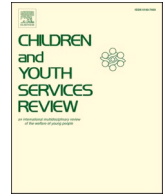




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Parents' and adolescents' perceptions of parental involvement and their relationships with depression among Chinese middle school students during the COVID-19 pandemic

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ABSTRACT

Although psychological stress that adolescents may encounter during the COVID-19 pandemic has been of increasing interest to scholars, few studies have examined the profound impact that parents give to adolescents when staying indoors. This study surveyed 1,550 students and their parents from eight middle schools in eastern China. We employed multiple linear regressions with school fixed effects to examine the different perceptions of parental involvement between parents and children, and the relationships between these different types of parental involvement and depression in middle school students. Results indicated that discrepancies existed in their perceptions of behavioral aspects of parental involvement, including parental academic involvement, parent-teacher communication, and parent-child communication. Most saliently, higher levels of parental academic involvement ($B = 0.051, p < 0.05$) and lower levels of parent-child communication ($B = -0.084, p < 0.05$) perceived by students were associated with higher levels of depression. These findings contribute to the understanding of the association between parental involvement and students' mental health during the COVID-19 pandemic.

1. Introduction

In response to the COVID-19 outbreak, countries across the world employ the social distancing strategy at various strict levels and forms that encourage residents to stay indoors (Haaretz, 2020). Concomitantly, students in numerous nations have switched from traditional classrooms to online learning at home (World Bank, 2020a). The stay-at-home order also disrupts the students' everyday lives, particularly resulting in a sudden decrease in their outdoor activities. In tandem with factors such as the fear towards the spread of COVID-19 pandemic, these disruptions and concomitant changes tend to endanger students' mental health (Jiao et al., 2020; Wang et al., 2020). It is important to note that existing research suggests that parents play a critical role in supporting adolescents' psychological well-being during the pandemic (Wang et al., 2020; World Bank, 2020b). However, the parents themselves bear stress

from job losses or reduction in earnings as well as sparing enough time for adolescents during this chaotic period (Fegert et al., 2020). Arguably, the stress that parents undergo is adversely associated with their children's psychological well-being (Spinelli et al., 2020).

Therefore, the COVID-19 pandemic may undermine adolescents' mental health in many ways as addressed above, and the influence may perpetuate after the pandemic, while parental involvement plays a significant role in their children's psychological well-being under the stay-at-home policy. Focusing on the psychological stress that adolescents may encounter and the profound impact that their parents have on them, the present study examines the relationship between different types of parental involvement and the depressive tendencies in adolescents during the pandemic. In this study, we define "adolescents" as individuals aged 10–24 years old (Sawyer et al., 2018). Findings of this study not only can deepen our understandings of the effects of parental

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involvement on adolescents' mental health, but also put forward possible means to guarantee adolescents' psychological well-being during the public health crisis. Two research questions guided this study:

Are there any differences between parents' and adolescents' perceptions of parental involvement during the COVID-19 pandemic?

What are the relationships between different types of parental involvement and middle school students' levels of depression during the COVID-19 pandemic?

2. Literature Review and Theoretical Framework

2.1. The COVID-19 pandemic and its impacts on mental health

Previous studies show that social isolation caused by public health crises or natural disasters can negatively influence the mental health of the general population (Hall & Chapman, 2008; Rohde et al., 2016; Rubin et al., 2010; Smith & Victor, 2019). Although adolescents are not as physically vulnerable as the elders to the coronavirus (CDC, 2020a; WHO, 2020), they still suffer from mental health problems (Clemens et al., 2020; Orben, Tomova, & Blakemore, 2020), especially for those with low socio-economic status, child maltreatment history, and/or chronic mental health problems (Fegert et al., 2020). Orben, Tomova, and Blakemore (2020) claim that the adverse effects of social distancing may be particularly profound to adolescents, because they are experiencing a sensitive period for social interaction. Existing studies identify certain protective factors for adolescents. According to a survey conducted in a Chinese college, undergraduates tend to have lower chances of experiencing anxiety, if they come from families with a steady household income, bear less economic and educational worries brought by the COVID-19, and enjoy higher levels of social support (Cao et al., 2020). Clemens et al. (2020) maintain that adolescents may not be affected by undesirable experiences when facing the COVID-19 pandemic, if they enjoy parental support, hold positive attitudes towards online learning, and are not being bullied or socially excluded. Equally emphasizing the importance of family and parents, Orben, Tomova, and Blakemore (2020) suggest that virtual social connection (e. g., through social media) can mitigate the possible negative impacts concomitant with social distancing. However, virtual social connection serves as a double-edged sword. That is, it can alleviate negative feelings resulting from social exclusion, but it may endanger those who do not have offline friendships and/or suffer from mental health issues (Orben et al., 2020). Findings from other research also imply the duality of online communication. Gao et al. (2020) suggest that higher levels of virtual social exposure during the COVID-19 pandemic are associated with a higher tendency towards anxiety. In comparison, Yang et al. (2020) indicate that having caring online interactions with friends during COVID-19 is associated with lower levels of anxiety and depression. Thus, depending on the kinds of online communication being adopted, it can yield opposite results.

Although some studies examine adolescents' mental health issues during the COVID-19 pandemic, little research utilizes empirical data to explore their mental health conditions, because it requires a considerable amount of time and a way to access the target population to conduct such studies. The majority of scientific outputs related to general population's mental health has been compiled in the forms of letters to journal editors and commentary. Commenting on the theoretical and practical contributions of these publications, Rajkumar (2020) suspects the quality of evidence in this body of literature, and urges the need for empirical research on vulnerable populations such as adolescents. When reviewing the literature related to COVID-19 in this section, we find that most of them are not empirical.

