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The importance of parents for key outcomes among socio-economically disadvantaged students: Parents' role in emergency remote education

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Abstract

Parents play an important role in shaping behavioral and motivational outcomes in their child's education, presumably even more so during the COVID-19 pandemic, where concomitant school closures forced students worldwide to learn remotely at home, affecting socio-economically disadvantaged students most negatively. However, it remains unclear how different parent-focused family process variables (demanding-structuring and responsive-motivational parental involvement, responsibility for learning) and structure variables (socio-economic status, immigrant background) relate to important learning-related student outcomes, namely extrinsic and intrinsic motivation and actual participation in learning activities, during emergency remote education. Using questionnaire data from $N = 117$ German secondary school students ($M_{age} = 15.14$, $SD = 0.93$; 49.6% female) with a low average socio-economic status, structural equation models revealed associations between higher parental involvement and responsibility and higher motivational and behavioral student outcomes. Furthermore, immigrant background related negatively to some parent process variables, and indirectly negatively to extrinsic motivation. These results highlight parents' role in learning, particularly during emergency remote education.

Keywords Emergency remote education · Intrinsic motivation · Learning participation · Parental support · Secondary school

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1 Introduction

The worldwide spread of the Sars-CoV-2 virus in the first months of 2020 had a large impact on educational systems internationally. In late March 2020, over 80% of students worldwide were affected by school closures (UNESCO, 2020). With this sudden shift in students' educational environment from schools to the home, differences in students' family situations influenced students' experience of the home learning situation (e.g., Cullinane & Montacute 2020; Pensiero et al., 2020) and key variables for educational success, such as learning engagement (e.g., Lawrence & Fakuade 2021; Steinmayr et al., 2021).

During emergency remote education (ERE), students' experiences varied greatly. Studies revealed declines for all students on average in many areas, for example learning progress (e.g., Ludewig et al., 2022) and time spent on schoolwork (e.g., Grewenig et al., 2021) but especially disadvantaged students were negatively affected (e.g., Dietrich et al., 2021; Engzell et al., 2021). Overall, students spent significantly more learning time with their parents than with their teachers (Thorell et al., 2021), but levels of parental involvement (PI) differed, with disadvantaged and low-achieving students receiving less support from their parents (e.g., Bol, 2020; Werner & Woessmann, 2021). Theoretical models emphasize family process and structure variables' importance for learning- and achievement-related student variables (e.g., McElvany et al., 2009). Accordingly, previous research showed that family process variables like parents' educational support at home positively influence various student outcomes, such as achievement and academic motivation (e.g., Wilder, 2014; Shukla et al., 2015). Additionally, while the associations of parental involvement with facets of family background are complex, studies suggest a relation of home involvement specifically to family structure variables like socio-economic status (SES; e.g., Tan, 2019; Zhang et al., 2021). These associations might be even more relevant when education takes place in the homes, which requires students to motivate themselves or with help of their parents and pursue learning activities with less or no direct teacher support. Hence, parent and family variables' relation to student outcomes during home learning needs closer investigation. In this study, we specified a model based on the approach by McElvany et al. (2009) to examine how, in a sample of especially vulnerable students from primarily disadvantaged socio-economic backgrounds, family process variables, namely demanding-structuring and responsive-motivational PI, as well as parental perceived responsibility for learning, related to students' intrinsic and extrinsic motivation and participation in learning activities during ERE. Additionally, we investigated whether family structure variables SES and immigrant background influenced those variables and relations.

2 Theory

2.1 Lockdown and emergency remote education

In reaction to the rapid spread of the SARS-CoV-2 virus, most countries around the world resorted to school closures, affecting more than 80% of enrolled learn-

ers worldwide in late March 2020 (UNESCO, 2020). This forced an unprecedented sudden shift from face-to-face instruction to alternative educational approaches on schools and students internationally, which Bozkurt et al. (2020) summarized under the term *emergency remote education.* Internationally, many schools stayed closed for the remaining school year (UNICEF, 2021) or, as was the case for Germany, implemented strict infection control measures upon reopening, leading to students attending in-person instruction on alternating days. Thus, ERE remained part of most secondary school students' educational experience for the rest of the 2019/2020 school year not only in Germany but also many other countries worldwide.

Examining parents' role during ERE, Thorell et al. (2021) found that students spent considerably more learning time with their parents than their teachers, highlighting the importance of adequate parental support. First studies regarding ERE in secondary school confirmed a positive relation between PI and student commitment (Lawrence & Fakuade, 2021), and parents reported being more involved and spending more time learning for school with their children than before the pandemic (Panaoura, 2021; Werner & Woessmann, 2021). However, research also revealed that some parents felt inadequately prepared to support their children (e.g., Andrew et al., 2020; Haller & Novita, 2021; S. J. Lee et al., 2021), with parents from lower socioeconomic backgrounds being less confident overall (Cullinane & Montacute, 2020). Additionally, research on how different PI strategies influenced students' individual learning in ERE is virtually nonexistent. This shows a pressing need for empirical studies examining PI's role for students' motivational and behavioral outcomes during ERE, while simultaneously considering potential influences of family structure variables.

