 <i>exploratory</i> ; S3 <i>exploratory</i>
Paternal support Time 1	H2b1b L3 <i>exploratory</i> ; S3 <i>exploratory</i>	H2b2b L3 <i>exploratory</i> ; S3 <i>exploratory</i>
Sibling support Time 1	H2b1c L3 <i>exploratory</i> ; S3 <i>exploratory</i>	H2b2c L3 <i>exploratory</i> ; S3 <i>exploratory</i>
Best friend support Time 1	H2b1d L3 <i>exploratory</i> ; S3 <i>exploratory</i>	H2b2d L3 <i>exploratory</i> ; S3 <i>exploratory</i>
Maternal conflict Time 1	H2c1a L2 positive; S2 <i>exploratory</i>	H2c2a L2 positive; S2 <i>exploratory</i>
Paternal conflict Time 1	H2c1b L2 positive; S2 <i>exploratory</i>	H2c2b L2 positive; S2 <i>exploratory</i>
Sibling conflict Time 1	H2c1c L2 positive; S2 <i>exploratory</i>	H2c2c L2 positive; S2 <i>exploratory</i>
Best friend conflict Time 1	H2c1d L2 positive; S2 <i>exploratory</i>	H2c2d L2 positive; S2 <i>exploratory</i>
Maternal conflict Time 1	H2d1a L3 <i>exploratory</i> ; S3 <i>exploratory</i>	H2d2a L3 <i>exploratory</i> ; S3 <i>exploratory</i>
Paternal conflict Time 1	H2d1b L3 <i>exploratory</i> ; S3 <i>exploratory</i>	H2d2b L3 <i>exploratory</i> ; S3 <i>exploratory</i>
Sibling conflict Time 1	H2d1c L3 <i>exploratory</i> ; S3 <i>exploratory</i>	H2d2c L3 <i>exploratory</i> ; S3 <i>exploratory</i>
Best friend conflict Time 1	H2d1d L3 <i>exploratory</i> ; S3 <i>exploratory</i>	H2d2d L3 <i>exploratory</i> ; S3 <i>exploratory</i>

Note: L2 = Immediate change pandemic phase, S2 = Gradual change pandemic phase, L3 = Immediate change reopening phase, and S3 = Gradual change reopening phase.

the degree to which they predict heterogeneity in longitudinal change patterns in depressive and anxiety symptoms.

METHOD

Participants

Data were used from the “One size does not fit all” study, with biweekly measurements across 1 year (Dutch: *Elk gezin is anders*). Data collection started in November 2019 and ended in November 2020. Participants of the study were 195 adolescents. However, three participants had missing data

on all study variables; therefore, the analytic sample consisted of 192 adolescents.

The adolescents were on average 14.3 years old ($SD = 1.63$, range = 12–17 years), 132 of them were female (68.8%), and most of them were born in the Netherlands (96.9%). Seventeen percent followed prevocational secondary education, 1% a vocational/technical training, 27% higher general secondary education, 52% preuniversity secondary education, and 5% followed mixed tracks. Their parents were also mostly born in the Netherlands (96.4%) and were married/living together (75%), separated/divorced (22%), and in a few families one parent was deceased (3%). One hundred and thirty-seven adolescents (71%) indicated that their mother

was their primary caregiver (i.e., with whom they spent most time) and their father their secondary caregiver, and for 19% of the adolescents, their father was the primary caregiver and their mother the secondary caregiver. For a few adolescents, their mother and stepfather (6%), stepmother and father (0.5%), father and stepfather (0.5%), or their mother and duo mother were the primary and secondary caregivers (0.5%), or they were raised only by their mother (2%).

Moreover, 90.6% of the adolescents ($n=174$) had at least one sibling, with most of them having one ($n=88$) or two siblings ($n=72$). When the adolescent had multiple siblings ($n=86$), they reported on the sibling that was closest to them in age. The sibling was on average 14.7 years old ($SD=4.65$, range = 4–50 years). For 93 adolescents (53%), the sibling was older, with an average age difference of 3.3 years. For adolescents with a younger sibling, the average age difference was -2.9 years.

Compared with characteristics of youth in the Netherlands (Statistics Netherlands, 2022), our sample is representative concerning country of birth, education level, and marital status. However, our sample has a higher percentage of females (68,8% vs. 48,9% nationwide) and of adolescents with siblings (90,6% vs. 57,2% nationwide).

Procedure

From September to November 2019, adolescents and parents were recruited at a Dutch high school (± 2000 students). The school was located at a medium-sized Dutch city (population ca. 100,000) and included all secondary educational levels. Adolescents and parents were informed about the longitudinal study by school newsletters, parents' evenings, class visits, and through a school screening questionnaire that we conducted for the school board. Adolescents were eligible to participate if they were between 12 and 17 years at the start of the study. There were no additional inclusion or exclusion criteria. Adolescents provided active informed consent for their participation through an online form, and parents provided active consent for the participation of their children under the age of 16.

The data collection entailed completing a biweekly online questionnaire during a full year ($t=26$), which took 5–10 min to complete. However, the first "baseline" questionnaire (30–60 min) and four three-monthly questionnaires (10–20 min) included additional measures. The online questionnaire was sent every Sunday at 10:00 a.m. through e-mail and a text message, and reminders were sent next Tuesday and Thursday at 10:00 a.m. The questionnaire closed on Friday at 10:00 a.m. Adolescents received €5 for completing the first "baseline" questionnaire, €2 for each three-monthly questionnaire, and €1 for each short biweekly questionnaire they completed. Additionally, on every measurement occasion, adolescents could win one of six €10 prizes that were raffled among participants who completed the questionnaire. The study was approved by the ethical committee of Tilburg University (Record no.: EC-2019.65t).

