Effect of teacher autonomy support on the online self-regulated learning of students during COVID-19 in China: The chain mediating effect of parental autonomy support and students’ self-efficacy

Xuemei Bai | Xiaoqing Gu

Department of Educational Information Technology, East China Normal University, Shanghai, China

Correspondence
Xiaoqing Gu, Department of Educational Information Technology, East China Normal University, 3663 North Zhongshan Road, Shanghai, China. Email: xqgu@ses.ecnu.edu.cn

Abstract

Background: Self-regulated learning (SRL) ability is the key determinant of the success of full-time online learning. Thus, exploring the influencing factors of SRL and their influencing mechanisms is necessary to improve this ability among K-12 students.

Objectives: The purpose of this study was to investigate the influence mechanism of teacher autonomy support on students' online SRL by examining the structural relationship among teacher autonomy support, parental autonomy support, students' self-efficacy, and students' online SRL.

Methods: We use structural equation modelling and effect analysis to analyse the collected data from 961 Chinese K-12 students who engaged in full-time online learning in their homes during the coronavirus disease 2019 (COVID-19) outbreak.

Results and Conclusions: Parental autonomy support and students' self-efficacy play crucial independent mediating roles in the influence of teacher autonomy support on students' online SRL. Parental autonomy support and students' self-efficacy have a chain mediating effect on the influence of teacher autonomy support on students' online SRL.

Implications: On the basis of the results, we suggest that in order to develop students' online SRL ability, it is important for teacher to improve parental autonomy support and students' self-efficacy. In addition, base on the chain mediating effect, to improve students' online SRL, teacher autonomy support needs focus on parental autonomy support, and then parental autonomy support needs focus on improving students' self-efficacy.

KEYWORDS

parental autonomy support, structural equation modelling, students' online self-regulated learning, students' self-efficacy, teacher autonomy support

1 INTRODUCTION

The sudden outbreak of the coronavirus disease 2019 (COVID-19) pandemic has greatly influenced school education. To address this issue, the Chinese government immediately adopted the “classes suspended, but learning continues” emergency plan, requiring the closure of all schools but uninterrupted student learning through online education. Accordingly, schools at all levels, including K-12 and
colleges and universities across the country, successively implemented the emergency plan “classes suspended, but learning continues.” However, this emergency plan not only reveals the indispensability of online education but also its deficiencies. Students conduct full-time online learning completely at home, experiencing a lack of supervision from teachers and a flood of various online information. These challenges cause students to easily lose their way while learning. The self-regulated learning (SRL) ability of students plays a crucial role on whether they can succeed in this type of online learning.

SRL claims that to achieve expected learning outcomes, learners need to conduct SRL through goal setting, metacognitive monitoring, and effort regulation (Zimmerman, 2002). In particular, they should monitor and regulate their cognition, motivation, and behaviour and actively participate in the learning process (Zimmerman & Martinez-Pons, 1990). As a vital learning strategy, SRL is a key determinant of whether students can succeed in online learning (Dent & Koenka, 2016). Some researchers even argued that whether students could succeed in the online learning largely depends on their online SRL ability (Serdyukov & Hill, 2013; Wang et al., 2013). Recently, the importance of SRL competence for online learning became particularly evident in the context of the COVID-19 pandemic, and researchers have suggested that schools should strengthen their investment in promoting the development of students’ SRL competencies (Berger et al., 2021).

Teacher support is one of the important resources that schools can provide for students’ learning. Teacher autonomy support refers to teachers satisfying students’ autonomy needs and improving their internal motivation. Teacher can demonstrate their autonomy support by providing students with choices, understand students’ feelings, and avoiding the use of controlling language (Reeve et al., 2004; Ryan & Deci, 2000). Teacher autonomy support emphasizes providing support for students to solve problems independently (Reeve et al., 2004). The important role of teacher autonomy support has been emphasized and verified by empirical research, such as its influence on student academic success (Gutiérrez & Tomás, 2019), and engagement (Hospel & Galand, 2016; Yu et al., 2016). In a recent study, Chiu (2021) found that online learning environments that supported more autonomy were more likely to engage students in developing SRL.

However, to the best of our knowledge, no study has examined how teacher autonomy support influences students’ online SRL, especially in full-time online learning. In response, based on a thorough literature review, we chose to focus on two critical factors which may contribute on the relationship between teacher autonomy support and students’ online SRL, namely, (1) parental autonomy support and (2) students’ self-efficacy. Therefore, this study focuses on how teacher autonomy support influences students’ online SRL through parental autonomy support and students’ self-efficacy, that is, the indirect influence mechanism of teacher autonomy support on students’ online SRL. Conversely, some researchers claimed that only a few studies have examined the support needed to develop students’ online SRL ability (Araka et al., 2020; Lee et al., 2020; Tran, 2021). Given our findings, we provide suggestions on how to support the further development of online SRL ability among K-12 students.

### 1.1 Parental autonomy support

Researchers found that one of the challenges of online learning during the pandemic is the lack of parental support (An et al., 2021). Other studies have also emphasized the influence of parental support in students’ online learning during the COVID-19 pandemic (Fox, 2020; McCarthy & Wolfe, 2020; Novianti & Garzia, 2020). Parental autonomy support refers to “the degree to which parents value and use techniques which encourage independent problem solving, choice, and participation in decisions (Grolnick & Ryan, 1989, p 144).” Parental autonomy support involves encouraging and supporting children’s initiatives, taking children’s perspectives, offering opportunities to make their own choices, honouring students’ opinions (Deci & Ryan, 1985; Ryan & Deci, 2017) and encourage children to engage in problem solving (Cheung et al., 2022), thereby improving their competence (Feng et al., 2019). Parental autonomy support is critical to students’ learning, and it is considered a highly important variable for student self-regulation and competence in school (Deci et al., 1981). Researcher revealed that parental autonomy is positively associated with student academic engagement (Boonk et al., 2018; Xu et al., 2018). Parents and students have spent the longest time together during the pandemic. Parents can give their children autonomy support. For instance, due to the absence of a fixed schedule, students may procrastinate. Parents can encourage and promote students’ purposeful and effective time management (Won & Yu, 2018). However, as far as we know, no research has investigated the effect of parental autonomy support on students’ online SRL during the COVID-19 outbreak.