2.2. Online learning and its relationship with Adolescents' mental health

In terms of the benefits of online learning, Barbour and Reeves (2009) explicate that these advantages include expanding educational

access, providing high-quality learning opportunities, and allowing for educational choice. They also point out the challenges posted by the online learning, including high start-up costs associated with virtual schools, access issues surrounding the digital divide, and student readiness and retention issues. Furthermore, Cavanaugh et al. (2009) review 226 open access documents about K-12 online learning, and reveal that expanding educational access is the one examined the most. Among all identified challenges, "access issues surrounding the digital divide" and "high start-up costs associated with virtual schools" tend to be studied the most. Acknowledging the benefits and challenges of online learning as well as the argumentations in prior research are vital for improving further studies and enriching our understandings of online learning. Nevertheless, during the COVID-19 pandemic, adolescents experience online learning that is oftentimes not well-planned when they rapidly switch from traditional classrooms to online learning environment. This expedient way of learning and instruction evinces the transient nature of the online learning during the pandemic, and thus some propositions we gain from the existing scholarship are not adequate for scrutinizing this emerging phenomenon.

Notably, the online learning scholarship overlooks the experiences of K-12 students, especially the potential impact of such experiences on the psychological well-being of the adolescents. Conducting an extensive review on 356 articles (from 1994 to 2016) on K-12 online learning, Arnesen et al. (2018) conclude that a majority of the reviewed articles (40.2%) is theoretical, although among them the amount of quantitative and qualitative research has steadily increased in recent years. Moreover, their review on the top 20 often-cited articles detects focused interests in preparing teachers to teach online, creating and assessing programs and environments for distance learning, and assessing student characteristics and achievement in online learning. However, none focuses on K-12 students' mental health. In sharp contrast, many studies examine issues concerning psychological well-being of university students. For instance, Otolara and Barros (2014) find that distance-learning students in their sample present high levels of psychological well-being in general, but the researchers do not identify the possible causes. Others suggest that Israeli undergraduates with higher levels of self-esteem tend to hold more positive attitudes towards online learning, while these positive attitudes are not associated with their feeling of loneliness (Kurtz et al., 2009).

2.3. Parental involvement and psychological well-being of adolescents

Although parental involvement has been extensively studied, there is a lack of agreement and consistency in its definition and dimension (Fan & Chen, 2001; Jeynes, 2007). In this study, we adopt the definition of parental involvement provided by Jeynes (2007), meaning parents' participation in their children's education as well as parents' experiences with their children. Hill and Tyson (2009) distinguish three dimensions of parental involvement, which are home-based involvement, school-based involvement, and academic socialization. Many researchers have adopted this typology (Benner, Boyle, & Sadler, 2016; Brajsa-Zganec, Merkas, & Sakic Velic, 2019; Park & Holloway, 2013; Wang & Sheikh-Khalil, 2014). The home-based involvement includes aspects such as communication between parents and their children. School-based involvement contains, for example, communication between parents and teachers, and academic socialization embraces, for instance, parents' aspirations and expectations towards their children's education. Thus, home- and school-based parental involvement indicate the behaviors of parents, while parental involvement in the form of academic socialization represents parents' non-behavioral engagement (Englund et al., 2004; Li et al., 2019).

Home- and school-based parental involvement are oftentimes regarded as parental involvement in various studies, and aspects in academic socialization are not always categorized as parental involvement (Anderson & Minke, 2007; Guo et al., 2018; Zhan, 2006). Parents may hold high aspirations and expectations as well as strong values in

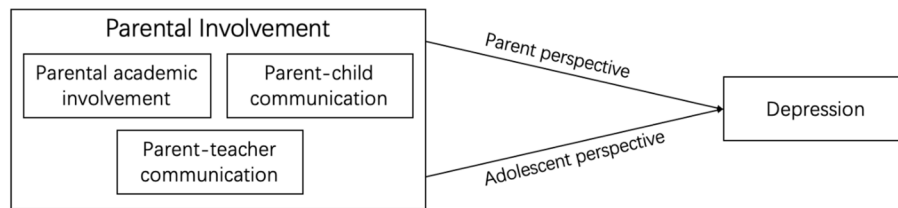


Fig. 1. Theoretical Framework Guiding the Present Study (generated from [Korelitz and Garber, 2016])

education, but do not have an equally high level of behavioral involvement. In this study, we examine home- and school-based parental involvement. Specifically, we examine parents' participation in their children's education, parents' interaction with their children, and parents' interaction with teachers, because these variables are frequently measured in existing studies, and they can help us capture the major activities between parents and students who experience home confinement during the pandemic.

As many studies indicate, parental involvement has long been perceived as positively associated with students' academic achievement (Al-Alwan, 2014; Brajsa-Zganec, Merkas, Sakic Velic, 2019; Fan & Chen, 2001; Jeynes, 2007; Wang & Sheikh-Khalil, 2014). Nonetheless, few studies examine the relationship between parental involvement and mental health problems of adolescents such as depression (Wang et al., 2019; Wang & Sheikh-Khalil, 2014). As a few exceptions, some studies targeting adolescents and parents in non-online-learning contexts yield valuable insights. For example, Hashimoto et al. (2011) survey middle school students in Japan, and demonstrate that parental emotional support and students' perceptions of their parents relate to their self-perception and psychological well-being (i.e., anxiety and depression). Specifically, students with more positive feelings/perceptions towards their parents score higher on positive self-image and lower on mental illness indicators. Similarly, analyzing the 2013–2014 Georgia Student Health Survey 2.0 (GSHS 2.0), Wang et al. (2019) find that higher appraisal levels of middle school students' home-based parental involvement are associated with lower levels of mental health difficulties. Further, Wang and Sheikh-Khalil (2014) indicate that higher appraisal levels of US high school students' school-based involvement and academic socialization are associated with lower tendencies toward depression, while home-based involvement is not associated with depression. Results from these studies imply the importance of parents' involvement and support to adolescents, and highlight the centrality of adolescents' perceptions of the parental involvement and support that they receive.

2.4. Discrepancies in Parents' and Adolescents' perceptions of parental involvement

Prior studies demonstrate the differences between how students and parents perceive parental involvement. Surveying seventh grade students and their parents in Belgium, Thomas et al. (2020) find that parents' perceptions of involvement are positively but weakly associated with adolescents'. Notably, consistent with previous findings (DePlanty et al., 2007; Paulson & Sputa, 1996), Thomas et al. (2020) indicate that students perceive lower levels of parental involvement than their parents do. Nonetheless, student-reported parental involvement is related to both student achievement and well-being at school, while parent-reported involvement is solely associated with students' well-being and to a lesser extent. This finding can be explained by Epstein's model of school, family, and community partnerships, in which students play a major role in their own education, development, and success in school. Thus, it is the students rather than the others (e.g., parents) who determine their schooling success and well-being. Although the discrepancy between students' and parents' perceptions of parental involvement is predictable, few studies have explored the differences

between their perceptions, given the multifaceted nature of parental involvement and its relationship with mental health of adolescents, especially during the ongoing COVID-19 outbreak. The present study takes up this challenge.