On average, adolescents completed 18.6 of the 26 biweekly measures (72%; $SD=8.1$, range = 1–26). The majority of the adolescents (59%, $n=113$) completed at least 20 of the 26 biweekly questionnaires and 31% of the sample ($n=59$) completed all 26 questionnaires. The biweekly data were completely missing at random (MCAR), as indicated by Little's MCAR test ($\chi^2(19)=6.04$, $p=.998$).

The measurement times can be divided into three distinct phases (see Figure 1 for an overview, including government restrictions): (1) the prelockdown phase before the onset of the pandemic (T1–T9; November 2019 through the beginning of March 2020); (2) lockdown phase (T10–T17; end of March through June 2020); and (3) reopening phase (T18–T25; July through October 2020). The lockdown phase and reopening phase together reflect the pandemic phase. We chose July 1st as a cutoff point for Phase 3 because from this specific date measures that strongly affected adolescents were lifted (see also Figure 1). We removed the final measurement time (T26) because at that time, a new lockdown went into effect which would have changed the interpretation of the reopening phase results. See also our preregistration for an overview of measurement dates.

MEASURES

Relationship quality

At the baseline measurement (T1) before the pandemic, adolescents reported on support and conflict in the relationship with their (step)mother, (step)father, sibling, and best friend. Support was measured with four items (e.g., "During the last two weeks, did your mother/father/sibling/best friend appreciate the things you do?"), and Conflict with three items (e.g., "During the last two weeks, did you and your mother/father/sibling/best friend annoy and get mad at each other?"). Items originated from the Network of Relationships Inventory (NRI; Furman & Buhrmester, 1985) and the Dutch translation was validated in prior research (Dietvorst et al., 2021). The items were answered on a 5-point Likert scale, ranging from 1 (*not at all*) to 5 (*very much*) for Support and from 1 (*never*) to 5 (*very often*) for Conflict. Cronbach's alpha at baseline ranged between .79 and .84 for Support and between .76 and .87 for Conflict.

Depressive symptoms

Adolescents reported on their depressive symptoms by using 10 items from the Reynolds Adolescent Depression Scale Short Form (RADs-SF; Reynolds, 2008), which we translated to Dutch. A sample item is "During the last two weeks, I felt lonely." The adolescents responded on a 4-point Likert scale, ranging from 1 (*almost never*) to 4 (*most of the times*). The RADs-SF has good psychometric properties (Ortuño-Sierra et al., 2017; Szabo et al., 2014). In our sample, Cronbach's alpha ranged from .80 to .89 across the

25 measurements. Multilevel confirmatory factor analyses were used to calculate within- and between-person reliability estimates (Geldhof et al., 2014). The results for depressive symptoms showed satisfactory within-level reliability ($\omega = .73$, $p < .001$) and between-level reliability ($\omega = .87$, $p < .001$).

Anxiety symptoms

General anxiety symptoms were reported by the adolescent using a subscale of the Screen For Child Anxiety Related Emotional Disorders (SCARED; Birmaher et al., 1997). The general anxiety subscale comprised nine items (e.g., “In the last two weeks, I worried about the future”). A psychometric study has confirmed that the SCARED is a valid instrument for measuring anxiety symptoms in Dutch adolescents (Wijsbroek et al., 2005). The response scale ranged from 1 (*never*) to 3 (*often*). Cronbach’s alpha ranged from .89 to .94 across the 25 measurements. Within-level reliability ($\omega = .71$, $p < .001$) and between-level reliability ($\omega = 0.87$, $p < .001$) were satisfactory.

Preregistered analytic plan

We followed a preregistered analytic plan to test our hypotheses. Hypotheses were tested using latent piecewise growth models with additional growth factors (Flora, 2008) in *MPlus* (Muthén & Muthén, 1998-2017, version 8.6). Additive piece-wise growth models are specifically suited for disentangling ongoing processes of (normative) change from change that occurs after a meaningful point in time, such as the start of the lockdown and the partial societal reopening (e.g., Bülow et al., 2021).

So, our models estimated the normative development throughout the whole study period as well as COVID-19-specific changes during the pandemic phase, *above and beyond these overall levels and changes*. Additionally, our models also estimated the changes during the reopening phase, *above and beyond the overall as well as pandemic levels and changes*. All growth parameters were allowed to covary. Finally, by allowing each trajectory of estimated growth to vary across individuals, our models were also suitable to examine heterogeneity or individual differences concerning changes during the pandemic and reopening phase. To address potential skewness of the study variables, we used MLR estimation (maximum likelihood for robust standard errors). Full information maximum likelihood (FIML) was used to deal with missing data. See our <https://osf.io/2zkat> for the analytic plan and *Mplus* syntax.

For Study Aim 1, we specified separate models for each of the two dependent variables (depressive and anxiety symptoms). Overtime changes in adolescent adjustment were examined by modeling three distinct but overlapping linear processes (see Figure 2). A first intercept (L1) and slope (S1) were included to model the level and linear change over the whole study period (overall level and trend). The first intercept can be interpreted as overall level of adolescent adjustment in the entire study period, and the first slope can be interpreted as normative (ongoing) changes in adjustment throughout the entire study period.