### 1.2 Students’ self-efficacy

Self-efficacy refers to “beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments” (Bandura, 1997). Zimmerman’s (2002) SRL model claims that self-efficacy is a motivational variable that affects the SRL of students. It helps student perform and maintain SRL (Pintrich, 1999). Especially in the first stage of the self-regulated process, students’ self-efficacy plays a crucial role in the use of SRL strategies, such as goal setting and strategy planning (Zimmerman, 2002). In terms of empirical research, research on self-efficacy has mixed results. For instance, one study with a large sample (N = 815) found that “self-efficacy scores were not correlated with student performance” (Puzziferro, 2008). However, overall, the vast majority of research confirms the important role of self-efficacy. Recently, researchers found that self-efficacy significantly predicted the satisfaction of students with distance learning (Al-Tarawneh et al., 2021). Martín et al. (2021) revealed that self-efficacy is significantly associated with achievement and significantly mediates the relationship between adaptability and achievement. In addition, research has investigated the mediating role of students’ self-efficacy between teacher autonomy support and students’ deep learning (Zhao & Qin, 2021), children’s academic achievement (Grijalva-Quinonez et al., 2020), and university students’ academic
success (Gutiérrez & Tomás, 2019). However, as far as we know, no study has investigated the mediating role that students’ self-efficacy plays on the influence of teacher autonomy support on students’ online SRL.

Therefore, the purpose of this study is to investigate the influence mechanism of teacher autonomy support on students’ online SRL by examining the structural relationship among teacher autonomy support, parental autonomy support, students’ self-efficacy, and students’ online SRL. The research questions for this study are as follows:

1. Does parental autonomy support mediate the relationship between teacher autonomy support and students’ online SRL?
2. Does students’ self-efficacy mediate the relationship between teacher autonomy support and students’ online SRL?
3. Does parental autonomy support and students’ self-efficacy have a chain mediating effect on the influence of teacher autonomy support on students’ online SRL?

2 | RESEARCH HYPOTHESIS AND THEORETICAL MODEL CONSTRUCTION

2.1 | Teacher autonomy support, parental autonomy support, and online SRL

Teachers can guide or encourage parents on how they can provide support for their children’s learning. In addition, teacher support for students will help parents feel that teachers care and attach importance to their children’s learning, eventually leading to the realization of their responsibilities in the process (Marisela, 2014). At the same time, parents can fully understand how the school system works and perceive their role in the system (Ordoñez-Jasis & Ortiz, 2006). Schuck et al. (2021) found that teachers emphasize providing support to families and reported opportunities for teachers and parents to learn more about each other during COVID-19 pandemic.

In addition, parental autonomy support is another vital external environmental factor for student learning. In the traditional classroom, teachers mainly guide and support student learning. However, when students receive full-time online learning in their homes, parental autonomy support is also significant (Zheng & Wan, 2020). Students’ characteristics, such as cognitive ability, age, gender, and talent, influence their SRL ability (Zimmerman & Martinez-pons, 1990). Generally, the SRL ability of K-12 students is lower than that of adult learners. Therefore, parental autonomy support is important when they are receiving online education in their homes. In recent studies, Won and Yu (2018) found that students’ perceived parental autonomy support is positively correlated with time management (one important sub-dimension of SRL). Grijalva-Quíñonez et al. (2020) found that parental autonomy support is positively associated with children’s SRL. In short, teacher autonomy support influences parental autonomy support, which, in turn, influences students’ online SRL. This study speculates that teacher autonomy support may influence students’ online SRL through parental autonomy support. We therefore propose the following hypothesis:

H1. Parental autonomy support plays a mediating role in the influence of teacher autonomy support on the online SRL ability of students.

2.2 | Teacher autonomy support, students’ self-efficacy and online SRL

According to self-determination theory (SDT), teacher autonomy support, which meets students’ basic psychological needs and enhances their intrinsic motivation, is an important factor to the development of students’ self-efficacy (Deci et al., 1981). Recently, the influence of teacher autonomy support on students’ self-efficacy has been empirically examined. The results show that students’ perceived teacher autonomy support influences their self-efficacy (Duchatelet & Donche, 2019; Gutiérrez & Tomás, 2019; Li et al., 2020; Zhao & Qin, 2021). In addition, in an online environment, self-efficacy is a personal characteristic factor that influences students’ online SRL. Many studies have found that students’ self-efficacy has a positive correlation with the use of online SRL strategies (Cho & Shen, 2013; Lee et al., 2020; Shea & Bidjerano, 2010). For example, Lee et al. (2020) revealed that self-efficacy has a correlation with the use of SRL strategies and is a significant predictor of SRL strategies. Therefore, in short, teacher autonomy support influences students’ self-efficacy, which, in turn, influences their online SRL. This study speculates that teacher autonomy support may influence students’ online SRL through their self-efficacy. Thus, we propose the following hypothesis:

H2. The self-efficacy of students plays a mediating role in the influence of teacher autonomy support on their online SRL ability.

2.3 | Teacher autonomy support, parental autonomy support, students’ self-efficacy, and online SRL

In addition to teacher autonomy support, parental support is also crucial to students’ self-efficacy (Schunk et al., 2008). Support from parents can increase students’ learning motivation and enable them to realize that they can finish learning activities. Sha et al. (2016) took a science class as a research context and found that parental support influences student learning by influencing their learning interest and self-efficacy in the traditional teaching context. The influence of parental support on self-efficacy is greater than that of learning interest. A meta-analysis study revealed that parental autonomy support is positively associated with students’ intrinsic motivation (Vasquez et al., 2015). Another study revealed that parental autonomy support positively predicts high school students’ self-efficacy (Grijalva-Quíñonez et al., 2020; Jungert & Koestner, 2015). Won and
Yu's (2018) study suggested that parental autonomy support influences students’ self-efficacy for SRL. Moreover, Liu et al. (2019) found that parental autonomy support influences students’ homework self-efficacy. In short, previous studies have found that parental autonomy support affects students’ self-efficacy, but no study has focused on this topic in the context of a fully online learning environment. In addition, at present, direct evidence that explains the mechanism of parental autonomy support and students’ self-efficacy on the influence of teacher autonomy support on students’ online SRL. Thus, we propose the following hypothesis:

**H3.** Students’ self-efficacy and parental autonomy support play a chain mediating role in the influence of teacher autonomy support on the online SRL ability of students.

Figure 1 shows the proposed theoretical model based on the above hypotheses.

