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Research paper

Loneliness, social relationships, and mental health in adolescents during the COVID-19 pandemic

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ABSTRACT

Loneliness is a common experience in adolescence and is related to a range of mental health problems. Such feelings may have been increased by social distancing measures introduced during the COVID-19 pandemic. We aimed to investigate the effect of loneliness, social contact, and parent relationships on adolescent mental health during lockdown in the UK. Young people aged 11–16 years ($n = 894$) completed measures of loneliness, social contact, parent-adolescent relationships, and mental health difficulties during the first 11 weeks of lockdown and one-month later ($n = 443$). We examined cross-sectional associations and longitudinal relationships between loneliness, social contact, and parent relationships and subsequent mental health. Adolescents who reported higher loneliness had significantly higher symptoms of mental health difficulties during lockdown. We found that adolescents who had closer relationships with their parents reported significantly less severe symptoms of mental health difficulties and lower levels of loneliness. We also found that adolescents who spent more time texting others reported higher symptoms of mental health difficulties. Our hypothesis that loneliness would predict poorer mental health one month later was not supported. Time spent texting others at baseline was significantly associated with higher hyperactivity at follow-up, and closeness to parents was significantly associated with lower psychological distress at follow-up. We conclude that while loneliness was associated with greater mental health difficulties at baseline, it did not predict increased mental health difficulties one month later. Moreover, existing mental health problems significantly predicted later increased mental health difficulties, thereby highlighting the importance of continuing support for vulnerable people.

1. Introduction

Loneliness is a distressing feeling resulting from a discrepancy between actual and desired social connection (Perlman and Peplau, 1981). Many young people experience loneliness, with 11–20% of those aged 12–15 years reporting that they are lonely at least "sometimes" (Qualter et al., 2015). Chronic feelings of loneliness remain stable from adolescence onwards (Mund et al., 2020). Socioeconomic status is inversely associated with loneliness (Madsen et al., 2019), and adolescent males experience significantly higher levels of loneliness than females (Maes et al., 2019). Loneliness is associated with a range of adverse outcomes in adolescents including poor physical and mental health (Eccles et al., 2020; Loades et al., 2020).

Measures to contain the spread of the COVID-19 virus have resulted in school closures and have curtailed young people's social contacts outside of their immediate household. This has led to a steep reduction in social contact which is likely to have increased experiences of loneliness and may have increased psychological distress (Barari et al., 2020; Serafini et al., 2020; Liu et al., 2020; Ellis et al., 2020). Evidence from a range of countries has highlighted the association between increased loneliness and increased distress in the pandemic context. For example, approximately one third of Spanish and Italian parents of children aged

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3–18 (n = 1143) reported that their child was more lonely after quarantine measures had been introduced (Orgilés et al., 2020). Many also reported their child was more nervous, anxious, angry, and lower in mood. However, loneliness is inherently subjective, and it is therefore important to measure it by self-report rather than parent-informant report. Furthermore, as age is associated with loneliness (Qualter et al., 2015) including in the pandemic context (Bu et al., 2020), it is important to look more specifically at particular age groups.

Virus containment measures may have more adverse effects on adolescents as an age group than on adults or children because many of the key tasks of adolescent development are achieved through interactions with others (Blakemore and Mills, 2014; La Greca and Prinstein, 1999; Papini et al., 1990). As adolescents move towards independence, they spend less time with family and more time with friends and romantic partners (Collins and Laursen, 2004).

While peer relationships become more important during adolescence, family relationships remain central to adolescent social development (Flynn et al., 2017). Longitudinal studies indicate that childhood experiences of family instability and parent behaviours such as aggression are associated with mental health problems in adolescence (Bakker et al., 2012; Schwartz et al., 2014), and difficulties in parent-child relationships such as family discord are associated with adult mental health problems later in life (Weich et al., 2009; Pompili et al., 2014). Therefore, good parent relationships, as well as a sense of connection with peers, contribute to psychological well-being in adolescence. It has been suggested that parent-child relationships may be negatively affected by pandemic related factors such as confinement-related stress (Prime et al., 2020). Moreover, recent research has found that higher parental psychological distress contributed to lower emotion regulation in children during the COVID-19 pandemic (Morelli et al., 2020). Further, in a sample of Spanish and Latin American 10–14-year-olds, better family functioning during the pandemic was associated with lower mental health symptoms in young people (Penner et al., 2020).