The second intercept (L2) and slope (S2) capture changes in the level and linear slope during the pandemic phase, above and beyond overall levels and trends. The second intercept represents the mean level change before versus after the announcement of the lockdown (providing a test of H1a). The second slope captures gradual changes

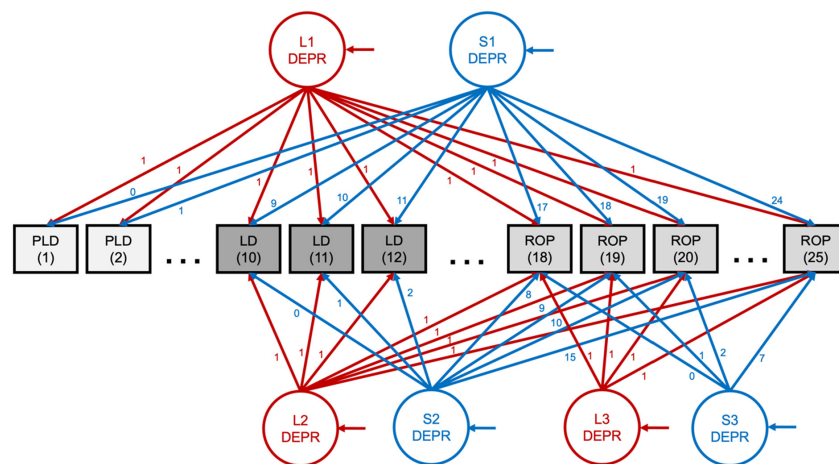


FIGURE 2 Model specification of 25-wave biweekly data of depressive symptoms. Intercorrelations between latent factors and correlations with support and conflict with mothers, fathers, siblings, and best friends are not displayed in this visualization. L1 = Overall level, S1 = Overall change, L2 = Immediate change pandemic phase, S2 = Gradual change pandemic phase, L3 = Immediate change reopening phase, and S3 = Gradual change reopening phase. LD, Lockdown phase; PLD, Prelockdown phase; ROP, Reopening phase.

during the pandemic phase, above and beyond normative changes. The third intercept (L3) and slope (S3) capture changes in the level and linear slope during the reopening phase, above and beyond overall and pandemic levels and trends. The third intercept represents the mean level change before versus after the partial reopening of society (providing a test of H1b). The third slope captures gradual changes during the reopening phase, above and beyond normative changes and changes in adolescent adjustment during the pandemic phase. We also tested heterogeneity concerning changes during the lockdown and reopening phase by adding a variance term to the growth factors, thus allowing each trajectory of estimated growth to vary across individuals (providing a test of H1c).

Next, to examine Study Aim 2, we estimated associations between baseline scores of maternal, paternal, sibling, and best friend support and conflict and level and slope of, respectively, depressive symptoms and anxiety symptoms during the pandemic phase (L2, S2) and reopening phase (L3, S3). We did this in separate models for depressive and anxiety symptoms, and for maternal, paternal, sibling, and best friend support and conflict ($2 \times 4 \times 2 = 16$ separate models). These models provided tests for hypotheses H2a through H2d. We also explored links between baseline scores of maternal, paternal, sibling, and best friend support and conflict and overall level and slope of respectively depressive and anxiety symptoms during the entire study period (L1, S1).

Finally, we also explored, without a priori hypotheses, whether support from and conflict with mothers, fathers, siblings, and best friends would differ in the degree to which they predict heterogeneity in longitudinal change patterns in depressive and anxiety symptoms. We compared an unconstrained model in which the associations between all relationship measures at baseline and the growth parameters were estimated freely to a fully constrained model in which the associations between all relationship measures and baseline and growth parameters were constrained to be equal. We then tested whether the fully constrained model provided a significantly worse fit than the basic unconstrained model, as indicated by Satorra–Bentler scaled chi-square difference test.

We evaluated model fit in *Mplus* following preregistered criteria (two out of three criteria would hold: RMSEA < .08; CFI > .90, TLI > .90). For depressive symptoms as well as anxiety symptoms, the models fit the data sufficiently.

Deviation from preregistration

We had also preregistered hypotheses concerning aggression, but model fit for aggression was insufficient (RMSEA = 0.17, CFI = 0.34 and TLI = 0.34). We followed the steps outlined in our preregistration, for example, removing nonsignificant correlations or variances. However, these steps did not improve model fit, so we proceeded to devise tailor-made solutions (reported in Appendix S4).

None of the approaches resulted in an adequately fitting model. We therefore concluded that the aggression scale used was not appropriate to measure aggression in this study, which also means that we could not test any of the hypotheses for aggression.

RESULTS

Descriptive statistics

Table 2 and Table 3 show the descriptive statistics of respectively the outcome variables across the three study phases and the descriptive statistics for family and best friend support and conflict at baseline measurement (T1). Correlations for T1 variables can be found in Table 3.

TABLE 2 Descriptive statistics: Biweekly scores depressive and anxiety symptoms.