2.5. Theoretical Framework

Combing the insights of above-mentioned scholarship, we build up a theoretical framework to guide the present study (see Fig. 1). Because the concept of parental involvement is multifaceted in nature, previous studies reveal that the relationship between parental involvement and psychological well-being of adolescents is profoundly influenced by the constructs of parental involvement. In this paper, we measure parental involvement with the three concepts of parental academic involvement, parent-child communication, and parent-teacher communication. Moreover, existing studies imply that disparities in parents' and children's perceptions of parental involvement do exist. Enlightened by this finding, the present study examines the relationships between parental involvement and depression in adolescents by drawing upon two different viewpoints, namely, parent and adolescent perspectives of parental involvement. In the environment of online learning and under the impact of stay-at-home orders during the pandemic, the relationship between parental involvement and depression in adolescents necessitates a re-examination with up-to-date empirical evidence.

3. Methods

3.1. Sample

This study draws upon cross-sectional data to examine the educational experiences and psychological well-being of adolescents during COVID-19. Data were collected from adolescents and their parents from eight urban middle schools affiliated to a well-known university in eastern China. The middle schools provided formal education from seventh to ninth grade, where students were aged 12 to 14 years at the time of this study. The corresponding author of this essay holds a faculty position at the university, which provided her with the opportunity to access these schools. Utilizing convenience sampling, the survey data were gathered online using Wenjuanxing (a popular survey platform in China) between March 17 and March 23, 2020. On January 27, 2020, the Ministry of Education (MOE) of the People's Republic of China decided to suspend the opening of schools across the country, and requested all schools to switch to the remote teaching (MOE, 2020a, 2020b). It was only until 7 May 2020 that the MOE and the National Health Commission issued a notice to guide school reopening (MOE, 2020c). Therefore, collecting data through online questionnaires was our optimal option at the time. With consent and assistance from the school administrators, the QR codes of both the parent and student questionnaires along with informed consent forms were sent to all parents of the eight middle schools through teacher-parent WeChat groups, which was a popular avenue used by teachers to communicate with parents in China. Then, parents either forwarded the QR code of the student questionnaire to their children, or allowed the children to fill out the survey using their mobile devices. Subsequently, we matched the questionnaires of parents and their children based on linking variables.

Participation in the study was voluntary and anonymous. This study was approved by the Academic Committee of Shandong University to protect the rights of the research participants.

Data from 1,550 students, who were aged 12 to 14 years at the time of this study, were obtained with linked parental survey information. Since the eight surveyed schools had 6,151 students (as reported by the schools), approximately 25% of the students completed our questionnaires. In particular, 48.7% of the sampled students were female, 98.1% had internet access at home, and 97% owned their own study space. Students, on average, spent 3.823 h per day taking online courses provided by their teachers, which was approximately 50% less than the time of face-to-face learning they were exposed to at school. Among our sampled parents, 66.3% of them were female. The estimated average annual family income was 29,495 USD, while the per capita average annual income in 2019 was 12,711 USD in the urban areas of China (National Bureau of Statistics of China, 2020).

3.2. Variables

Questionnaires in Chinese were designed based on existing instruments and prior research. We also took into account expert opinions in related education fields such as educational psychology, and discussions with school administrators, teachers, and the research team's suggestions to ensure the content validity of the questionnaires. For example, to measure student-reported parent-child communication, the initial questionnaire only asked one question, "Since the COVID-19 pandemic, has the relationship between you and your parents changed?" with choices on a 5-point Likert scale. After modifications, we then had three statements to test the parent-child communication (see the Appendix). In the meantime, we tested several versions of questionnaires that were vetted by the surveyed schools before formally distributing the final version to the students and parents.

3.2.1. Dependent variable

Depression. Depression was the dependent variable. It consisted of 13 items on the student questionnaire (for example, "I feel unhappy recently") with answers on a 4-point scale (i.e., "never/seldom," "sometimes," "frequently," and "most of time/always"). The items originated from the Center for Epidemiologic Studies Depression Scale (CES-D Scale) that contained 20 statements (Radloff, 1977). After our pilot study, 13 items were selected with adaptations, where the CES-D items such as "I thought my life had been a failure" were excluded. Our factor analysis found one dimension (depression). The reliability was 0.936. A derived variable was created based on the mean, with higher values indicating higher levels of depression (mean = 1.526, $sd = 0.604$).

3.2.2. Independent variables

Parental involvement was examined in three dimensions encompassing parental academic involvement, parent-child communication, and parent-teacher communication. Parental academic involvement and parent-child communication measured the concept of home-based involvement, and parent-teacher communication was the operationalization of school-based involvement (Brajša-Zganec, Merkas & Sakic Velic, 2019; Hill & Tyson, 2009). Based on reports from both parents and adolescents, this study delved into the three dimensions of parental involvement to understand the potential disparities in perceptions of parental involvement between the two groups.

Parental academic involvement. Considering the suggestions of teachers and administrators from our surveyed schools as well as discussions among research team members, the items were designed based on the parental involvement type of learning at home identified by Epstein (1995), meaning that parents helped their children at home with academic related activities, decisions, and planning. Since emergency remote teaching was in place at the time of our survey, we renamed learning at home as parental academic involvement. Parent-reported

parental academic involvement contained 4 items, including "since the COVID-19 outbreak, I check my child's homework," with answers on a 5-point Likert scale. The factor analysis found one dimension (parental academic involvement). The reliability was 0.769. A derived variable was created based on the mean of the items, with higher values indicating higher levels of the perceived academic involvement by parents (mean = 3.292, $sd = 0.876$). Meanwhile, student-reported parental academic involvement included the same items as those of their parents, although they were differently worded to elicit opinions of parents and adolescents. Factor analysis extracted one dimension (parental academic involvement). The reliability was 0.782. Higher values of the derived variable indicated higher levels of academic involvement perceived by adolescents (mean = 3.319, $sd = 0.952$).