### 3 METHODS

#### 3.1 Instrument

The online SRL scale developed by Barnard et al. (2009) is a commonly used instrument to measure SRL ability (Zhou et al., 2021). This online SRL scale includes six sub-dimensions: goal setting, environment construction, task strategy, time management, seeking help, and self-evaluation. In the present study, combined with the SRL measurement scale developed by Pintrich (1999), we replaced self-evaluation with effort regulation and peer learning. Effort regulation and peer learning reflect the key learning strategies in the performance stage of SRL. These sub-dimensions of SRL strategies are significant for online learning. Effort regulation refers to the ability of learners to control and monitor their efforts to finish learning tasks, such as the ability to concentrate on learning even when the learning process is boring or difficult. Peer learning has a positive influence on the academic achievement of students (Michinov et al., 2011). Dialogue with peers can help students gain new insights. Given the lack of face-to-face communication, online learning environments should prioritize peer learning (Broadbent & Poon, 2015). Finally, we established an online SRL ability measurement scale containing 7 sub-dimensions and 29 measurement indicators. We also designed seven items to determine students’ self-efficacy and six items to assess teacher autonomy support developed by Jang et al. (2012). Following the questionnaire developed by Wang et al. (2007) and Mageau et al. (2015), we formed four items to gauge parental autonomy support. We adopted a five-point Likert scale in all the above measurement indicators. All measurement items are shown in the Appendix.

| Latent variable | Measurement indicators | Cronbach’s $\alpha$ | Combination reliability | AVE |
|-----------------|------------------------|----------------------|-------------------------|-----|
| TAS             | TS1                    | 0.844                | 0.914                   | 0.68|
|                 | TS2                    | 0.853                |                         |     |
|                 | TS3                    | 0.820                |                         |     |
|                 | TS4                    | 0.827                |                         |     |
|                 | TS5                    | 0.777                |                         |     |
| PAS             | PS1                    | 0.864                | 0.864                   | 0.62|
|                 | PS2                    | 0.749                |                         |     |
|                 | PS3                    | 0.854                |                         |     |
|                 | PS4                    | 0.659                |                         |     |
| Students’ self-efficacy | SE1          | 0.870                | 0.959                   | 0.77|
|                 | SE2                    | 0.853                |                         |     |
|                 | SE3                    | 0.878                |                         |     |
|                 | SE4                    | 0.854                |                         |     |
|                 | SE5                    | 0.876                |                         |     |
|                 | SE6                    | 0.924                |                         |     |
|                 | SE7                    | 0.892                |                         |     |
| Students’ online SRL | GS                   | 0.802                | 0.939                   | 0.69|
|                 | ES                     | 0.779                |                         |     |
|                 | TS                     | 0.909                |                         |     |
|                 | TM                     | 0.903                |                         |     |
|                 | HS                     | 0.841                |                         |     |
|                 | ER                     | 0.830                |                         |     |
|                 | PL                     | 0.728                |                         |     |

Note: TAS and PAS refer to teacher and parental autonomy support respectively.
3.2 | Data collection

We collected our data from middle and high school students who participated in the online learning of “classes suspended, but learning continues” during the COVID-19 outbreak in China. After editing all scales to the questionnaire platform, we sent the link of the questionnaire to the respondents, inviting them to fill in the questionnaire voluntarily. Overall, we collected 1081 sample data. All the data collected were preprocessed to ensure that no missing or abnormal values appear in the overall sample data. In the preprocessing, we omitted 120 samples, leaving 961 samples as valid sample data. Among the participants, 407 (42.4%) were male, and 554 (57.6%) were female. A total of 57 (5.9%) students were in the 7th grade, 350 (36.4%) in the 8th grade, 42 (4.4%) in the 9th grade, 146 (15.2%) in the 10th grade, 305 (31.7%) in the 11th grade, and 61 (6.3%) students in the 12th grade.

3.3 | Descriptive analysis

First, we tested the reliability and validity of the measurement model by determining the Cronbach’s $\alpha$ coefficient and combination reliability. Table 1 shows the reliability analysis results. The Cronbach’s $\alpha$ coefficient of the measurement model exceeded the threshold value of 0.7, except for item PS4, which was close to 0.7. The combination reliability of each sub-dimension was greater than the threshold value of 0.8. Thus, the measurement model had high reliability.

Second, we ensure the convergence validity and discriminant validity of the measurement model by obtaining the average variance extraction (AVE) and its square root. Generally, the AVE value should be greater than 0.5 (Fornell & Larcker, 1981). Its square root should be greater than the absolute value of the correlation coefficient between the latent variables. Accordingly, the internal correlation should be greater than the external correlation to determine that the measurement model has good discriminative validity. For the measurement model, the AVE and its square root met the requirements (Tables 1 and 2, respectively), indicating high convergence validity and discriminant validity of the measurement model.

4 | MODEL TEST AND RESULTS

4.1 | Model fitting testing

We used AMOS 22.0 software to examine the structural model and conduct structural equation modelling (SEM) with maximum likelihood to estimate the parameters. Table 3 shows the results and includes the $\chi^2$/df, goodness-of-fit index (GFI), comparative fit index (CFI), normed fit index (NFI), Tucker–Lewis index (TLI), and root mean square error of approximation (RMSEA) as indicators to evaluate the goodness of the structural model fitting. In Table 3, $\chi^2$/df < 5.0, GFI > 0.90, AGFI > 0.80, CFI > 0.90, NFI > 0.90, TLI > 0.90, and RMSEA < 0.08, indicating good model fitness.

4.2 | Hypothesis testing

We examined the statistical significance of the path coefficient between the variables. Table 4 and Figure 2 present the following results. The $p$ values of the research hypotheses were all less than 0.05, the path coefficients were all positive and between (−1, 1), and the CR values all exceeded 2. Teacher and parental autonomy support and students’ self-efficacy significantly and positively influence students’ online SRL ability ($p < 0.001$), indicating that the more autonomy support from teacher and parental and the higher students’ self-efficacy is, the higher the level of students’ online SRL will be. Teacher and parental autonomy support also significantly and positively influenced students’ self-efficacy ($p < 0.001$), indicating that the more autonomy support from teacher and parental is, the higher students’ self-efficacy will be. Finally, teacher autonomy support significantly and positively influenced parental autonomy support ($p < 0.001$).

| Latent variable | TS | PS | Students’ self-efficacy | Students’ online SRL |
|-----------------|----|----|-------------------------|----------------------|
| TAS | 0.825** |
| PAS | 0.634** | 0.786** |
| Students’ self-efficacy | 0.507** | 0.619** | 0.878** |
| Students’ online SRL | 0.639** | 0.671** | 0.800** | 0.830** |

Note: TAS and PAS refer to teacher and parental autonomy support respectively. **$p < 0.001$.

| Fit criteria | $\chi^2$/df | GFI | CFI | NFI | TLI | RMSEA |
|--------------|-------------|-----|-----|-----|-----|-------|
| Hypothesized model | 4.888 | 0.905 | 0.953 | 0.941 | 0.945 | 0.064 |
indicating that the more autonomy support from teacher is, the more autonomy support from parents will be.

### 4.3 Effect analysis

#### 4.3.1 Direct, total indirect, and total effect analyses among variables

In the proposed model, except for direct effect, teacher autonomy support affects students’ online SRL through parental autonomy support and students’ self-efficacy. Direct, total indirect, and total effect of teacher autonomy support on students’ online SRL were analysed using Mplus7.0 software, and the results are displayed in Table 5. The *p* values of direct, total indirect, and total effect were less than 0.001. Bootstrapping with 95% confidence intervals (CI) were 0.060–0.117, 0.105–0.161, and 0.190–0.252 (Table 5), indicating that the direct, total indirect, and total effect of teacher autonomy support on students’ online SRL were significant. Specifically, the total indirect effect was 0.133, accounting for 59.9% of the total effect, whereas the direct effect was 0.088, accounting for 39.6% of the total effect.