	Depressive symptoms		Anxiety symptoms	
	M	SD	M	SD
Phase 1: Prelockdown				
Time 1	1.78	0.57	1.67	0.50
Time 2	1.69	0.56	1.66	0.52
Time 3	1.66	0.57	1.65	0.51
Time 4	1.55	0.47	1.56	0.48
Time 5	1.62	0.56	1.58	0.53
Time 6	1.56	0.52	1.57	0.52
Time 7	1.58	0.54	1.59	0.51
Time 8	1.56	0.54	1.58	0.52
Time 9	1.54	0.51	1.59	0.52
Pandemic phase				
Phase 2: Lockdown				
Time 10	1.62	0.54	1.54	0.48
Time 11	1.71	0.55	1.50	0.50
Time 12	1.69	0.56	1.55	0.51
Time 13	1.66	0.54	1.51	0.49
Time 14	1.61	0.45	1.52	0.51
Time 15	1.66	0.55	1.53	0.52
Time 16	1.64	0.53	1.54	0.49
Time 17	1.61	0.50	1.51	0.53
Phase 3: Reopening				
Time 18	1.55	0.47	1.47	0.50
Time 19	1.55	0.52	1.42	0.46
Time 20	1.48	0.43	1.42	0.46
Time 21	1.49	0.50	1.43	0.49
Time 22	1.48	0.48	1.50	0.50
Time 23	1.53	0.48	1.50	0.50
Time 24	1.55	0.53	1.54	0.51
Time 25	1.49	0.48	1.56	0.54

TABLE 3 Descriptive statistics and correlations study variables at Time 1.

	1	2	3	4	5	6	7	8	9	10
1. Support mother	–									
2. Support father	.66***	–								
3. Support sibling	.42***	.41***	–							
4. Support best friend	.18**	.20**	.32***	–						
5. Conflict mother	–.55***	–.40***	–.28***	.01	–					
6. Conflict father	–.28***	–.46***	–.23***	–.13	.46***	–				
7. Conflict sibling	–.16*	–.15	–.46***	.01	.36***	.30***	–			
8. Conflict best friend	–.03	–.09	–.10	–.41***	.15*	.36***	.08	–		
9. Depressive symptoms	–.39***	–.34***	–.32***	–.23***	.43***	.38***	.34***	.28***	–	
10. Anxiety symptoms	–.27***	–.27***	–.18*	–.14	.41***	.37***	.31***	.21***	.75***	–
<i>M</i>	4.60	4.49	4.14	4.34	1.93	1.83	2.69	1.46	1.78	1.67
<i>SD</i>	0.48	0.59	0.67	0.59	0.75	0.78	0.85	0.55	0.57	0.50
<i>n</i>	190	186	174	190	190	186	174	190	191	191

Note: *n* = sample size adolescents with complete data on respective variables.

p* < .05. *p* < .01. ****p* < .001.

TABLE 4 Results of the piece-wise growth models for depressive and anxiety symptoms.

	Overall		Pandemic		Reopening	
	Level (L1)	Change (S1)	Level (L2)	Change (S2)	Level (L3)	Change (S3)
Depressive symptoms						
Mean	1.72***	–0.02***	0.20***	0.01	–0.08***	0.01
Variance	0.26***	0.00***	0.02	0.00***	0.02	0.00***
Anxiety symptoms						
Mean	1.65***	–0.01**	–0.02	0.01	–0.10***	0.02***
Variance	0.22***	0.00***	0.02*	0.00**	0.02*	0.00**

Note: L1 = Overall level, S1 = Overall change, L2 = Immediate change pandemic phase, S2 = Gradual change pandemic phase, L3 = Immediate change reopening phase, and S3 = Gradual change reopening phase. Fit indices models: Depressive symptoms ($\chi^2(298) = 583.351, p = .000$), RMSEA (root mean square error of approximation) = 0.071, CFI (comparative fit index) = 0.905, TLI (Tucker-Lewis index) = 0.904, SRMR (standardized root mean squared residual) = 0.053; Anxiety symptoms: $\chi^2(298) = 586.772, p = .000$, RMSEA = 0.071, CFI = 0.925, TLI = 0.925, SRMR = 0.045.

p* < .05, *p* < .01, ****p* < .001.

Aim 1: Changes during lockdown and reopening phase

Changes in depressive symptoms

The piece-wise growth model for depressive symptoms showed a significant medium-sized mean-level increase in depressive symptoms during the pandemic phase compared to the overall level during the entire 1-year study period (L2 mean $d = .35$; confirming H1a1, see Table 4). This means that adolescents showed immediate increases in depressive symptoms during the pandemic phase compared to the overall level. Additionally, we found a small mean-level decrease in depressive symptoms during the reopening phase

compared to overall and pandemic trends (L3 mean $d = -.14$; confirming H1b1). We also explored gradual changes during the entire study (S1) as well as during the pandemic or reopening phase (S2, S3). Only slope S1 was significant, indicating that depressive symptoms gradually decreased during the entire study period (i.e., from prepandemic to reopening phases) and did not show additional gradual changes during the specific pandemic or reopening phases.

Thus, adolescents showed *mean-level changes* in depressive symptoms during the pandemic phase (compared to the overall level) and during the reopening phase (compared to the overall and pandemic levels), but did not show *gradual changes* in depressive symptoms during the pandemic nor during the reopening phases on top of the decreasing

trend during the entire study period. Correlations between growth parameters of depressive symptoms can be found in Appendix S1 (Table A1).

Our hypothesis regarding individual differences (H1c1; according to which all variances for L2, S2, L3, and S3 should have been significant) was only partially confirmed: Although individual differences in mean-level change of depressive symptoms during the pandemic phase (L2 variance) and reopening phase (L3 variance) were not significant, we did find significant individual differences in gradual change during both phases (S2 variance and S3 variance). Individual trajectories of depressive symptoms can be found in Figure 3 (panel a).