Parent-child communication. We adopted the definition provided by Davidson and Cardemil's (2008), which focused on the exchange and discussion of factual and emotional information between parents and their children. Based on this definition and the results from our pilot study, the seven-item communication scale offered by Krohn et al. (1992), including items such as "how often does he/she talk to you about things that bother him/her," were adapted and simplified. Parents reported their perception of parent-child communication by answering 3 items, such as "since the COVID-19 outbreak, my child and I have more time to communicate with each other (e.g., on things that troubled them)," with answers on a 5-point Likert scale. Factor analysis indicated that 1 dimension (parent-child communication) was found. The internal consistency reliability was 0.766. A derived variable was created based on the mean of the items, with higher values indicating higher levels of parent-child communication reported by parents (mean = 3.628, $sd = 0.790$). Student-reported parent-child communication measured the same communication behaviors. Factor analysis extracted one dimension (parent-child communication). The reliability was 0.739. Higher values of student-reported parent-child communication denoted higher levels of communication perceived by adolescents (mean = 3.596, $sd = 0.895$). Since parental academic involvement and parent-child communication were on the same scale from both parents' and students' reports, a comparison between the variables was possible.

Parent-teacher communication. It was designed based on the parental involvement type of communicating referred by Epstein (1995). That is, the communication between parents and schools. Nonetheless, it was difficult to test various aspects of parent-teacher communication, as suggested by Epstein (1995), due to following reasons. Firstly, at the time of our survey, students in China started the 2020 spring semester < 2 months ago. Secondly, the adopted emergency remote teaching restricted the communication venues between parents and teachers. Finally, the purpose of this study was to examine the experiences of parental involvement during the pandemic. Thus, parent-teacher communication was measured by one question, that was, whether parents frequently communicated with teacher(s) since the COVID-19 pandemic (No vs. Yes). Results revealed that 42.7% of the parents reported that they frequently communicated with teachers (vs. 57.3% not). In contrast with the results from student reports, 50.6% of the parents kept frequent communications with teachers (vs. 49.4% not).

3.2.3. Control variables

Findings of the existing research imply that adolescents' attitude, engagement, and time invested in learning and physical activities may have impact on their academic and daily life during COVID-19 (Chambers et al., 2020; Di Pietro et al. 2020; Moore & Lucas; 2020). In addition, Di Pietro et al. (2020) suggest that students from financially disadvantaged families may face more learning barriers (e.g., limited access to appropriate digital resources at home) than those from more advantaged families during the COVID-19. Based on the aforementioned research, our study considered the following variables: students' positive attitude towards staying at home (mean = 3.740, $sd = 0.828$) (student report); students' worries brought on by the coronavirus disease outbreak (mean = 3.201, $sd = 0.905$) (student report); students' affective engagement in

Table 1
Parents' versus students' perception on parental involvement.

	Parent report		Student report		Gap (Parent-student)
	Mean	SD	Mean	SD	
Parental academic involvement	3.292	0.876	3.319	0.952	-0.027
Parent-child communication	3.628	0.790	3.596	0.895	0.032
Parent-teacher communication	0.427		0.506		-0.079

online learning (mean = 3.703, *sd* = 0.918) (student report); students' time spent on learning online (mean = 3.823, *sd* = 1.737) (student report) and exercising (mean = 0.767, *sd* = 0.425) (student report); family economic burden related to online learning (3.4% felt burden) (student report); and whether the COVID-19 pandemic lowered parents' expected incomes (i.e., 51.7% parents reported a reduction in their anticipated income) (parent report). Meanwhile, student and parental background variables were also examined, including students' gender (48.7% females) (student report), grade level (36.8% grade 7, 30.7% grade 8, and 32.5% graduate 9) (student report), family annual income in USD (mean = 2.950, *sd* = 1.863) (parent report), and parents' educational level (78.7% father and 76.1% mother received on lower than undergraduate education) (student report).

Detailed variable descriptions are available in the Appendix.

3.3. Data analysis

Utilizing SPSS 26, we conducted both descriptive and inferential analyses. To answer research question 1, means were compared and simple correlations as well as crosstab were run among parental involvement variables. To explore research question 2, simple correlations were first run to test the relationships between parental involvement variables and students' depression tendency without controlling any other effects. Next, multiple linear regression analyses were run in two steps. Step 1 contained only parental involvement variables. Step 2 added control variables (e.g., family economic burden and students' grade level) to the step 1 model. A comparison between the models of step 1 and step 2 allowed us to examine the potential changes in the relationship between parental involvement variables and students' depression with and without the control variables being equal. To control effects at the school level, school fixed effects were added to the regression models.

Since online questionnaires were utilized, we were able to adopt the forced answering option, although respondents could still choose not to start the survey or drop out before completing it. This resulted in no missing values for all the questions we surveyed. In the meantime, while the results of our reliability and exploratory factor analysis did not detect any noticeable signs of random answers, we unfortunately cannot exclude their existence. In terms of the variable coding, before importing the questionnaires from Word documents into *Wenjuanxing*, we double checked the orders of the choices for each question to make sure the

Table 2
Correlations among parental involvement variables.

	1	2	3	4	5	6	VIF
1 Depression	1						
2 Parental academic involvement (parent report)	0.019	1					1.554
3 Parental academic involvement (student report)	0.034	0.507	1				1.692
4 Parent-child communication (parent report)	-0.143	0.275	0.147	1			1.317
5 Parent-child communication (student report)	-0.200	0.162	0.328	0.417	1		1.362
6 Parent-teacher communication (parent report)	0.022	0.322	0.211	0.224	0.166	1	1.313
7 Parent-teacher communication (student report)	-0.008	0.169	0.407	0.177	0.277	0.396	1.424

Notes: 1. Areas in gray indicated statistically significant correlations and $p < 0.001$. 2. Parent-teacher communication variables were dummy coded; thus, the correlations involved those variables should be interpreted with caution. 3. The VIFs were calculated with depression as the dependent variable.

automatic variable coding offered by *Wenjuanxing* was as what we intended.