Virus containment measures, including quarantine and social distancing, intended to reduce social contact may inadvertently increase the risk of loneliness, mental health problems and may adversely affect adolescent-parent relationships. Understanding more about the relationship between loneliness, social contact, relationships with parents and mental health in adolescents is important to understand mental health difficulties in adolescents in the context of COVID-19. However, relationships between these variables are likely to be bi-directional and so longitudinal research is needed to understand and explore plausible causal pathways.

2. Aims and hypotheses

1) To investigate the relationship between baseline loneliness and mental health symptoms (internalising and externalising difficulties) during lockdown. Based on previous research we hypothesised that higher loneliness would correlate with higher mental health symptoms.
2) To investigate the cross-sectional relationships between frequency of social contact and parent relationships with loneliness and mental health. We hypothesised that more frequent social contact and higher closeness with parents would be associated with lower loneliness and mental health symptoms in adolescents.
3) To investigate whether mental health symptoms at one-month follow-up were predicted by baseline loneliness, frequency of social contact and parent relationships. We hypothesised that higher loneliness, lower frequency of social contact and less close parent relationships at baseline would predict higher mental health difficulties including internalising and externalising difficulties one month later.

3. Method

3.1. Study design

We used data from the Covid-19: Supporting Parents, Adolescents and Children during Epidemics (Co-SPACE) study. The Co-SPACE study started data collection within seven days of lockdown measures being introduced in England (i.e. March 30th 2020). The Co-SPACE study aimed to record child and adolescent mental health throughout the COVID-19 crisis and collected monthly survey data from parents or carers of children aged 4–16 years. Once parents completed their questionnaires, if they had reported on a child aged 11–16 years, they were invited to consent to their child taking part, and if their child agreed, the child was then asked to assent. At this point self-report data was collected from the adolescents aged 11–16 years. Recruitment was through social media sites such as Twitter and Facebook, partner organisations such as schools and charities, and the media in the UK. Participants gave informed consent and had the right to withdraw from the study at any time. The study was approved by the University of Oxford research ethics panel (R69060).

3.2. Participants

For the present study, we used self-report data from young people aged 11–16 years (n = 894; see Table 1 for demographic information). In total, 2212 parents of adolescents completed the Co-SPACE survey in the time period of interest, 1037 of these consented for their adolescent child to take part, and 894 adolescents assented and completed measures. Young people completed self-report measures and their parents reported demographic data. We included participants who completed

Table 1
Baseline measures for participants who completed baseline only (n = 451) and those who completed baseline and follow-up (n = 443).

	Baseline only group		Baseline and Follow-up group	
Age	Mean	SD	Mean	SD
	13.37	1.64	13.28	1.68
Gender	*n*	%	*n*	%
Male	231	51.2	221	49.9
Female	220	48.8	222	50.1
Household annual income				
<£30,000	102	22.6	81	18.3
>£30,000	319	70.7	326	73.6
Prefer not to say	30	6.7	36	8.1
Child ethnicity				
Asian/Asian British	5	1.1	3	0.7
Black/Black British	3	0.7	2	0.5
Chinese/ Chinese British	1	0.2	0	0
Middle Eastern/Middle Eastern British	2	0.4	1	0.2
Mixed race – other	18	4.0	13	2.9
Mixed race – White and Black/Black British	5	1.1	3	0.7
Other ethnic group	2	0.4	1	0.2
Prefer not to say	2	0.4	1	0.2
White – British, Irish, other	413	91.6	419	94.6
Measure (minimum – maximum)				
1. Loneliness (4–12)	6.85	2.01	6.65	1.92
2. SDQ – emotional symptoms (0–10)	3.47	2.58	3.61	2.58
3. SDQ – conduct problems (0–10)	2.22	1.90	2.10	1.71
4. SDQ – hyperactivity-inattention (0–10)	4.65	2.68	4.44	2.50
5. K6 psychological distress (0–24)	6.55	5.04	6.10	4.63
6. Time spent talking with friends and family via voice and video calls per day (0–5)	1.79	1.49	1.70	1.39
7. Time spent texting with friends and family per day (0–5)	1.83	1.36	1.77	1.29
8. Closeness with parents (0–3)	2.10	0.79	2.15	0.75

1No significant differences were found between those who completed follow-up and those who did not complete follow-up using chi-square for categorical variables, a t-test for age and MANOVA for the questionnaire measures.
SDQ=Strengths and Difficulties Questionnaire.

the baseline measures between the beginning of data collection, 30th March 2020, and 1st June 2020, which is when some schools re-opened and social distancing measures were relaxed in the UK. We then used data collected at the first follow-up, one month after baseline; for some participants this was within lockdown, and for others this was up to one-month after distancing measures were relaxed.