Changes in anxiety symptoms

For anxiety symptoms, contrary to our hypothesis (H1a2), we found no immediate mean-level increases (L2) nor gradual increases (S2) in anxiety symptoms during the pandemic phase (see Table 4). We did find that anxiety symptoms gradually decreased during the entire study period (i.e., from pre-pandemic to reopening phase; S1). So, adolescents did not show immediate or gradual increases in anxiety symptoms during the specific pandemic phase compared to the overall level and trend.

However, we did find a significant small mean-level decrease in anxiety symptoms immediately after reopening

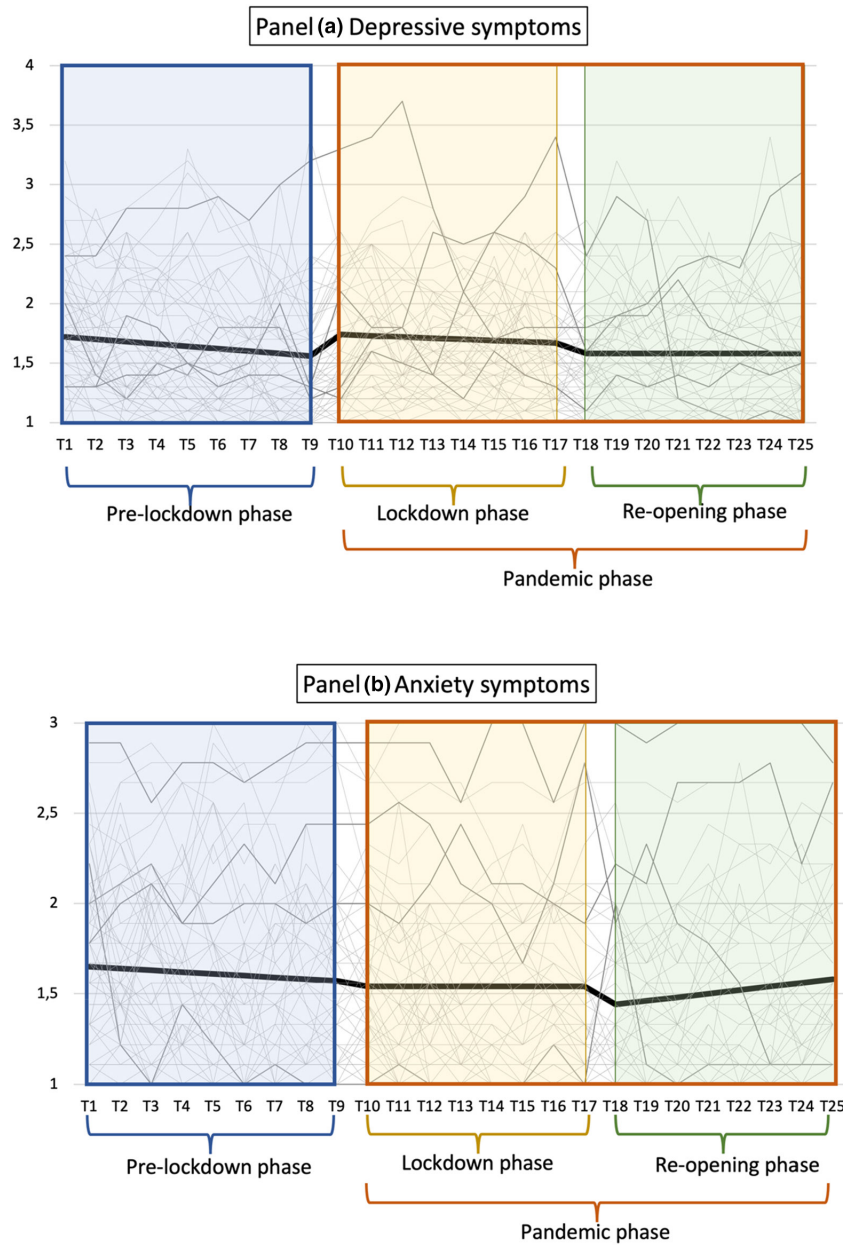


FIGURE 3 Individual trajectories of depressive and anxiety symptoms over time. Trajectory in bold is the overall trajectory across the whole sample. Gray lines depict trajectories of participants.

(L3 mean $d = -.20$; confirming H1b2). Exploratively, we also found a gradual increase throughout the reopening phase (S3 mean). In other words, controlling for the overall and the pandemic levels and trends, adolescents showed an immediate decrease in anxiety symptoms at reopening, followed by gradual increases throughout the reopening phase. Correlations between growth parameters of anxiety symptoms can be found in Appendix S1 (Table A2).

Regarding individual differences in these trajectories, H1c2 was confirmed for all four growth parameters: We found significant individual differences in mean-level change (L2 variance) and in gradual change in anxiety symptoms during the pandemic phase (S2 variance). Additionally, there were significant individual differences in mean-level change during reopening (L3 variance) and in gradual change during reopening (S3 variance). Individual trajectories of anxiety symptoms can be found in Figure 3 (panel b).