4. Results

4.1. A comparison between Parents' and Adolescents' perceptions of parental involvement

As Table 1 demonstrates, parental academic involvement as reported by parents was lower on average than parental academic involvement reported by adolescents, although the difference was minimal ($gap_{parent-student} = -0.027$). In general, parents reported higher levels of parent-child communication than adolescents. However, the disparity was also minimal ($gap_{parent-student} = 0.032$). Meanwhile, levels of parent-child communications conceived by both parents (mean = 3.628, *sd* = 0.790) and adolescents (mean = 3.596, *sd* = 0.895) were higher than the parental academic involvement reported by parents (mean = 3.292, *sd* = 0.876) and students (mean = 3.319, *sd* = 0.952). In terms of the parent-teacher communication, 42.7% of the parents reported that they frequently communicated with teachers, while 50.6% of the students replied the same. Thus, more students deemed that their parents kept close communication with their teachers ($gap_{parent-student} = 7.9\%$).

Correlation results among the parental involvement variables (Table 2) indicated that parents' perception of parental academic involvement was positively and moderately associated with students' perception of parental academic involvement, $r = 0.507$. Similarly, parent-reported parent-child communication was positively and moderately associated with student-reported parent-child communication, $r = 0.417$. All other correlations were positively but weakly to moderately associated with one another, although the relationship between student-reported parent-teacher communication and parental academic involvement was moderate and positive, $r = 0.407$.

Crosstab results showed that among the parents who did not report that they kept close communication with teachers, 66.4% of the adolescents reported that their parents did not frequently communicate with their teachers. Among parents who reported that they kept frequent communication with teachers, 73.6% of the adolescents perceived that their parents had close communication with teachers. Therefore, a certain degree of mismatch existed between parents' and adolescents' perceptions of parent-teacher communication. Furthermore, regardless of whether it was parents' or adolescents' perception, the mean scores of parental academic involvement and parent-child communication were higher for those parents who kept frequent communication with teachers, rather than for the parents who did not (Table 3).

4.2. Parental Involvement, control variables and depression

As Table 2 illustrates, although the magnitude of the correlations was small, both parents' ($r = -0.143$) and students' ($r = -0.200$) perceptions of parent-child communication were negatively and significantly associated with depression in adolescents. Specifically, higher levels of parent-child communication were related to lower levels of depression. Considering both the magnitude and significance of the correlations, all

Table 3
Parental academic involvement and parent–child communication by parent–teacher communication.

Parent-teacher communication	Parental academic involvement (parent report)		Parental academic involvement (student report)		Parent-child communication (parent report)		Parent-child communication (student report)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Parent report								
Frequent communication	3.618	0.832	3.551	0.945	3.833	0.779	3.768	0.919
No frequent communication	3.048	0.827	3.146	0.920	3.475	0.764	3.468	0.854
Student report								
Frequent communication	3.438	0.885	3.702	0.891	3.767	0.771	3.841	0.882
No frequent communication	3.142	0.841	2.927	0.848	3.486	0.785	3.345	0.837

other parental involvement variables basically presented no relationships with student depression.

Relationships between the control variables and student depression varied. Holding higher levels of positive attitude towards staying at home ($r = -0.248$) as well as bearing higher levels of affective engagement in online learning ($r = -0.161$) were significantly associated with lower levels of depression, although the correlations were small in their magnitude. In contrast, higher levels of worries resulting from the COVID-19 pandemic was moderately and significantly associated with higher levels of depression among the adolescents, $r = 0.303$. Spending more time on learning online was unrelated to student depression ($r = 0.087$). Nevertheless, due to the relatively large sample size, this positive but weak correlation was significant. Notably, students' time spent in exercising ($r = -0.035$) and family annual income ($r = -0.043$) were not associated with depression in students.

In addition, comparing the means indicated that students with parents who felt the expenses of online learning imposed an economic burden on them (mean = 1.861, $sd = 0.776$) had a higher depression score than those with parents who did not sense such a burden (mean = 1.515, $sd = 0.594$). Students with parents who regarded the COVID-19 pandemic as having a negative impact on their anticipated income (mean = 1.590, $sd = 0.645$) generally had a higher level of depression than those with parents who did not feel such an impact (mean = 1.458, $sd = 0.549$). Female students (mean = 1.550, $sd = 0.618$) had a slightly higher level of depression than that of male students (mean = 1.504, $sd = 0.591$). Grade 9 students (mean = 1.588, $sd = 0.596$) showed the highest level of depression, followed by grade 8 (mean = 1.532, $sd = 0.640$) and then grade 7 (mean = 1.468, $sd = 0.576$) students, indicating that depressive tendencies lowered with the students' age. As for parents' educational level, students with either father (mean = 1.497, $sd = 0.595$) or mother (mean = 1.498, $sd = 0.594$) who received undergraduate education had lower levels of depression than those with either father (mean = 1.637, $sd = 0.628$) or mother (mean = 1.617, $sd = 0.629$) had no such education.

4.3. Multicollinearity among parental involvement variables

As shown in Table 2, none of the correlations among parental involvement variables were equal to or larger than $|0.7|$, which did not suggest the existence of collinearity between parental involvement variables. In addition, the multicollinearity among the parental involvement variables were examined with depression as the dependent variable. Results demonstrated that none of the Variance Inflation Factors (VIFs) were >5 (Table 2), which did not indicate the existence of multicollinearity. Therefore, it was justifiable to put both parents' and students' perceptions of parental involvement variables in the same regression models. This analysis, as also suggested by Korelitz and Garber (2016), allowed us to better determine which group of reporters' views mattered more.

Table 4
Stepwise multiple linear regression with school fixed effects.