3.3. Procedure

Parents were invited to read the information sheet and complete a consent form and questionnaire on the Qualtrics platform by following a link in the study advert, which was advertised via various social media platforms and on the radio and television. Parents were then given the option to consent for their adolescent child to complete measures, at which point adolescents could assent to take part and complete the questionnaires. Participants were given the option to not share sensitive information to specific questionnaire items by selecting the 'prefer not to say' response. Participants were emailed one month after baseline with a request to complete the follow-up measures.

3.4. Measures

At baseline, parents completed demographic measures regarding their child including age in years, gender, ethnicity, and household income, which was measured in 6 categories from 'less than £16,000 a year' to 'more than £120,000 a year' and used as a proxy measure of socio-economic status. At baseline and follow-up, adolescents completed the following measures:

UCLA Short Loneliness Scale (ULS-4) (Russell et al., 1980) is a four-item measure, with scores ranging from 4 to 12, and higher scores indicating higher loneliness. The items are: "Do you feel that you lack company?", "Do you feel left out?", "Do you feel isolated from others?" and "Do you feel lonely?". The ULS-4 has adequate internal consistency in adolescents (Yurdagül et al., 2019). Cronbach's alpha was 0.82–0.84 in the current study.

Strengths and Difficulties Questionnaire (SDQ) The SDQ measures psychological difficulties in children and adolescents (Goodman, 1997). This 25-item questionnaire has five subscales, three of which assess mental health: emotional symptoms (internalising problems), conduct problems and hyperactivity-inattention (both externalising problems). Each subscale is composed of five items, scored from 0 to 10. Higher scores indicate greater difficulties. The measure is valid and reliable (Goodman, 2001). Cronbach's alpha in the current study was 0.76–0.77 for emotional symptoms, 0.57–0.62 for conduct problems and 0.76–0.77 for hyperactivity-inattention.

Kessler-6 Psychological Distress Scale (K6) The K6 measures psychological distress (Kessler et al., 2002). The six items form one scale which is scored from 0 to 24 and higher scores indicate higher distress. It has good consistency and validity (Mewton et al., 2016). Cronbach's alpha in the current study was 0.84–0.85.

Type and frequency of ***social contact***: we administered two questions, both on a six-point Likert scale from 'not at all' (0) to '6+ hours' (5). The root for both questions was "Try to remember what you did yesterday, how many hours did you spend doing the following?". The first item was "Audio or video talking with friends/school mates/family" and the second item was "Communicating with friends or family, via email, WhatsApp, text or other messaging service".

Parent relationship: a single question was adapted from the Millennium Cohort Study Age 14 Sweep (Study, 2016 MCS Sweep 6, 2016), rated on a Likert scale from 'not very close' (0) to 'extremely close' (3). "Overall, how close would you say you are to your parent(s)?".

3.5. Analysis plan

Data were analysed using IBM SPSS Statistics 25. To assess selective attrition chi-square tests were used to check for differences in demographic categories between the participants completing each time point. The assumptions of regression analysis were checked. For each of the SDQ subscales (emotional distress, conduct problems and hyperactivity), 98% of the scales were complete at baseline and 49.6% were complete at follow-up. The K6 scale was 97.4% complete at baseline and 48.7% at follow-up. There were no missing data regarding the young person's age, gender or ethnicity, but 7.4% of household income data were missing. We conducted Little's MCAR test (Little, 1998) which was not significant, indicating that data were missing at random $\chi^2(119) = 128.79$, $p = .254$.

To ensure that attrition did not bias the results, multiple imputation was used to impute missing data at follow-up, using the fully conditional specification method. To predict these missing data we used all of the study variables (ULS-4 loneliness scale, SDQ subscales and K6 psychological distress score, frequency/type of social contact, parent relationships) as predictors in the imputation model, alongside demographic variables (gender, age in years, date of completion and income). Where participants had not completed follow-up, we imputed 50 datasets predicting their scores in the mental health, social contact and parent relationship follow-up measures. The 50 imputed datasets were pooled, and this pooled dataset was used for the regression analysis.