Turning now to the student perspective, considering how changes to students' learning environment wrought by ERE affected their schooling experiences is essential. Students' motivation played an integral role for learning processes in ERE (Baber, 2020; Chiu, 2022); however, outside the classroom, students could rely less on teachers being the source for motivating them and more than 40% of German secondary school teachers sampled by Schneider et al. (2021) reported that motivating students worked (rather) badly. Additionally, over 60% of teachers in that sample indicated that ensuring equal participation of all students worked (rather) badly, which can only partially be explained by technical aspects and difficulties (Schneider et al., 2021). In line with pre-pandemic research highlighting the importance of students' motivation and self-regulation skills for successful participation in distance education (e.g., Kauffman, 2015), these findings imply that students bore more responsibility to partake in learning activities. Multiple studies focusing on the effect of pandemic-induced school closures on students have been conducted already (for a review, see Zancajo, 2021). First evidence from studies in England (Cattan et al., 2021) and Germany (Grewenig et al., 2021) showed that both primary and secondary school students spent less time doing schoolwork than before, especially students from marginalized and socio-economically disadvantaged families (Bayrakdar & Guveli, 2020; Dietrich et al., 2021). In turn, large-scale studies revealed significant education losses: In Germany, a comparison of fourth graders in 2021, one year after the outbreak of the pandemic, with students of the same grade in 2016 revealed significantly lower reading achievement even after controlling for changes in student composition

and other variables, with the former group being estimated to be as much as four to six months of learning behind fourth graders in 2016 (Ludewig et al., 2022). For the initial period of school closures specifically, Engzell et al. (2021) found that Dutch students suffered education losses comparable to the length of school closures across math, spelling, and reading, with losses being even larger for disadvantaged students, implying that students made barely any learning progress during that time. These findings are also in line with results of first literature reviews (e.g., Hammerstein et al., 2021) and meta-analysis (König & Frey, 2022) on an international scale, although some of the studies included might be subject to systematic bias and should thus be interpreted carefully. A cross-national parent survey by Zaccoletti et al. (2020) showed significant motivation losses in primary and lower secondary school students during ERE. Motivation declines were likewise present in higher education students in the United States and Canada (Aguielera-Hermida, 2020; Daniels et al., 2021; Hicks et al., 2021), and Klapproth et al. (2020) found that approximately two-thirds of surveyed German teachers encountered low student motivation as a barrier during ERE. Research focusing on English families (Andrew et al., 2020) and book checkouts in Danish public libraries (Jæger & Blaabæk, 2020) revealed that underprivileged students were provided with fewer educational resources at home and prepandemic studies imply similar patterns for the German context as well (Geis-Thöne, 2020). Additionally, studies from Germany (Werner & Woessmann, 2021), the Netherlands (Bol, 2020) and the United States (Gao et al., 2020) showed that especially low-achieving and disadvantaged students received lower levels of support from their parents during ERE.

2.2 Relations between family structure, family process, and individual student variables

To examine how differences between families influenced students' ERE experience, we considered a theoretical model including *individual student variables* as well as *family structure variables* and *family process variables*. This model allows an investigation of the interrelations of all three groups of variables, while simultaneously maintaining an important distinction between them. Especially the separation of family structure and process variables is necessary to fully understand the underlying processes influencing student outcomes during ERE. On the one hand, family structure variables comprise information about the family's background, such as household size, SES or immigrant background (McElvany et al., 2009; Brown & Mann, 1990). They can influence both family process variables and individual student outcomes and thus need to be considered, but usually cannot be changed easily. Family process variables on the other hand include parents' beliefs, cultural and communicative practices (Baumert et al., 2003; Davis-Kean, 2005), reflecting aspects of the family's cultural and social capital (Bourdieu, 1986). They are also associated with students' individual outcomes, serving as partial mediators for the effects of family structure variables (e.g., Serbin et al., 2013; von Otter, 2014). In contrast to structure variables, parents have more direct control over the process variables. Thus, considering family process variables in ERE is important, especially for identifying factors that allow parents to influence their children's outcomes in a positive way.

This theoretical model has been applied in various educational settings (e.g., McElvany et al., 2009; Baumert et al., 2003; Davis-Kean, 2005) and is similarly applicable to the unique circumstances of ERE. A simplified depiction is provided in Fig. 1. Family structure variables like SES and immigrant background can influence both family process and student variables and were consequently included in the analyses. Regarding process variables, we focused on parents' role, including measures of PI and responsibility. As student variables, we included variables we deemed especially relevant for the extraordinary situation of ERE.