	Depression	
	Model 1 B (se)	Model 2 B (se)
Parental academic involvement (parent report)	-0.010 (0.021)	-0.004 (0.020)
Parental academic involvement (student report)	0.052** (0.020)	0.051** (0.019)
Parent-child communication (parent report)	-0.050* (0.022)	-0.028 (0.021)
Parent-child communication (student report)	-0.155*** (0.020)	-0.084*** (0.021)
Parent-teacher communication (parent report)	0.093** (0.035)	0.087** (0.033)
Parent-teacher communication (student report)	-0.035 (0.036)	-0.010 (0.035)
Students' positive attitude towards staying at home		-0.120*** (0.024)
Worries brought by the COVID-19		0.166*** (0.016)
Affective engagement		-0.041* (0.019)
Time spent on online learning		-0.002 (0.010)
Time spent on exercising		0.031 (0.035)
Family economic burden		0.248** (0.090)
Reduced expected income		0.078** (0.030)
Female (vs Male)		0.044 (0.029)
Grade (vs Grade 9)		
Grade 7		-0.080* (0.038)
Grade 8		-0.025 (0.040)
Family annual income		0.017 (0.009)
Father's education (vs no undergraduate)		0.043 (0.054)
Mother's education (vs no undergraduate)		0.008 (0.050)
Adjusted R ²	7.4%	18.2%

Notes: 1. B = Unstandardized coefficients; 2. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; 3. Family annual income was converted into US dollars based on the rate of May 23, 2020 (1 USD = 7.12 CNY); 4. School fixed effects were included in all the models.

4.4. Multiple linear regression models with school fixed effects predicting depression in students

Taking account of school fixed effects, model 1 results displayed (see Table 4) that higher levels of parent- (B = -0.050, $p < 0.05$) and student-reported (B = -0.155, $p < 0.05$) parent–child communication were associated with lower levels of depression among students. Specifically, one unit increase in parents' perception of parent–child communication was related to 0.050 point decrease in students' depression score. And, one unit increase in students' perception of parent–child communication was related to a 0.155 point decrease in the depression score. Hence, in comparison with parents' perception, students' perception of the parent–child communication had a stronger negative relationship with depression in students. In contrast, controlling all other parental involvement-related variables and school fixed effects, one unit increase in student-reported parental academic involvement was associated with 0.052 point increase in students' depression score, B = 0.052, $p < 0.05$. In addition, students with parents who reported keeping frequent communication with teachers generally had a significantly higher

depression score than the students with parents who did not do so, $B = 0.093, p < 0.05$. Parents' perception of parental academic involvement ($B = -0.010, p > 0.05$) and student-reported parent-teacher communication ($B = -0.035, p > 0.05$) were not related to student depression. Model 1 in total explained 7.4% of the variance in student depression.

Model 2 results (see Table 4) indicated that students' perception of parent-child communication was still negatively and significantly associated with student depression, $B = -0.084, p < 0.05$, although the reduction in depression was lower than that in Model 1 (from 0.155 to 0.084). One unit increase in student-reported parent-child communication was related to 0.084 unit decrease in depression. In the meantime, parents' perception of parent-child communication is not significant, $B = -0.028, p > 0.05$. As for parental academic involvement reported by students ($B = 0.051, p < 0.05$) and parent-teacher communication reported by parents ($B = 0.087, p < 0.05$), they remained positively and significantly associated with student depression, and presented no great reduction in the effects (i.e., from Model 1 to Model 2). To be more specific, one unit increase in student-perceived parental academic involvement was related to 0.051 unit increase in depression. Students with parents who reported keeping close communication with teachers tended to have 0.087 unit higher depression score than other students whose parents did not keep such close communication with teachers. Similar to Model 1, parent-reported parental academic involvement ($B = -0.004, p > 0.05$) and student-reported parent-teacher communication ($B = -0.010, p > 0.05$) in Model 2 were not related to student depression.

Results of the other variables in Model 2 showed that students who held more positive attitude towards staying at home ($B = -0.120, p < 0.05$) and effectively engaged more in their online learning ($B = -0.041, p < 0.05$) had lower depression scores than students expressing less positive attitude and effective engagement. In addition, students who bore higher levels of worries towards the spread of COVID-19 pandemic ($B = 0.166, p < 0.05$), with parents who shouldered an economic burden due to their children's online learning ($B = 0.248, p < 0.05$), and with parents who believed that the COVID-19 outbreak lowered their anticipated income ($B = -0.078, p < 0.05$) had significantly higher depression scores than other students. Moreover, seventh grade students had a significantly lower depression score than those at grade 9 ($B = -0.080, p < 0.05$), while eighth grade students did not present a significant difference with those in grade 9 ($B = -0.025, p > 0.05$). Other variables such as students' time spent in learning online ($B = -0.002, p > 0.05$) and in exercising ($B = 0.031, p > 0.05$), their gender ($B = 0.044, p > 0.05$), family income ($B = 0.017, p > 0.05$), and whether parents received undergraduate education ($B_{\text{father}} = 0.043, p > 0.05$; $B_{\text{mother}} = 0.008, p > 0.05$) were not associated with student depression. Model 2 explained 18.2% of the variation in depression, in which variables except the ones measuring parental involvement explained 10.8% of the variation in student depression.

5. Discussion and conclusions

5.1. Discrepancies in Parents' and Adolescents' perceptions of parental involvement

Findings of this study suggest that parental involvement should be viewed as a multifaceted construct (Fan & Chen, 2001). Researchers have identified different types of parental involvement (Desimone, 1999) and grouped those types into larger dimensions (Wang & Sheikh-Khalil, 2014). The parental involvement factors examined in this study include home-based versus school-based parental involvement (Brajsa-Zganec, Merkas & Sakic Velic, 2019; Hill & Tyson, 2009). Regardless whether it is from the parents' or adolescents' report, our results reveal that even within the same parental involvement dimensions, discrepancies exist at the levels of parental involvement-related activities and in their relationships with student depression. This finding is further complicated by interrogating student's and parents' differing

perceptions of parental involvement.