To address hypotheses 1 and 2 partial correlations were conducted between the baseline ULS-4 loneliness scale, SDQ subscales and K6 psychological distress score, frequency/type of social contact, parent relationships, controlling for age, income and gender at baseline. This analysis was conducted with the dataset before multiple imputation because 97% of participants completed all measures at this time point.

For the third hypothesis we conducted four hierarchical regression analyses. The dependent variables for the four models were SDQ emotional symptoms, SDQ conduct problems, SDQ hyperactivity-inattention and K6 psychological distress at one-month follow up. All models included the target measure at baseline. Model 1 included the predictor variables of baseline SDQ emotional symptoms OR baseline SDQ conduct problems OR baseline SDQ hyperactivity-inattention OR baseline K6 psychological distress. Model 1 also included Gender, Age, Date of completion, Income. Model 2 included the predictor variables of the ULS-4 loneliness scale, frequency of social contact and parent relationships.

4. Results

Preliminary analysis: To decide which demographic variables to include in the following analyses as covariates a series of correlations between loneliness, demographic factors and survey completion date were conducted. Being lonely was significantly associated with being female $r(867) = 0.19$, $p < .001$ and being older $r(867) = 0.13$, $p < .001$ and lower income $r(804) = -0.08$, $p < .05$. All three effect sizes were small. There was no significant association between date of survey completion and loneliness $r(869) = 0.00$, $p = .99$, and so this was not included as a covariate in the later analyses.

Objective 1: We conducted partial correlations between loneliness, social contact, and symptoms of mental health difficulties at baseline, controlling for demographic factors which had significant relationships with study variables (gender, age, and income; see Table 2 for the correlation matrix). As predicted, higher loneliness was significantly associated with higher scores on all mental health measures, including the three SDQ subscales. There was a medium size association between loneliness and SDQ emotional symptoms $r(866) = 0.43$, $p < .001$ and a small association between loneliness and SDQ conduct problems $r(866) = 0.25$, $p < .001$ and SDQ hyperactivity-inattention $r(866) = 0.27$, $p < .001$. There was a large association between loneliness and the K6 psychological distress scale $r(866) = 0.51$, $p < .001$ (see Table 2).

Objective 2: Contrary to our hypothesis, there was not a significant relationship between time spent talking with others and the mental health variables or loneliness. There was a significant relationship between higher frequency of texting others and higher scores on all the

Table 2
Associations (Pearson's *r*) between main study variables at baseline controlling for demographic factors.

	1.	2.	3.	4.	5.	6.	7.	8.
1. Loneliness	.	0.43**	0.25**	0.27**	0.51**	−0.01	0.04	−0.15**
2. SDQ - emotional symptoms			0.29**	0.37**	0.66**	0.01	0.02	−0.10*
3. SDQ – conduct problems				0.53**	0.39**	0.05	0.15**	−0.21**
4. SDQ – hyperactivity-inattention					0.49**	0.05	0.08*	−0.12*
5. K6 -psychological distress						0.00	0.09*	−0.19**
6. Time spent talking							0.36**	0.03
7. Time spent texting								−0.04
8. Closeness with parents								

* $p < .05$.
** $p < 001$ *SDQ=Strengths and Difficulties Questionnaire.*

mental health variables except the SDQ emotional symptoms, with a small positive association between texting others and SDQ conduct problems $r(874) = 0.15$, $p < .001$, SDQ hyperactivity-inattention $r(874) = 0.08$, $p < .05$ and K6 psychological distress $r(869) = 0.09$, $p < .05$. There was no significant relationship between texting others and loneliness. As hypothesised adolescents who reported being closer to their parents had fewer symptoms of mental health difficulties. There were small associations between closeness with parents and mental health; SDQ emotional symptoms $r(865) = -0.1$, $p < .05$, SDQ conduct problems $r(865) = -0.21$, $p < .001$, SDQ hyperactivity-inattention $r(865) = -0.12$, $p < .05$ and K6 psychological distress $r(865) = -0.19$, $p < .001$. There was also a small significant association between being close to parents and reporting less loneliness $r(866) = -0.15$, $p < .001$.