Aim 2: Relationship quality as predictor of heterogeneity in longitudinal change

After estimating the longitudinal change models, we examined whether support from and conflict with family members and best friends at baseline predicted individual differences (heterogeneity) in these longitudinal change patterns. Tables 5 and 6 show the standardized coefficients, with $r = .10$ reflecting small effect sizes, $r = .30$ indicating medium effect sizes, and $r > .50$ reflecting large effect sizes (Cohen, 1988). We found that higher baseline levels of family and best friend support and lower baseline levels of family and best friend conflict were associated with lower mean levels of depressive and anxiety symptoms across the entire study period (L1). Moreover, higher baseline levels of family and best friend conflict were also negatively correlated to the overall gradual decrease in adolescent depressive symptoms

(S1). Family and best friend support was not significantly linked to overall gradual changes in depressive symptoms nor anxiety symptoms. In other words, adolescents who reported higher levels of conflict with family and best friend at the start of the study showed steeper decreases in their depressive symptoms during the entire study period than adolescents who reported lower starting levels of family and best friend conflict.

Contrary to our expectations, we found few significant associations between support (H2a1, H2a2) nor conflict (H2c1, H2c2) from the social partners with the mean-level changes in depressive or anxiety symptoms during the pandemic phase (L2) or the reopening phase (L3). Only higher baseline levels of sibling support were linked to stronger mean level decreases in anxiety symptoms during both the pandemic phase (L2) and reopening phase (L3). See Appendix S2 (Figure B2) for a visualization of these results. Thus, hypotheses H2a and H2c were rejected.

We also explored links between maternal, paternal, sibling, and best friend support and conflict on the one hand and gradual changes in depressive and anxiety symptoms during the pandemic (S2) and reopening phase (S3) on the other hand. Higher baseline levels of best friend conflict were significantly linked to weaker gradual decreases in depressive symptoms during the pandemic phase (S2). The results for anxiety symptoms showed that higher baseline levels of conflict with parents were linked to weaker gradual decreases in anxiety symptoms during the pandemic phase (S2). See Appendix S2 (Figures B1, B3, and B4) for a visualization of these results.

Finally, we also tested, without a priori hypotheses, whether support from and conflict with mothers, fathers, siblings, and best friends would differ in the degree to which they predict heterogeneity in longitudinal change patterns in depressive and anxiety symptoms. Generally, there was very limited evidence for differences between

TABLE 5 Standardized coefficients of support and conflict as predictors of heterogeneity in adolescent depressive symptoms.

	Overall		Pandemic		Reopening	
	Level (L1)	Change (S1)	Level (L2)	Change (S2)	Level (L3)	Change (S3)
Support						
Mother	-0.51***	0.24	0.14	-0.23	0.23	0.11
Father	-0.45***	0.20	0.22	-0.19	0.09	0.10
Sibling	-0.39***	0.21	-0.10	-0.22	0.23	0.13
Best friend	-0.23**	0.21	-0.04	-0.13	0.15	-0.06
Conflict						
Mother	0.48***	-0.25*	0.23	0.05	0.11	0.07
Father	0.44***	-0.45***	0.29	0.20	-0.10	0.01
Sibling	0.33***	-0.25*	0.27	0.16	0.09	-0.19
Best friend	0.29***	-0.27*	0.05	0.28*	-0.56*	-0.13

Note: L1 = Overall level, S1 = Overall change, L2 = Immediate change pandemic phase, S2 = Gradual change pandemic phase, L3 = Immediate change reopening phase, and S3 = Gradual change reopening phase. Fit indices of models were all sufficient (RMSEA (root mean square error of approximation) $< .08$; CFI (comparative fit index) $> .90$, TLI (Tucker-Lewis index) $> .90$; SRMR (standardized root mean squared residual) $< .08$) except for support and conflict father and sibling (range CFI and TLI = .88-.90).

* $p < .05$, ** $p < .01$, and *** $p < .001$.

TABLE 6 Standardized coefficients of support and conflict as predictors of heterogeneity in adolescent anxiety symptoms.

	Overall		Pandemic		Reopening	
	Level (L1)	Change (S1)	Level (L2)	Change (S2)	Level (L3)	Change (S3)
Support						
Mother	-0.30***	0.08	0.22	-0.27	0.06	0.20
Father	-0.32***	0.06	0.27	-0.17	0.01	0.22
Sibling	-0.16	-0.03	0.25*	-0.23	0.37*	0.08
Best friend	-0.18	0.15	0.06	-0.16	0.12	-0.21
Conflict						
Mother	0.43***	-0.18	-0.15	0.34*	-0.09	-0.07
Father	0.40***	-0.25*	-0.10	0.32*	-0.04	-0.07
Sibling	0.27**	-0.15	0.04	0.18	-0.13	-0.12
Best friend	0.28***	-0.20	0.01	0.32	-0.34	0.13

Note: L1 = Overall level, S1 = Overall change, L2 = Immediate change pandemic phase, S2 = Gradual change pandemic phase, L3 = Immediate change reopening phase, and S3 = Gradual change reopening phase. Fit indices of models were all sufficient (RMSEA (root mean square error of approximation) <.08; CFI (comparative fit index) >.90, TLI (Tucker-Lewis index) >.90; SRMR (standardized root mean squared residual) <.08).

p* < .05, *p* < .01, and ****p* < .001.

the impact of mothers, fathers, siblings, and best friends on longitudinal change patterns in depressive and anxiety symptoms during the COVID-19 pandemic. Details of these model comparisons and estimates can be found in Appendix S3 (Tables C1–C4).