In the mediating effect analysis, if the direct influence of variable A on variable B is moderated by variable C, then variable C becomes a mediator.

#### Table 4 Results of hypothesis testing and standardized path coefficient

| Predicted variable | Predictive variables | Path coefficient | CR     | *p*  |
|--------------------|----------------------|------------------|--------|------|
| PAS                | TAS                  | 0.631            | 17.263 | ***  |
| Students’ self-efficacy | TAS                  | 0.238            | 5.668  | ***  |
|                    | PAS                  | 0.378            | 9.749  | ***  |
| Students’ online SRL | TAS                  | 0.237            | 7.527  | ***  |
|                    | PAS                  | 0.194            | 5.950  | ***  |
|                    | Students’ self-efficacy | 0.560          | 17.406 | ***  |

Note: TAS and PAS refer to teacher and parental autonomy support respectively.*** *p* < 0.001.

#### Table 5 Results of direct, total indirect and total effect analysis

|                      | Estimate(effect) | Product of coefficients | Bootstrapping 95% CI |
|----------------------|------------------|-------------------------|----------------------|
| Direct effect        | 0.088***         | 0.017                   | 0.060–0.117          |
| Total indirect effect| 0.139***         | 0.017                   | 0.105–0.161          |
| Total effect analysis| 0.222***         | 0.019                   | 0.190–0.252          |

*** *p* < 0.001.

#### Table 6 Results of mediating effect analysis

|                      | Estimate(effect) | Product of coefficients | Bootstrapping 95% CI |
|----------------------|------------------|-------------------------|----------------------|
| TAS → students’ self-efficacy → students’ online SRL | 0.041***         | 0.013                   | 0.021–0.063          |
| TAS → PAS → students’ online SRL | 0.051***         | 0.010                   | 0.034–0.068          |
| TAS → PAS → students’ self-efficacy → students’ online SRL | 0.042***         | 0.008                   | 0.030–0.057          |

Note: TAS and PAS refer to teacher and parental autonomy support respectively.*** *p* < 0.001.
variable B is greater than its indirect influence on variable B through the mediating variable C, then the mediating variable C does not play a crucial role on variable B. If the direct influence is less than the indirect influence, then the mediator variable C influences variable B, and the mediator variable C is the key influencing factor of variable B.

In the present study, the total indirect effect of teacher autonomy support on students’ online SRL through parental autonomy support and students’ self-efficacy was stronger than its direct effects, indicating that parental autonomy support and students’ self-efficacy were significant mediating variables of the influence of teacher support on students’ online SRL.

### 4.3.2 Mediating effect analysis

The established theoretical model is a chain mediation model. The present three paths are teacher autonomy support → students’ self-efficacy → students’ online SRL, teacher autonomy support → parental autonomy support → students’ online SRL, and teacher autonomy support → parental autonomy support → students’ self-efficacy → students’ online SRL. Mplus7.0 software was used to analyse the mediating effect with bootstrapping methods, and the results are displayed in Table 6 and Figure 2.

The mediating relations of the variables were tested using a bootstrapping method (n = 5000 bootstrap samples). The significance of the indirect effects was determined at the level of 0.05; the indirect effect was considered statistically meaningful if the estimates of the 95% CI did not contain zero. Given that the indirect effect p values of the three paths were less than 0.001 and the indirect results of bootstrapping 95% CI did not contain 0 (Table 6), the three mediating effect paths were thus supported. Specifically, the indirect effect of the teacher autonomy support → parental autonomy support → students’ online SRL path was the largest, which indicates that parental autonomy support has more significant influence.

### 5 DISCUSSION

Our investigation proved that the total indirect effect of teacher autonomy support on students’ online SRL through parental autonomy support and students’ self-efficacy was stronger than its direct effects, indicating that parental autonomy support and students’ self-efficacy were significant mediating variables of the influence of teacher autonomy support on students’ online SRL. These two variables accounted for 59.9% of the total effect.

First, this study revealed that parental autonomy support mediated the influence of teacher autonomy support on students’ online SRL (teacher autonomy support → parental autonomy support → students’ online SRL), indicating that teacher autonomy support had a significant indirect influence on students’ online SRL through parental autonomy support. Specifically, perceived teacher autonomy support could promote parental autonomy support and thus enhance students’ online SRL. Teacher autonomy support positively predicted parental autonomy support. This finding supports the previous research findings that teacher autonomy support is significantly correlated with parent autonomy support (Nini et al., 2019).

During the COVID-19 pandemic, teachers have implemented all teaching interventions and provided student support through the Internet. Students have stayed at home with their parents and continued their studies at home. Therefore, the autonomy support from teachers can easily be perceived by parents. The more autonomy support teachers provide students, the easier the parents will feel that teachers are making efforts to promote their children’s learning. In turn, this feeling will stimulate parents’ attention toward their children’s learning (Marisela, 2014) and may encourage them to provide their children more autonomy support.

This study revealed that parental autonomy support positively predicted students’ online learning SRL. These findings are in line with the finding that parental autonomy support positively affects students’ mathematics homework effort (Feng et al., 2019). According to self-determination theory (Deci & Ryan, 2000), autonomy support can satisfy students’ basic psychological need, which can enhance students’ learning engagement in tasks. Therefore, with autonomy support from parents, student exert more effort into learning tasks (Feng et al., 2019), which show higher levels of SRL. Second, according to SDT that when parents provide autonomy support, children are more likely to recognize the value of learning, and thus exhibit more autonomous motivation of learning behaviours (Lerner et al., 2021). Then, the autonomous learning motivation can drive students to regulate and monitor their own learning to conduct self-regulated learning. Finally, parental autonomy support can create an independent learning environment for students, which help students feel trust and support. This phenomenon can promote students’ autonomy, and they thus actively monitor and regulate their own learning.

Second, students’ self-efficacy mediated the effects of teacher autonomy support on students’ online SRL (teacher autonomy support → students’ self-efficacy → students’ online SRL), which indicated that the more teacher autonomy support students perceive, the higher the students’ self-efficacy will be and thus the higher the level of their online SRL. Teacher autonomy support influences students’ self-efficacy, which is consistent with previous related research (Duchatelet & Donche, 2019; Li et al., 2020; Wang et al., 2016; Zhao & Qin, 2021) conducted in a traditional face-to-face environment. Zhao and Qin (2021) revealed that teacher autonomy support has a significant influence on students’ self-efficacy. Teacher autonomy support can satisfy students’ internal motivation, which can encourage individual initiative (Gagné et al., 2003) and ultimately influence students’ self-efficacy. Moreover, teacher autonomy support claims avoid creating undue stress (Ryan & Deci, 2000). When teachers provide students with a relaxed and autonomous learning environment, students’ basic psychological needs will be satisfied, and the satisfaction of psychological needs will lead to a higher sense of self-efficacy (Geitz et al., 2016).