Objective 3: We conducted a series of regression analyses to test the hypothesis that higher baseline loneliness, lower frequency of social contact and poor quality of parent relationships would predict symptoms of mental health difficulties (i.e., on each of the sub-scales of the SDQ and the K6 psychological distress scale) one month later (see Table 3 for results of regression analysis and Table 4 for score at baseline and follow-up).

In the first regression analysis predicting follow-up SDQ emotional symptoms, both Model 1 ($R^2 = 0.52$) and Model 2 ($R^2 = 0.53$) were significant. The two significant predictor variables were a) SDQ emotional symptoms at baseline $\beta = 0.7$, $p < .001$, 95% CI [0.64, 0.76] which predicted higher follow-up SDQ emotional symptoms, and b) higher closeness to parents at baseline which predicted lower follow-up SDQ emotional symptoms $\beta = -0.08$, $p < .05$, 95% CI [−0.14, −0.01]

In the next regression analysis predicting SDQ conduct problems at one-month follow-up, both Model 1 ($R^2 = 0.43$) and Model 2 ($R^2 = 0.44$) were significant. The only significant predictor variable was SDQ conduct problems at baseline $\beta = 0.64$, $p < .001$, 95% CI [0.58, 0.71] which predicted higher SDQ conduct problems.

In the third regression analysis SDQ hyperactivity-inattention at one-month follow-up was the dependent variable. Model 1 ($R^2 = 0.53$) and Model 2 ($R^2 = 0.53$) were significant. In Model 1 SDQ hyperactivity-inattention at baseline predicted SDQ hyperactivity-inattention 4 weeks later $\beta = 0.71$, $p < .001$, 95% CI [0.66, 0.77]. In Model 2, more time spent talking to others was significantly associated with lower hyperactivity-inattention problems at follow-up $\beta = -0.08$, $p < .05$, 95% CI [−0.15, −0.01].

The fourth regression analysis examined predictors of K6 psychological distress at one-month follow-up. Model 1 ($R^2 = 0.49$) and Model 2 ($R^2 = 0.50$) were significant. In Model 1 psychological distress at baseline significantly predicted higher psychological distress at follow-up $\beta = 0.68$, $p < .001$, 95% CI [0.61, 0.74]. In Model 2, adolescents who reported being closer to their parents at baseline had significantly lower psychological distress scores at follow-up $\beta = -0.08$, $p < .05$, 95% CI [−0.15, −0.01].

5. Discussion

We found that higher levels of loneliness were cross-sectionally associated with more mental health difficulties, particularly emotional distress, although loneliness was not associated with mental health difficulties one month later. Contrary to expectations, increased social contact was not associated with better mental health or lower loneliness. Adolescents who spent more time talking to others (via voice or video call) at baseline reported less symptoms of hyperactivity and inattention one month later. Adolescents who reported feeling closer to their parents experienced less loneliness and less distress at baseline and follow-up.

The association between mental health problems and loneliness in adolescents, both cross-sectionally and longitudinally, is well established in the literature (Loades et al., 2020). We found empirical evidence that mental health problems, particularly emotional internalising symptoms and distress, but also externalising symptoms, were associated with loneliness in early stages of the global pandemic. Importantly, this association was cross-sectional and so the direction of these effects cannot be assumed from this finding. It may be that loneliness leads to distress, or vice versa, and most likely, this relationship is bidirectional (Lasgaard et al., 2011).

Over time, between baseline and follow-up (1 month), loneliness was not associated with subsequent mental health difficulties, contrary to prior research (Loades et al., 2020). This could be due to the strong continuity of mental health difficulties over time in our sample. It is also possible that the short window between baseline and follow-up meant that there was not enough time for mental health symptoms to change. Prior studies which have found loneliness to be associated with subsequent anxiety and depression have tended to have considerably longer follow-up periods (Loades et al., 2020). Furthermore, levels of loneliness in our sample were relatively low and participants were relatively well connected with friends and family, restricting the potential to detect changes in mental health associated with higher loneliness. This may have changed as the pandemic related restrictions continued over the longer term, and future studies should investigate this. Equally, there may also be a genuine lack of relationship between loneliness and follow-up mental health, due to pandemic-specific factors; for example, as everyone experienced less social contact to contain the spread of COVID-19, this may have reduced feelings of being 'left out'.