Consistent with the findings of previous studies (Paulson, 1994; Thomas, 2019), this research indicates that discrepancies existed in parents' and adolescents' perceptions of parental involvement. As Korelitz and Garber (2016) suggest based on their meta-analysis, the discordance between parents' and their children's perceptions of parents' behaviors may reflect problems in their relationship, and may be associated with their children's maladjustment. In our study, parent-reported parent-child communication is higher than that perceived by students. Nonetheless, levels of parental academic involvement and parent-teacher communication perceived by parents are generally lower than those reported by students. In comparison, DePlanty et al.'s (2007) survey of 234 students and 301 parents from a rural junior high school in the US finds that parents report higher levels of parental involvement behaviors than students in all aspects the researchers examined (e.g., talking to the child's teacher). The differences between our research findings and those presented by DePlanty et al. (2007) may not only result from the sample characteristics as well as the variable definitions and classification, but also should be explained by the cultural differences between the US and China. For example, Cheung and Pomerantz (2011, p. 944) assert that Chinese parents score higher on parents' psychological control than US parents. Also, unlike US parents, the "more involved Chinese parents were, the more psychologically controlling they were." Accordingly, Chinese students may perceive their parents' academic involvement as an excessive burden, while their parents do not hold such perception.

Furthermore, similar with what Thomas (2019) and Paulson (1994) conclude, we find that higher levels of parent-reported parental involvement are associated with higher levels of students' perception of the corresponding behaviors, although these associations are not robust. Since parental academic involvement and parent-child communication appear on the same scale, a comparison between the two measures indicates that both parents and students in this study present higher levels of parent-child communication than that of parental academic involvement. The characteristics of our sample and the social background that this study is situated in perhaps provide an explanation. Students in our study mainly came from financially better-off families and go to relatively prestigious middle schools. Also, compared with primary school students, they are older and learn more advanced knowledge. Andrew et al. (2020) state that during the COVID-19 pandemic, primary and secondary students from better-off families can enjoy higher-quality home learning opportunities which may result in less parental support being needed. Additionally, parents may not be equipped with, for example, enough skills, confidence, and time to support their children's learning at home. Thus, when staying at home, parent-child communication may become an easier task to accomplish in relation to parental academic involvement for our surveyed parents.

As mentioned above, our findings do share similarities with some previous research conducted in western countries. However, we also find that compared to adolescents, parents do not report higher levels of parent involvement in all aspects examined in this study. Cultural differences can be an explanation. For instance, many parents in China regard that parent-teacher communication often focuses on the negative aspects of their child(ren), such as their low academic performance. Thus, parents are inclined to report lower parent-teacher communication frequency than their children. But, the current lack of empirical research examining the differing perceptions of parents and adolescents on multiple aspects of parental involvement weakens our claim.

5.2. Relationships between parental involvement behaviors and depression in students

Different types of parental involvement exhibit varied associations with depression in middle school students. Among all parental involvement behaviors reported by parents and students, higher levels of parent-child communication (home-based involvement) perceived by

students are associated with lower levels of depression in students. Unsurprisingly, parent–child communication perceived by students can be a protective factor for their psychological well-being. For example, Thomas et al. (2019) find that higher levels of parental involvement perceived by students are associated with higher levels of students' well-being at school (e.g., measuring how happy students were). Also, CDC (2020b) recommends that parents maintain a trustworthy relationship and open communication with adolescents to ensure the adolescents' well-being during the COVID-19.

However, we discern that higher levels of students' perception of parental academic involvement (home-based involvement) is linked with higher levels of depression in students. This may be because parental involvement behaviors themselves can impose psychological burdens on students, considering the impact of the COVID-19 pandemic and the parental control tendency of Chinese parents (Cheung & Pomrantz, 2011). Previous research shows that parental pressure for better academic performance can be detrimental to students' mental health (Deb, Strodl & Sun, 2015; Quach et al., 2013). To measure students' perception of parental academic involvement, we asked, for instance, students' rating on the frequency their parents checked their homework. This might have caused students to feel that they were being monitored and controlled. Combined with the stressful situation brought by the COVID-19, this might have further jeopardized students' mental health. Meanwhile, we find that parents' perception of higher parent-teacher communication (school-based involvement) frequency, rather than adolescents' perception, is associated with a higher level of depression. One possible explanation can be students who reported or exhibited a higher level of depression may draw more attention from their parents and therefore result in the increased level of parent-teacher communication, with such communication happening even without students' notice. This observation parallels with what other researchers find in the negative relationship between certain parental involvement behaviors and students' academic performance (Chen, 2008). The *reactive hypothesis* put forward by McNeal (1999) explains this phenomenon well.

Overall, leaving out the directions of the relationships, students' perception of parent–child communication weights more than parental academic involvement reported by students and parent-teacher communication reported by parents in measuring and predicting the levels of student depression. Our findings generally support Esptein's (1995) idea that students are the main actors in their education. Rather than schools, families, and communities, students are the key for their academic and even psychological well-being. Like what Esptein (1995, p. 701) states that “school, family, and community partnerships cannot simply produce successful students,” parents cannot simply assume that what they perceive as good or even great behaviors for their children can lead to desirable psychological outcomes. Skills are needed in parenting as concluded by Korelitz and Garber (2016).

5.3. Implications

This study meticulously examines the relationships between the three types of parental involvement (i.e., parental academic involvement, parent–child communication, and parent-teacher communication) and student depression. Findings suggest that students' and parents' perceptions matter differently on students' psychological well-being. Students' perception of parental academic involvement and parent–child communication, rather than those of parents, are related to depression, suggesting the importance of examining how students actually feel about parental involvement. Thus, while parents, educators, and other stakeholders emphasize the significance of parental involvement, we should attend to how these behaviors of parental involvement are delivered and perceived on the ground. In addition, this study demonstrates that parents' report of parent-teacher communication, rather than that of the students, is positively associated with student depression. This finding implies that parents who keep close communication with teachers may place extra pressure on their

children's education, which in turn can lead to a higher level of depression in adolescents. In all, while Thomas et al. (2019) find that parental involvement as a single construct is positively associated with students' school well-being (regardless whether it is perceived by parents or by their children), this study suggests the existence of discrepancies in parental involvement behaviors in terms of their positive and negative effects on adolescents' mental health as well as the effects of parental involvement perception difference on adolescents' mental health. Further research exploring why and how those discrepancies exist is needed to have a better understanding of the effect of parental involvement on students' mental health.