Students’ self-efficacy has a significant influence on students’ online SRL, consistent with Lee et al. (2020), who found that self-efficacy is a significant predictor of students’ use of SRL strategies in
massive open online courses (MOOCs). Liang-Yi (2015) found that students’ self-efficacy has a positive correlation with their cognitive learning strategies and motivation strategies. As a significant motivational factor, students’ self-efficacy denotes their confidence in their learning performance and outcome. Students with high self-efficacy are likely to set high learning goals, overcome difficulties, and make efforts, indicating their strong online SRL ability. SRL requires students to regulate their motivation to perform cognitive and meta-cognitive strategies (Zimmerman, 2000). Thus, learning motivation is an important aspect of self-regulating learning. Therefore, as a motivational variable, self-efficacy affects SRL. In summary, previous studies found positive relationships between self-efficacy and SRL in different learning contexts. However, we further found that self-efficacy is a significant mediator for SRL. We also extended the relationship between self-efficacy and SRL from the traditional online learning (Cho & Shen, 2013) and MOOC (Lee et al., 2020) contexts to full-time online learning.

Finally, teacher autonomy support affects students’ online SRL through the chain mediating effect of parental autonomy support and students’ self-efficacy (teacher autonomy support → parental autonomy support → students’ self-efficacy → students’ online SRL). Specifically, parental autonomy support and students’ self-efficacy as mediating variables show sequence and form a mediating chain, through which teacher autonomy support has an indirect effect on students’ online SRL. This finding indicates that the influence of parental autonomy support on students’ self-efficacy plays an important role in the influence of teacher support on students’ online SRL. First, teacher autonomy support significantly predicts parental autonomy support. Then, parental autonomy support has a significant effect on students’ self-efficacy (Liu et al., 2019; Jungert & Koestner, 2015). Finally, students’ self-efficacy significantly affects students’ online SRL (Lee et al., 2020). The chain mediating effect reveals how teacher autonomy support indirectly affects students’ online SRL through parental autonomy support and students’ self-efficacy, helping to understand the influence mechanism of teacher autonomy support on students’ online SRL. Previous studies have investigated that teacher autonomy support (Chiu, 2021), parental autonomy support (Grijalva-Quiñonez et al., 2020), and students’ self-efficacy (Lee et al., 2020) have a crucial effect on students’ online SRL. This study further reveals how the three variables affect students’ online SRL. Finally, the direct effects (accounted for 59.9% of its total effect) of teacher autonomy support on students’ online SRL ability were weaker than its indirect effects (accounting for 39.6% of its total effect), indicating that parental autonomy support and students’ self-efficacy were important mediating variables. This finding fills a gap in the literature research on the relationship among teacher autonomy support, parental autonomy support, self-efficacy, and students’ online SRL.

Notably, the indirect influence of the path of teacher autonomy support → parental autonomy support → students’ online SRL is the largest among the three paths. The reason may rest on the learning context of students during the COVID-19 pandemic. On the one hand, during the epidemic, teachers have been publishing learning tasks, reminding students to participate in learning, and giving guidance to students by sending messages to parents’ mobile phones. Therefore, parents can easily perceive the autonomy support provided by teachers to student. On the other hand, Muijs and Bokhove (2020) also claimed that students’ SRL ability develops through their interaction with others, which depend on the support from teachers and the support they receive at home. During COVID-19 pandemic, students stayed at home and interacted with their parents frequently. Students may obtain some autonomy support while interacting with their parents. Moreover, different from physical classroom learning, online learning during the current health crisis is not restricted by schedules and processes. In other words, the duration of student engagement in learning and doing related activities depends on the students themselves. However, K-12 students tend to have limited SRL ability (Wigfield et al., 2011). Therefore, in full-time online learning at home, parents play a vital role in supporting students’ SRL. Parental autonomy support is more likely to affect students’ online SRL.

6 | IMPLICATIONS

SRL becomes particularly evident in online learning context. The present research finding laid a theoretical foundation for the further research on students’ online SRL. More importantly, it has important practical significance for how to improve students’ online SRL. In China, the pandemic, especially the Omicron variant is still breaking out, and the government is continuing to take measures to immediately open online education in outbreak areas. Therefore, schools in some areas in China are still adopting the “classes suspended, but learning continues” emergency plan once the pandemic breaks out. To ensure that students participate in full-time online learning and can acquire knowledge and skills from online learning, teachers need to provide autonomy support for promoting the development of students’ online SRL skills.

First of all, teachers should focus on improving students’ self-efficacy and parental autonomy support for students’ online SRL development. On the one hand, to improve students’ self-efficacy, teachers can give students enough encouragement and give them appropriate tasks to make the students believe they can and that the task is not that difficult for them to perform. On the other hand, teachers need to make parents perceive their support. Although improving parental autonomy support for students is not the main work of teachers, given the emergence of sudden situations, such as the epidemic, online learning has become or is becoming an important part of student learning, which makes online SRL increasingly important for students anywhere in the world. We encourage schools and teachers who are committed to developing students’ online SRL to keep close contact with their parents by using various technologies, such that parents can feel the teachers autonomy support for student learning. Accordingly, parents will be stimulated to give their children autonomy support and pay attention to the actual effect of their support on students’ online SRL. We encourage parents to express their expectations for their children’s online learning performance to
influence their online SRL performance, help their children in learning plan formulation and progress, and ask their children to share what they have learned. To improve students’ online SRL, teacher autonomy support also needs to pay attention to parental involvement and its influence on students’ self-efficacy. For example, teachers can give parents some guidance on how to improve students’ self-efficacy.

Given that teachers’ transitional autonomy support may hinder the development of students’ online SRL, the autonomy support or scaffolding must be removed as students develop their SRL skills when their online SRL ability has developed to a certain degree.

7 | CONCLUSION, LIMITATIONS, AND RECOMMENDATIONS FOR FUTURE RESEARCH

This study explores the relationship among teacher autonomy support, parental autonomy support, self-efficacy, and K12 students’ online SRL. It mainly investigates how teacher autonomy support influences students’ online SRL through parental autonomy support and students’ self-efficacy among Chinese K-12 students. Our findings are as follows. First, parental autonomy support and students’ self-efficacy are significant variables that mediate the influence of teacher autonomy support on students’ online SRL. Second, parental autonomy support and students’ self-efficacy play a chain mediating role in the influence of teacher autonomy support on students’ online SRL. These findings have some practical implications on how to improve the online SRL ability of students.