Previous research has found a relationship between social contact and loneliness; for example, adolescents experience higher state loneliness when alone than when with others (van Roekel et al., 2015; van Roekel et al., 2018). However, we did not find an association between social contact and loneliness, which is consistent with the conceptualisation of loneliness as being about discrepancy between desired and actual contact, rather than about absolute amount of social contact (Perlman and Peplau, 1981), which was what our social contact measure assessed. It may be that the types of social contact are also more nuanced than our measures allowed for, as there is evidence that adolescents feel lonelier when spending time with family after being alone, but less lonely if with friends (van Roekel et al., 2015). In the pandemic context, future studies should examine in more detail the nuances of different types of social contact, including family versus friends, and modality of social contact such as social media, live online and socially distanced

Table 3
Hierarchical regression analyses with MI pooled dataset.

Predictors Model		Dependent variable T2 SDQ – emotional symptoms				T2 SDQ – conduct problems				T2 SDQ – conduct problems				T2 K6 psychological distress			
		β	95% CI	*t*	*p*	β	95% CI	*t*	*p*	β	95% CI	*t*	*p*	β	95% CI	*t*	*p*
1.	T1 target variable	0.70	**[.64, 0.76]**	22.51	**.000**	0.64	**[0.58, 0.71]**	19.18	**.000**	0.71	**[0.66, 0.77]**	24.60	**.000**	0.68	**[0.61,0.74]**	20.59	**.000**
	Gender	0.02	[−0.04, 0.09]	0.68	.495	0.01	[−0.06, 0.08]	0.31	.755	−0.04	[−0.11, 0.03]	−1.19	.234	0.01	[−0.06, 0.07]	0.21	.833
	Age	0.06	[−0.01, 0.13]	1.61	.109	0.00	[−0.08, 0.09]	0.10	.924	0.06	[0.00, 0.12]	1.92	.056	0.05	[−0.02, 0.12]	1.30	.194
	Date completed	0.03	[−0.04, 0.10]	0.76	.447	0.04	[−0.04,0.12]	1.09	.278	−0.02	[−0.09, 0.06]	−0.41	.679	0.02	[−0.05, 0.09]	0.58	.564
	Income	−0.01	[−0.08, 0.06]	−0.23	.817	−0.02	[−0.09,0.06]	−0.51	.614	−0.02	[−0.09, 0.05]	−0.68	.495	−0.02	[−0.09, 0.04]	−0.69	.490
R^2 for model	0.52	0.43	.53	0.49													
2.	Loneliness T1	0.02	[−0.05, 0.09]	0.57	.568	0.03	[−0.04,0.11]	0.87	.384	0.00	[−0.07, 0.07]	0.02	.983	0.04	[−0.05, 0.14]	0.98	.329
	Time spent talking to others T1	0.02	[−0.04, 0.09]	0.70	.485	0.03	[−0.05,0.11]	0.78	.436	−0.08	**[−0.15, −0.01]**	−2.29	**.023**	0.05	[−0.01, 0.12]	1.57	.118
	Time spent messaging others T1	−0.02	[−0.08, 0.05]	−0.50	0.616	0.01	[−0.08,0.09]	0.18	.857	0.04	[−0.03, 0.11]	1.16	.246	0.01	[−0.06, 0.08]	0.23	.820
	Closeness parents T1	−0.08	**[−0.14, −0.01]**	−2.12	**0.035**	−0.08	[−0.16, 0.00]	−1.90	.059	−0.03	[−0.10, 0.05]	−0.77	.445	−0.08	**[−0.15, −0.01]**	−2.20	**.029**
R^2 for model	.53	0.44	0.53	0.50													

SDQ = strengths and difficulties questionnaire.

Table 4
Baseline and follow-up scores for main study variables.

Participants who completed both baseline and follow-up (n = 443)				
Measure (minimum – maximum)	Baseline		Follow-up	
	Mean	*SD*	*Mean*	*SD*
1. Loneliness (4–12)	6.65	1.92	6.75	2.06
2. SDQ – emotional distress (0–10)	3.61	2.58	3.54	2.49
3. SDQ – conduct problems (0–10)	2.10	1.71	1.99	1.63
4. SDQ – hyperactivity (0–10)	4.44	2.50	4.49	2.47
5. K6 – psychological distress (0–24)	6.08	4.63	5.67	4.76
6. Time spent talking (0–5)	1.70	1.39	1.68	1.43
7. Time spent texting (0–5)	1.77	1.29	1.80	1.31
8. Closeness with parents (0–3)	2.15	0.75	2.15	0.77

SDQ = strengths and difficulties questionnaire.

physical interactions, which may be differentially associated with loneliness.