Other findings of this study offer insights on factors related to students' psychological well-being in the online learning environment, especially during the COVID-19 pandemic, as well as on how those individual and family factors may relate to one's mental well-being. As many researchers and research institutions assert, the general population's mental health is endangered during the COVID-19 pandemic (CDC, 2020c; Gao et al., 2020). Our findings suggest that encouraging and cultivating students (particularly in middle schools in China) to hold positive attitudes towards staying at home and to effectively engage in online learning may reduce their depression level. Adopting some measures to relieve worries that students bear during the COVID-19 pandemic may lower levels of depression in students. Those means may include limited social media exposure during the COVID-19 outbreak (Gao et al., 2020), support services (e.g., counseling) (CDC, 2020c; Zhang et al., 2020), and positive parental involvement behaviors as examined in this study. Meanwhile, more attention should be paid to the students in families experiencing financial difficulties, because the burden that parents encounter may in the end transform into stressors that adversely affect students' psychological well-being (Cao et al., 2020; Fegert et al., 2020; Rajkumar, 2020). While we should attend to the mental health issues related to adolescents (Fegert et al., 2020), our findings show that in general, middle school students at higher grade levels present higher levels of depression than those at the lower grade levels, which may relate to their psychological development as well as the pressure for succeeding in the high school entrance examination. Thus, we need to devise some measures (including counseling services) to help students psychologically adjust themselves towards the unexpected and unprecedented situation caused by the COVID-19 pandemic. Such endeavors would be useful even when we approach the end of the pandemic. Remarkably, exercise has been advised by various sources as a means to guarantee general population's psychological and physical well-beings during the pandemic (CDC, 2020c), but our results do not support this proposition. The interpretation of the findings should be considered with caution, given the cultural differences between eastern and western contexts, such as policy towards the pandemic and parental involvement.

6. Limitations

This study is subject to a few limitations. First, due to China's stay-at-home order, this study could only survey adolescents and parents online, which might harm the response rate and quality of the questionnaires. Second, our sample were drawn from middle schools located in urban areas in eastern China, limiting the generalizability of our findings to a larger population. Third, other aspects of parental involvement, including parental daily life involvement, were not examined. Fourth, the data collected in this study was self-reported. Fifth, while we designed our questionnaires based on existing instrument and literature and did a pilot study, the validity of the instruments could have been impaired by the relatively short of time we had to prepare the questionnaires. Finally, we only studied depression, leaving other mental health issues such as anxiety unexamined. Findings from a large amount of studies conducted during the COVID-19 pandemic suggest that anxiety is another key psychological problem that the general population may suffer from (Brooks et al., 2020; Gao et al., 2020).

Table A1
Variable description

Variable Name	Variable Description	N	Mean	Min	Max	SD	Cronbach's α
Depression (student report)	A derived variable based on mean of 13 items, e.g., "I feel unhappy recently"	1550	1.526	1	4	0.604	0.936
Parental academic involvement (parent report)	A derived variable based on mean of 4 items, e.g., "I check my child's homework"	1550	3.292	1	5	0.876	0.769
Parental academic involvement (student report)	A derived variable based on mean of 4 items, e.g., "my parents check my homework"	1550	3.319	1	5	0.952	0.782
Parent-child communication (parent report)	A derived variable based on mean of 3 items, e.g., "since the COVID-19 outbreak, my child and I have more time to communicate with each other"	1550	3.628	1	5	0.790	0.766
Parent-child communication (student report)	A derived variable based on mean of 3 items, e.g., "since the COVID-19 outbreak, my parents and I have more time to communicate with each other"	1550	3.596	1	5	0.895	0.739
Parent-teacher communication (parent report)	A dummy variable. "Since the COVID-19 outbreak, I frequently communicate with my child's teacher(s)"	1550	0.427	0	1		
Parent-teacher communication (student report)	A dummy variable. "Since the COVID-19 outbreak, my parents frequently communicate with my teacher(s)"	1550	0.506	0	1		
Students' positive attitude towards staying at home (student report)	A derived variable based on mean of 3 items, e.g., "when staying at home, I enjoyed my time"	1550	3.740	1	5	0.828	0.721
Worries brought by the COVID-19 (student report)	A derived variable based on mean of 4 items, "during the COVID-19, I worry about the health of my family"	1550	3.201	1	5	0.905	0.738
Affective engagement (student report)	A derived variable based on mean of 4 items, e.g., "in general, the online courses offered since the outbreak of COVID-19 are interesting"	1514	3.703	1	5	0.918	0.846
Time spent on online learning (student report)	"Recently, how many hours per day, on average, do you spend on taking online courses?"	1490	3.823	0	8.5	1.737	
Exercising time (student report)	"Recently, how many hours per day, on average, do you spend on exercising?"	1503	0.767	0	2	0.425	
Family economic burden (student report)	A dummy variable indicating whether the online course related expense is a burden to parents	1550	0.034	0	1		
Reduced income (parent report)	A dummy variable indicating whether the COVID-19 resulted in a reduction in the expected income	1550	0.517	0	1		
Female (vs. male) (student report)	Students' gender	1550	0.487	0	1		
Grade level (student report)	Students' grade level						
Grade 7		1550	0.368	0	1		
Grade 8		1550	0.306	0	1		
Grade 9 [reference]		1550	0.325	0	1		
Family annual income (parent report)	Family annual income (in USD)	1481	2.950	0.13	10.53	1.863	
Father's education (student report)	A dummy variable indicating whether a student's father received at least undergraduate education	1514	0.787	0	1		
Mother's education (student report)	A dummy variable indicating whether a student's mother received at least undergraduate education	1525	0.761	0	1		

Besides the limitations, the results of this study should be understood in China's specific context. Many of our research participants came from financially better-off families in eastern China. Meanwhile, we collected data during the COVID-19 pandemic, meaning that when we surveyed our participants, they were complying to the stay-at-home order. Students had to rapidly switch from their familiar traditional classrooms to the ill-prepared online learning environment, and many parents had to work from home and experienced a reduction in their incomes. Therefore, although our research results can shed light on the relationships between different types of parental involvement and students' mental health, the differences between parents' and students' perceptions of parental involvement, and students' online learning experiences, the results should be interpreted by taking into account the distinctive situations created by the COVID-19 pandemic.

Declaration of Competing Interest

The authors declare that they have no known competing financial

interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix

See [Table A1](#)

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