This study also has several limitations. We derived our sample data from only one province in China. Therefore, our sample profiles may not be representative of all the Chinese K-12 students, which may affect the generalizability of this study. Another limitation is that further studies should invite more K-12 students from different cultures to reveal the factors influencing online SRL and use other methods to investigate such factors. Moreover, online learning during COVID pandemic has extended beyond a year, the answers could be different at the beginning, in the middle, or toward the end of such a period. Therefore, the timing of data collection might play a role in the present research finding, and the results might not have been homogeneous across the whole timespan, which can be further studied in future studies. Finally, we only investigated three variables from two perspectives and established a model to explore their influence on students’ online SRL ability. In the future, we can explore more students’ characteristics (e.g., task value and goal setting) and external environmental factors and determine their influence on students’ online SRL.

PEER REVIEW

The peer review history for this article is available at https://publons.com/publon/10.1111/jcal.12676.

DATA AVAILABILITY STATEMENT

Data of this study is available upon request.

ORCID

Xiaoting Gu https://orcid.org/0000-0001-8256-5408

REFERENCES

Al-Tarawneh, L, Al-Nasah, M., & Awwad, F. A. (2021). The Effect of the COVID-19 Pandemic among Undergraduate Engineering Students in Jordanian Universities: Factors Impact Students’ Learning Satisfaction. 2021 Innovation and New Trends in Engineering, Science and Technology Education Conference (IETSEC). doi:https://doi.org/10.1109/ietsec51476.2021.9440500

An, Y., Rakowski, K. R., Yang, J., Conans, J., Kinard, W., & Daughtry, L. A. (2021). Examining K-12 teachers’ feelings, experiences, and perspectives regarding online teaching during the early stage of the COVID-19 pandemic. Educational Technology Research and Development, 69, 1–25. https://doi.org/10.1007/s11423-021-10008-5

Araka, E., Maina, E., Gitonga, R., & Oboko, R. (2020). Research trends in measurement and intervention tools for self-regulated learning for e-learning environments—Systematic review (2008–2018). Research and Practice in Technology Enhanced Learning, 15(1), 2–21. https://doi.org/10.1186/s41039-020-00129-5

Bandura, A. (1997). Self-efficacy: The exercise of control. Freeman and Company.

Barnard, L., Lian, W. Y., To, Y. M., Paton, V. O., & Lai, S. L. (2009). Measuring self-regulation in online and blended learning environments. The Internet and Higher Education, 12(1), 1–6. https://doi.org/10.1016/j.iheduc.2008.10.005

Berger, F., Schreiner, C., Hagelitner, W., Jesacher-Rößler, L., Roßnagl, S., & Kraier, C. (2021). Predicting coping with self-regulated distance learning in times of COVID-19: Evidence from a longitudinal study. Frontiers in Psychology, 12, 701255. https://doi.org/10.3389/fpsyg.2021.701255

Boonk, L., Gijsselaers, H. J. M., Ritzen, H., & Brand-Gruwel, S. (2018). A review of the relationship between parental involvement indicators and academic achievement. Educational Research Review, 24, 10–30. https://doi.org/10.1016/j.edurev.2018.02.001

Broadbent, J., & Poon, W. L. (2015). Self-regulated learning strategies & academic achievement in online higher education learning environments: A systematic review. The Internet and Higher Education, 27, 1–13. https://doi.org/10.1016/j.iheduc.2015.04.007

Cheung, S. K., Cheng, W. Y., Cheung, R. Y. M., & Lau, E. Y. H. (2022). Home learning activities and parental autonomy support as predictors of pre-academic skills: The mediating role of young children’s school liking. Learning and Individual Differences, 94, 1041–6080. https://doi.org/10.1016/j.lindif.2022.102127

Chiu, T. K. F. (2021). Student engagement in K-12 online learning amid COVID-19: A qualitative approach from a self-determination theory perspective. Interactive Learning Environments, 29, 1–14. https://doi.org/10.1080/10494820.2021.1926289

Cho, M. H., & Shen, D. (2013). Self-regulation in online learning. Distance Education, 34(3), 290–301. https://doi.org/10.1080/01587919.2013.835770

Deci, E. L., Nezlek, J., & Sheinman, L. (1981). Characteristics of the rewarer and intrinsic motivation of the rewardee. Journal of Personality and Social Psychology, 40, 1–10. https://jbpnzl.people.wm.edu/Reprints/1981-JPS-Deci-Nezlek-Sheinman.pdf

Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. Plenum Press.

Deci, E. L., & Ryan, R. M. (2000). The ‘what’ and ‘why’ of goal pursuits: Human needs and the self-determination of behavior. Psychological Inquiry, 11, 227–268. https://doi.org/10.1207/S15327966PI1104_01

Dent, A. L., & Koenka, A. C. (2016). The relationship between self-regulated learning and academic achievement across childhood and adolescence: A meta-analysis. Educational Psychology Review, 28(3), 425–474. https://doi.org/10.1007/s10648-015-9320-8
Duchatelet, D., & Donche, V. (2019). Fostering self-efficacy and self-regulation in higher education: A matter of autonomy support or academic motivation? Higher Education Research & Development, 38(4), 733–747. https://doi.org/10.1080/07294360.2019.1581143

Feng, X., Xie, K., Gong, S., Gao, L., & Cao, Y. (2019). Effects of parental autonomy support and teacher support on middle school Students’ homework effort: Homework autonomous motivation as mediator. Frontiers in Psychology, 10, 612. https://doi.org/10.3389/fpsyg.2019.00612

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50. https://doi.org/10.1177/0022243781018001004

Fox, K. R. (2020). Bidirectional benefits from school to home literacy practices in the early childhood virtual classroom. In R. E. Ferdig, E. Baumgartner, R. Hartshorne, R. Kaplan-Rakovski, & C. Mouza (Eds.), Teaching, technology, and teacher education during the COVID-19 pandemic: Stories from the field (pp. 133–140). Association for the Advancement of Computing in Education (AACE).

Gagné, M., Ryan, R. M., & Bargmann, K. (2003). Autonomy support and need satisfaction in the motivation and well-being of gymnasts. Journal of Applied Sport Psychology, 15(4), 372–390.

Geltz, G., Joosten-ten Brinke, D., & Kirschner, P. A. (2016). Changing learning behavior: Self-efficacy and goal orientation in PBL groups in higher education. International Journal of Educational Research, 75, 146–158. https://doi.org/10.1016/j.ijer.2015.11.001

Grijalva-Quiñonez, C. S., Valdés-Cuervo, A. A., Parra-Pérez, L. G., & García Vázquez, F. I. (2020). Parental involvement in Mexican elementary students’ homework: Its relation with academic self-efficacy, self-regulated learning, and academic achievement. PsicoLogia Educativa, 26, 129–136. https://doi.org/10.5930/ped.2020a5

Grolnick, W. S., & Ryan, R. M. (1989). Parent styles associated with children’s self-regulation and competence in school. Journal of Educational Psychology, 81(2), 143–154.