In our study, both time spent talking to others and closeness with parents were associated with more favourable outcomes subsequently. Adolescents who spent more time talking to others (by video or voice call) at baseline reported less hyperactivity-inattention one month later. It is possible that those who had more direct social contact with others were less bored and therefore less hyperactive. Frequency of indirect social contact (e.g. text messaging) did not have the same mitigating effect, as identified in other studies during the COVID-19 pandemic where more online contact with friends was associated with higher depression levels in Canadian adolescents (Ellis et al., 2020). Therefore, live social contact should be encouraged, even if via digital means. Consistent with previous findings pre-pandemic (e.g. Bakker et al., 2012; Schwartz et al., 2014) and during the pandemic (e.g. Penner et al., 2020), we found that closeness with parents at baseline was associated with lower internalising symptoms and psychological distress one-month later. Given that lockdown was a period when most families spent more time together at home than usual, it makes sense that adolescents who reported feeling close to their parents towards the beginning of lockdown reported less psychological distress one month later. In our study, closeness with parents was inversely associated with loneliness. Again, because our loneliness measure did not discriminate between friend-related loneliness and family-related loneliness, we could not examine whether closeness with parents was particularly associated with family-related loneliness, which may have decreased during lockdown, as separate from friend-related loneliness, which may have increased during lockdown. Previous studies have found that peer-related loneliness is more strongly associated with depression in adolescents than parent-related loneliness (Lau, Chan and Lau, 1999), and childhood chronic peer-related loneliness, but not parent-related predicted adolescent depression (Qualter et al., 2010). Future studies taking a more nuanced approach to measuring loneliness will enable a greater understanding of this potential mitigating effect of closeness to parents.

The Co-SPACE study rapidly recruited a sample of adolescents in the UK following the introduction of social distancing measures to manage the impact of the COVID-19 pandemic. However, it is important to note that our sample selection was not random and participant demographics do not reflect the wider population of adolescents in the UK. Our sample had a higher household income than average, and a large proportion were White British. This limits the extent to which our findings can be generalised; our null findings may reflect the characteristic of the sample who may have experienced fewer stressors than average during the pandemic, thereby potentially protecting them from more severe negative effects of lockdown. Moreover, previous research has found higher rates of loneliness in adolescents from lower socioeconomic backgrounds (Madsen et al., 2019) and we argue that adolescents from more disadvantaged backgrounds may well show greater associations, which need to be looked at urgently. Further, 50% of participants did not complete the one-month follow-up; although those lost to follow-up did not differ from those retained in terms of key demographic variables there will undoubtedly be some forms of selective attrition.

There are several important implications of our findings. Adolescents who were struggling with internalising symptoms and distress, and/or externalising symptoms, were also those who were lonelier. Therefore, if an adolescent reports feeling lonely, this should be a cue to ask more about mental health difficulties. Both closeness to parents and more frequent social contact by voice/video calls, but not by text messaging, was associated with more favourable outcomes 1 month later. Therefore, parent-adolescent relationships should be supported, and synchronous social contact should be encouraged (Morelli et al., 2020; Prime et al., 2020). Baseline symptoms of mental health difficulties were the most important predictor of mental health at follow-up, thereby supporting the importance of providing continuous support for already vulnerable groups. This highlights the importance of supporting young people who had higher levels of psychological distress prior to or at the start of lockdown, especially as there is evidence that mental health support has been more difficult to access during the pandemic (Young Minds, 2020). Increased access to adolescent mental health support is crucially needed to support this cohort of young people.

6. Conclusions

We found significant associations between loneliness and concurrent mental health difficulties in UK adolescents at the beginning of the COVID-19 pandemic and lockdown. Adolescents who reported feeling closer to their parents at baseline reported significantly lower emotional distress at both baseline and follow-up, and adolescents who reported more frequent social contact by talking to others (via video or voice call) at baseline reported significantly less hyperactivity-inattention at one month later. Further research with representative samples, more nuanced measures of loneliness and longer follow-up periods is needed to further understand the longer-term impact of loneliness on adolescent mental health during this global pandemic.

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Author statement

M.L., K.C., E.H. & S.R. conceptualised and designed the study. All authors contributed to the statistical analysis plan. All authors reviewed manuscript drafts and approved the submission.

Declarations of Competing Interest

None.

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