Sensitivity analyses

Age as covariate

To examine whether adolescent age affected the results found, we performed sensitivity analyses. We included age as a covariate in the additive piece-wise growth models for depressive and anxiety symptoms. The results of these analyses can be found in Appendix S5 (Table E1).

Age was only significantly correlated with overall levels of depressive and anxiety symptoms (L1), and not to any of the other growth parameters. Additionally, the estimates for the growth parameters were almost identical to the model without age as covariate. We therefore concluded that COVID-19-related change was similar among the age range in our sample.

DISCUSSION

Nowadays, depressive and anxiety symptoms are the most common mental health problems among adolescents, which calls for action to prevent these problems from emerging or escalating (UNICEF, 2021). For depressive symptoms, the COVID-19 pandemic added another risk factor to developing youth. Following adolescents for a year, from the period before the pandemic, throughout the first lockdown and reopening, our study provides detailed insights into how adolescents' emotional well-being may wax and wane along with

social restrictions. For depressive symptoms, we found an immediate increase in the pandemic phase, and an immediate decrease in the reopening phase. Anxiety symptoms did not significantly change in the pandemic phase, but we did find an immediate decrease in anxiety symptoms in the reopening phase, followed by a gradual increase. We also found significant differences between adolescents in these changes. Although more prepandemic family and best friend support and less conflict were associated with lower overall levels of depressive and anxiety symptoms, little support was found for the expected buffering effects during the pandemic.

Changes in internalizing problems during the COVID-19 pandemic

Research has shown increasing levels of adolescent internalizing problems during the COVID-19 pandemic (for a meta-analytic overview, see Racine et al., 2021). Our study confirmed this pattern for depressive symptoms, but not for anxiety symptoms. Consistent with evidence from earlier work (Breux et al., 2021), these increases in depressive symptoms at the start of the pandemic were followed by decreases when society was reopening. The pattern for anxiety symptoms was different: There was no increase in anxiety symptoms at the start of the pandemic. In the reopening phase, anxiety symptoms first decreased, and later slowly increased again.

These specific patterns may reflect different ways in which adolescents were coping with this new and uncertain situation. At the start of the pandemic, during the first lockdown, adolescents were seemingly not overly anxious about the impact of the COVID-19 virus on their lives. They did, however, immediately feel the effect of the government restrictions: Many activities they enjoyed were no longer possible, resulting in more depressed feelings. The

reopening, which largely coincided with the summer holidays, meant that a number of the restrictions that affected their daily life were lifted (i.e., social distancing and cancellation of leisure activities). Adolescents regained some of their earlier freedom. For most adolescents, being able to meet peers and to participate in social activities again likely improved their mood, resulting in a decrease in depressed feelings. In addition to that, many adolescents probably felt relieved by the improved situation and the partial lifting of the restrictions, which resulted in a decrease in anxiety symptoms. However, throughout the autumn of 2020, it also became clear to everyone that the pandemic was far from over and that the threat of new infection waves (and lockdowns) was very real. This awareness and associated worry about the future is conceivably reflected in the gradual increase in anxiety symptoms during the reopening phase.

Family and best friend support and conflict

Our findings also revealed differences between adolescents in their adjustment trajectories. Our second study aim was to examine whether relationship quality with mothers, fathers, siblings, and best friends would explain heterogeneity in these longitudinal change patterns.

According to the *stress-buffering model* (Aba et al., 2019; Cohen, 2004; Cohen & Wills, 1985), high quality of family and best friend relationships (as evidenced by high levels of support and low levels of conflict) should have been linked to lower levels of depressive and anxiety symptoms *specifically in times of stress*, that is, during the pandemic phase. However, this pattern was confirmed only to a limited degree. Overall, we found evidence for the *main effects model*, which states that social support is beneficial regardless of stress (Aba et al., 2019; Cohen, 2004; Cohen & Wills, 1985). Our findings show that higher prepandemic levels of family and best friend support were associated with lower mean levels of depressive and anxiety symptoms across the *entire study period*. These findings are consistent with earlier work showing links between internalizing problems and high relationship quality with parents (Brouillard et al., 2018; Buist et al., 2011; Ehrlich et al., 2012; McLeod et al., 2007), with siblings (Buist et al., 2013; Kim et al., 2007; Yeh & Lempers, 2004), and with peers (Ehrlich et al., 2012; La Greca & Harrison, 2005).

Family and best friend conflict seemed to be especially detrimental for overall levels of internalizing problems: Adolescents with higher prepandemic levels of family and best friend conflict showed higher overall levels of depressive and anxiety symptoms, and also showed faster gradual decreases in depressive symptoms across the entire study period, perhaps because they had more depressive symptoms to begin with (i.e., ceiling effect). The more pronounced impact of conflict as compared to support is consistent with earlier work (e.g., Baumeister et al., 2001; Buist et al., 2013).

We hardly found any significant differences between social partners in their impact on adolescent depressive and anxiety symptoms. Earlier work has suggested that different family subsystems may have different associations with adolescent mental health (e.g., Buist et al., 2011). Whereas not all social partners impacted depressive and anxiety symptoms in the same way, comparison showed that they did not significantly differ from one another.