Gutiérrez, M., & Tomás, J. M. (2019). The role of perceived autonomy support in predicting university students’ academic success mediated by academic self-efficacy and school engagement. Educational Psychology, 39(6), 729–748. https://doi.org/10.1080/01443410.2019.1566519

Hospel, V., & Galand, B. (2016). Are both classroom autonomy support and structure equally important for students’ engagement? A multi-level analysis. Learning and Instruction, 41, 1–10. https://doi.org/10.1016/j.learninstruc.2015.09.001

Jang, H., Kim, E. U., & Reeve, J. (2012). Longitudinal test of self-determination theory’s motivation mediation model in a naturally occurring classroom context. Journal of Educational Psychology, 104, 1175–1188. https://doi.org/10.1037/a0028089

Jungert, T., & Koestner, R. (2015). Science adjustment, parental and teacher autonomy support and the cognitive orientation of science students. Educational Psychologist, 35, 361–376. https://doi.org/10.1080/00461520.2013.828826

Lee, D., Watson, S. L., & Watson, W. R. (2020). The relationships between self-efficacy, task value, and self-regulated learning strategies in massive open online courses. Australasian Journal of Educational Technology, 35(1), 28–41. https://doi.org/10.19173/irr/v05i2.4389

Lerner, R. E., Grolnick, W. S., Caruso, A. J., & Levitt, M. R. (2021). Parental involvement and Children’s academics: The roles of autonomy support and Parents’. Motivation for Involvement.

Li, W., Gao, W., & Sha, J. (2020). Perceived teacher autonomy support and school engagement of tibetan students in elementary and middle schools: Mediating effect of self-efficacy and academic emotions. Frontiers in Psychiatry, 11, 50. https://doi.org/10.3389/fpsyg.2020.00050

Liang-Yi, C. (2015). Exploring the effectiveness of self-regulated learning in massive open online courses on non-native English speakers. International Journal of Distance Education Technologies, 13(3), 61–73. https://doi.org/10.4018/IJDET.2015070105

Liu, Y., Sang, B., Liu, J. S., Gong, S. Y., & Ding, X. C. (2019). Parental support and homework emotions in Chinese children: Mediating roles of homework self-efficacy and emotion regulation strategies. Educational Psychology, 39(5), 617–635. https://doi.org/10.1080/01443410.2018.1540769

Mageau, G. A., Ranger, F., Joussemet, M., Koestner, R., Moreau, E., & Forest, J. (2015). Validation of the perceived parental autonomy support scale (p-pass). Canadian Journal of Behavioural Science, 47(3), 251–262.

Marisela, S. (2014). Parents and teachers working together to enhance student success in the classroom, dissertation. California State University.

Martin, A. J., Collie, R. J., & Nagy, R. P. (2021). Adaptability and high school Students’ online learning during COVID-19: A job demands-resources perspective. Frontiers in Psychology, 12, 702163. https://doi.org/10.3389/fpsyg.2021.702163

McCarthy, J., & Wolfe, Z. (2020). Engaging parents through school-wide strategies for online instruction. In R. E. Ferdig (Ed.), Teaching, technology, and teacher education during the COVID-19 pandemic: Stories from the field (pp. 7–12). Association for the Advancement of Computing in Education (AACE).

Michinov, N., Brunot, S., Le Bohec, O., Juhel, J., & Delaval, M. (2011). Procrastination, participation, and performance in online learning environments. Computers & Education, 56(1), 243–252. https://doi.org/10.1016/j.compedu.2010.07.025

Muijs, D., & Bokhove, C. (2020). Metacognition and self-regulation: Evidence review. Education Endowment Foundation. https://educationendowmentfoundation.org.uk/evidence-summaries/evidence-reviews/metacognition-and-self-regulation-review/

Nini, W. U., Fan, J., Chen, P., Cai, C., & Education, S. O. (2019). The relationship between parental and teacher autonomy support and school adjustment—The mediating role of hope. Journal of Guangdong University of Education.

Novianti, R., & Garzia, M. (2020). Parental engagement in children’s online learning during COVID-19 pandemic. Journal of Teaching and Learning in Elementary Education, 3(2), 117–131. https://doi.org/10.33578/jtlee.v3i2.7845

Ordoñez-Jasis, R., & Ortiz, R. (2006). Reading their worlds: Working with diverse families to enhance Children’s early literacy development. Young Children, 61(1), 42–48. https://cipl.us/sites/default/files/CC/ELD/TM/docs/readingworlds.pdf

Pintrich, P. R. (1999). The role of motivation in promoting and sustaining self-regulated learning. International Journal of Educational Research, 31(6), 459–470. https://doi.org/10.1016/S0883-0355(99)00015-4

Puzziferro, M. (2008). Online technologies self-efficacy and self-regulated learning as predictors of final grade and satisfaction in college-level online courses. American Journal of Distance Education, 22(2), 72–89.

Reeve, J., Deci, E. L., & Ryan, R. M. (2004). Self-determination theory: A dialectical framework for understanding sociocultural influences on student motivation. In D. M. McInerney & S. Van Etten (Eds.), Big theories revisited: Research on sociocultural influences on motivation and learning (pp. 31–60). Information Age.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being American psychologist, 55(1), 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Ryan, R. M., & Deci, E. L. (2017). Self-determination theory: Basic psychological needs in motivation, development, and wellness. Guilford Press.

Schuck, K. R., Lambert, R., & Wang, M. (2021). Collaborating with parents during COVID-19 online teaching: Special educator perspectives. Education, 3(13), 1–14. https://doi.org/10.1080/03004279.2021.1967421

Schunk, D. H., Pintrich, P. R., & Meece, J. L. (2008). Motivation in education: Theory, research, and applications. Pearson Education Inc.

Serdyukov, P., & Hill, R. (2013). Flying with clipped wings: Are students independent in online college classes? Journal of Research in Innovative Teaching, 6(1), 54–67.
Sha, L., Schunn, C., Bathgate, M., & Ben-Eliyahu, A. (2016). Families support their children’s success in science learning by influencing interest and self-efficacy. *Journal of Research in Science Teaching, 53*(3), 450–472. https://doi.org/10.1002/tea.21251

Shea, P., & Bidjerano, T. (2010). Learning presence: Towards a theory of self-efficacy, self-regulated, and the development of a communities of inquiry in online and blended learning environments. *Computers & Education, 55*(4), 1721–1731. https://doi.org/10.1016/j.compedu.2010.07.017

Tran, M. T. (2021). Self-regulated learning recognition and improvement framework. In *The Asian Conference on Education*. The Asian Conference on Education 2020 Official Conference (pp. 1–18). The International Academic Forum.

Vasquez, A. C., Patall, E. A., Fong, C. J., Corrigan, A. S., & Pine, L. (2015). Parent autonomy support, academic achievement, and psychosocial functioning: A meta-analysis of research. *Educational Psychology Review, 28*, 1–40. https://doi.org/10.1007/s10648-015-9329-z

Wang, C. H., Shannon, D., & Ross, M. (2013). Students’ characteristics, self-regulated learning, technology self-efficacy, and course outcomes in online learning. *Distance Education, 34*(3), 302–323. https://doi.org/10.1080/01587919.2013.835779

Wang, C. K., Ng, B. L. L., Liu, W. C., & Ryan, R. M. (2016). Can being autonomy-supportive in teaching improve students’ self-regulation and performance? In W. C. Liu, J. C. K. Wang, & R. M. Ryan (Eds.), *Building autonomous learners: Perspectives from research and practice using self-determination theory* (pp. 227–243). Routledge.

Wang, Q., Pomerantz, E. M., & Chen, H. (2007). The role of parents? Control in early adolescents? Psychological functioning: A longitudinal investigation in the United States and China. *Child Development, 78*, 1592–1610. https://doi.org/10.1111/j.1467-8624.2007.01085.x

Wigfield, A., Klauda, S. L., & Cambria, J. (2011). Influences on the development of academic self-regulatory processes. In B. J. Zimmerman & D. H. Schunk (Eds.), *Handbook of self-regulation of learning and performance* (pp. 33–48). Routledge.

Won, S., & Yu, S. L. (2018). Relations of perceived parental autonomy support and control with adolescents’ academic time management and procrastination. *Learning and Individual Differences, 61*, 205–215. https://doi.org/10.1016/j.lindif.2017.12.001

Xu, J., Du, J., Wu, S., Ripplcy, H., & Cosgriff, A. (2018). Reciprocal effect among parental homework support, effort, and achievement: An empirical investigation. *Frontier in Psychology, 9*, 1–11. https://doi.org/10.3389/fpsyg.2018.02334

Yu, C., Li, X., Wang, S., & Zhang, W. (2016). Teacher autonomy support reduces adolescent anxiety and depression: An 18-month longitudinal study. *Journal of Adolescence, 49*, 115–123. https://doi.org/10.1016/j.adolescence.2016.03.001

Zhao, J., & Qin, Y. (2021). Perceived teacher autonomy support and Students’ deep learning: The mediating role of self-efficacy and the moderating role of perceived peer support. *Frontiers in Psychology, 12* (652796), 1–12. https://doi.org/10.3389/fpsyg.2021.652796

Zheng, X. D., & Wan, K. (2020). Implementation logic, content and suggestions of home-school partnerships in large-scale K12 online teaching. *China Educational Technology, 4*, 16–21.

Zhou, X., Chai, C. S., Jong, S. Y., & Xiong, X. B. (2021). Does relatedness matter for online self-regulated learning to promote perceived learning gains and satisfaction? *The Asia-Pacific Education Researcher, 30*(3), 205–215. https://doi.org/10.1007/s40299-021-00579-5

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory Into Practice, 41*(2), 64–70. https://doi.org/10.1207/s15430421tip4102_2

Zimmerman, B. J., & Martinez-Pons, M. (1990). Student differences in self-regulated learning: Relating grade, sex, and giftedness to self-efficacy and strategy use. *Journal of Educational Psychology, 82*(1), 51–59. https://doi.org/10.1037/0022-0663.82.1.51

---

**How to cite this article:** Bai, X., & Gu, X. (2022). Effect of teacher autonomy support on the online self-regulated learning of students during COVID-19 in China: The chain mediating effect of parental autonomy support and students’ self-efficacy. *Journal of Computer Assisted Learning, 38*(4), 1173–1184. https://doi.org/10.1111/jcal.12676
## Teacher autonomy support
- I feel that my teacher provides me with choices and options
- I feel understood by my teacher
- My teacher encourages me to ask questions
- My teacher listens to how I would like to do things
- My teacher conveys confidence in my ability to do well in the course
- My teacher tries to understand how I see things before suggesting a new way to do things

## Parental autonomy support
- My parents allow me to make choices whenever possible
- Within certain limits, my parents allowed me the freedom to choose my own activities
- My parents encourage me to give my ideas and opinions when it comes to decisions about me
- My parents listen to my opinions and ideas when something occurs

## Self-efficacy
- I believe I will receive an excellent grade in this class.
- I’m certain I can understand the most difficult material presented in the readings for this course
- I’m confident I can understand the basic concepts taught in this course
- I’m confident I can understand the most complex material presented by the instructor in this course
- I’m confident I can do an excellent job on the assignments and tests in this course
- I expect to do well in this class.
- I’m certain I can master the skills being taught in this class.

Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class

## Online self-regulated learning
### Goal setting
- I set standards for my assignments in online courses.
- I set short-term (daily or weekly) goals as well as long-term goals (monthly or for the semester).
- I keep a high standard for my learning in my online courses.
- I set goals to help me manage studying time for my online courses.
- I do not compromise the quality of my work because it is online

### Environment structuring
- I choose the location where I study to avoid too much distraction.
- I find a comfortable place to study.
- I know where I can study most efficiently for online courses.
- I choose a time with few distractions for studying for my online courses.

### Task strategies
- I try to take more thorough notes for my online courses because notes are even more important for learning online than in a regular classroom.
- I read aloud instructional materials posted online to fight against distractions.
- I prepare my questions before joining in the chat room and discussion.
- I work extra problems in my online courses in addition to the assigned ones to master the course content.

### Time management
- I allocate extra studying time for my online courses because I know it is time-demanding.
- I try to schedule the same time everyday or every week to study for my online courses, and I observe the schedule.
- Although we do not have to attend daily classes, I still try to distribute my studying time evenly across days.

### Help seeking
- I find someone who is knowledgeable in course content so that I can consult with him or her when I need help.
- I share my problems with my classmates online so we know what we are struggling with and how to solve our problems.
- If needed, I try to meet my classmates face-to-face.
- I am persistent in getting help from the instructor through e-mail.

### Effort Regulation
- I often feel so lazy or bored when I study for this class that I quit before I finish what I planned to do. (REVERSED)
- I work hard to do well in this class even if I do not like what we are doing.
- When course work is difficult, I give up or only study the easy parts. (Reversed)
- Even when course materials are dull and uninteresting, I manage to keep working until I finish

### Peer learning
- When studying for this course, I often try to explain the material to a classmate or a friend.
- I try to work with other students from this class to complete the course assignments.
- When studying for this course, I often set aside time to discuss the course material with a group of students from the class.