Concluding, we did not find that high quality relationships with mothers, fathers, siblings, and best friends (as reflected in high levels of support and low levels of conflict) buffered against the specific stressful circumstances of the pandemic and its associated restrictions. It is important to note that we assessed levels of family and best friend support and conflict *before* the start of the pandemic. The COVID-19 pandemic presented a unique multisystemic threat to not only the adolescents themselves, but also to their mothers, fathers, siblings, and friends, and society as a whole. Because mothers, fathers, siblings, and best friends were also under a lot of stress during the pandemic, they may not have been able to provide high quality support to the adolescents. If all parts of a system are in crisis, including the providers of social support, the buffering effects of social support may be less pronounced. Thus, the stress-buffering model could be more suitable for circumstances in which social support is relatively stable. This could also explain why the findings of our study did not confirm the stress-buffering model.

Strengths and limitations

Notwithstanding the strengths of this study, which include 25-wave assessments of adolescents over a full year in the midst of a pandemic, two relatively understudied social partners (fathers and siblings) and the preregistered approach of this study, the findings of this study should be interpreted in light of some limitations. First, we were unable to test our hypotheses concerning aggression due to the low scores and lack of variability on this measure. Our measure mainly tapped social aggression toward peers, which was unfortunate because during the lockdown, contact with peers was severely limited. An alternative explanation could be that the worrying health situation and associated governmental measures restricting adolescents' movement and social contacts to a large degree may have elicited mostly feelings of loneliness, sadness, and fear. So, it may also be expected that changes in depressive and anxiety symptoms would be more pronounced than changes in aggression.

Second, in our preregistration, we chose to include only data of prepandemic relationship data (T1) because this was the only measurement wave in which all four social relationships were measured. Therefore, we did not examine changes *during* the study period in quality of adolescents' relationships with mother, father, sibling, and best friend. It is possible that family and best friend support and conflict

during later phases of the pandemic could have different links to development of adolescent internalizing problems. Recent work has shown, for example, that the degree to which adolescents perceived changes in family relationship quality was linked to their level of internalizing symptoms (Martin-Storey et al., 2021). However, although there seems to be variability between families, several studies have demonstrated that overall, perceived parental support and conflict did not change significantly during the COVID-19 lockdown (Bülow et al., 2021; Janssen et al., 2020). Hence, experienced social support before the lockdown might be an adequate indicator of experienced support during the lockdown.

Third, the study sample consists of mostly well-functioning adolescents from relatively highly educated two-parent families, with high quality relationships with their family members and best friends. Additionally, almost all the adolescents and their parents were of Dutch descent and living in the Netherlands. Whereas the Dutch lockdown still affected adolescent daily life to a great extent (schools were closed, recreational possibilities were nonexistent, parents were working from home, etc.), in other countries, lockdowns were even stricter, with people hardly being allowed to leave their homes. The adolescents in our sample remained relatively well functioning. The impact of COVID-19 on this relatively privileged sample seemed to be limited. However, it is uncertain whether our findings can be generalized to less privileged adolescents in countries with much stricter lockdowns. Additionally, we did not assess to what extent adolescents were personally affected by the COVID-19 pandemic, for example, severe illness or death of close relatives or parental job loss. Such circumstances could also explain differences between adolescents in their internalizing problems during the first year of the pandemic. Studies with at-risk or culturally diverse populations, or across different countries would be insightful.

Fourth, we did not include gender in our models. Whereas some studies found gender differences in mental health during the COVID-19 pandemic (e.g., Magson et al., 2021), a recent meta-analysis comparing prepandemic and pandemic mental health did not confirm these gender differences (Robinson et al., 2022). Additionally, other studies have also found that gender did not moderate the link between parenting and child mental health during the pandemic (Whittle et al., 2020). We therefore chose not to include gender as a moderator or covariate in our models.

Finally, in this study, we focused on quality of the relationship of adolescents with their parents, siblings, and best friend. Other social partners may also have been important sources of support for the adolescents in our study (e.g., the peer group, grandparents, teachers, and sports coach). Additionally, whereas there are indications that social media use may affect both relationship quality and adolescent adjustment during the COVID-19 pandemic (Ellis et al., 2020; Pouwels et al., 2021), social media use was not included in our study. However, these aspects of social contact lay beyond the scope of this study.

CONCLUSION AND IMPLICATIONS

This study followed Dutch adolescents for a full year to examine the dynamic processes of normative as well as COVID-19-related adaptation and adjustment, including individual differences in these processes. Depressive symptoms increased in the pandemic phase and decreased in the reopening phase (as expected). However, anxiety symptoms did not show the expected patterns and remained (on average) relatively stable during the pandemic phase but did show a decrease after reopening. When looking beyond the average and assessing individual differences, we found that adolescents differed in their change over time in internalizing symptoms. Support from and conflict with parents, siblings, and best friends were consistently associated with overall levels of internalizing problems but not with changes in internalizing problems during the pandemic or reopening phase. Hence, adolescents who reported higher quality relationships showed better overall adjustment, but these relationships did not specifically buffer against potential maladjustment during the COVID-19 pandemic.

It is important to remember that our study was conducted during the first year of the COVID-19 pandemic, when it was still unclear how long the pandemic would last. The longevity of the COVID-19 pandemic stresses the importance of examining how adolescents fared after repeated lockdowns, with its associated disappointments and “pandemic fatigue.” Our findings stress that parents, practitioners, and policymakers should take into account that one size does not fit all, and each adolescent experiences the lockdown differently.

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DATA AVAILABILITY STATEMENT

The preregistered analytical plan is shared on the Open Science Framework (OSF; <https://osf.io/2zkat>). The data that support the findings of this study are available from the corresponding author upon request and will be made available on OSF.

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