2.3 Important individual student variables for emergency remote education

Students' ERE experience had many facets, but learning motivation was especially important due to its role within self-regulated learning and strong association with educational outcomes (e.g., Eom, 2019; Kriegbaum et al., 2018; Lim & Yeo, 2021). We included two central dimensions of school-related learning motivation: *Extrinsic motivation* means pursuing activities to achieve some external outcome, while *intrinsic motivation* comprises doing activities for their own sake, out of enjoyment of the activity or the challenge it entails (Ryan & Deci, 2000). The associations between extrinsic motivation and other educational outcomes, like achievement and cognitive engagement, are ambiguous (e.g., Lepper et al., 2005; Taylor et al., 2014; Walker et al., 2006), potentially due to varying levels of internal control in different subtypes of extrinsic motivation (Ryan & Deci, 2020). Intrinsic motivation, in contrast, relates consistently positively to educational outcomes, including academic achievement (Taylor et al., 2014), classroom engagement and setting challenging learning goals (Froiland & Worrell, 2016), and meaningful cognitive engagement (Walker et al., 2006). While not mutually exclusive (Litalien et al., 2017), direction and significance of intrinsic and extrinsic motivation's relation vary between studies (e.g., Lepper et al., 2005; Lemos & Veríssimo, 2014). To sum up, motivation is an important student outcome itself while also relating to other relevant learning variables. However, findings of reduced learning motivation (e.g., Aguielera-Hermida, 2020; Zaccoletti et al., 2020), as well as reports by students (Means & Neisler, 2021) and teachers (Klapproth et al., 2020) on lack of motivation as a core problem of ERE show the importance of studying students' motivation in this context.

Similarly important for ERE is students' *participation in learning activities* when learning at home, outside of their typical classroom environment. Learning activities are tasks that learners partake in to pursue intended learning outcomes in an educational setting (Conole, 2007). Previous studies found a positive association between

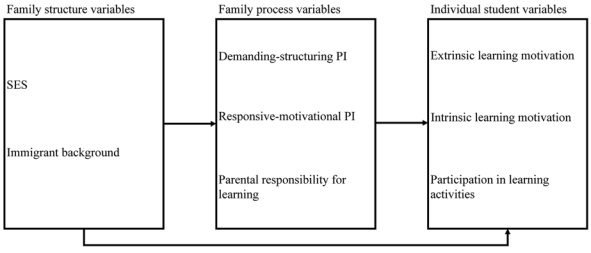

Fig. 1 *Simplified Model of Family Structure and Process Variables' Relations to Individual Student Variables*
Note. Figure adapted from McElvany et al. (2009). Indirect effects and intercorrelations are not depicted

active participation in school learning and academic achievement (Finn & Cox, 1992; Schnitzler et al., 2021). Moreover, research focused on online learning demonstrated positive relations between participation in learning activities and course and learning satisfaction (Cheng & Chau, 2016; Im & Kang, 2019). Therefore, students' frequency of participation in learning activities is an important variable for education both inside and outside the regular classroom setting. Due to the importance of these student variables and the unique home learning situation, investigating how family process variables, especially parental variables presumably central to fostering these student outcomes, affected them during ERE is crucial.

2.4 Relevant family process variables

Theory and empirical research point out that several central student variables are associated with certain family process variables (e.g., Dettmers et al., 2019; J. S. Lee & Bowen, 2006; see also home literacy environment research, e.g., Dong et al., 2020; Niklas & Schneider, 2013). Of all potentially influential family process variables, parents' role in their children's education seems especially important during ERE. Parents had to partially assume the teacher's role (Knopik et al., 2021; Thorell et al., 2021), leading to them assuming the role of a proxy educator (e.g., Davis et al., 2021), and while most parents reported home learning support from schools (S. J. Lee et al., 2021) to a satisfying extent (Cullinane & Montacute, 2020; Garbe et al., 2020), many still struggled to adequately assist their children (Andrew et al., 2020).

One important aspect to consider is *parental involvement* in their children's ERE. Much interest in PI originated from the Coleman report, which highlighted the importance of family and parental influences for students' school success (Coleman et al., 1966; Jeynes, 2011), but the term still lacks a singular definition (Wilder, 2014). Reynolds (1992) captured this ambiguity by defining PI as "any interactions between a parent and child that may contribute to the child's development or to direct parent participation with a child's school in the interest of the child" (p. 442). This clearly depicts PI as an umbrella term for a multitude of parent behaviors, rather than a singular homogenous construct.

A relevant distinction is commonly made between involvement at home and at school (e.g., Kaplan Toren & Seginer 2015; Reynolds, 1992; Tan, 2019), with the former being especially important for ERE since opportunities for parental school involvement became severely restricted. Previous research showed positive associations between aspects of home involvement and several student outcomes, such as academic achievement (e.g., Y. Li et al., 2019; Wilder, 2014), motivational variables (e.g., Berti et al., 2016; Régner et al., 2009) and learning effort and time (e.g., Dumont et al., 2014; Matsuoka et al., 2015), although negative relations emerged with strongly interfering PI (e.g., Dumont et al., 2012; Gonida & Cortina, 2014). Few studies investigated PI in remote education specifically, but a research synthesis suggested a similarly important role in virtual distance education compared to on-site education in schools (Hasler Waters et al., 2014). Moreover, in Borup's (2016) qualitative research, teachers at a distance education high school identified monitoring performance, motivating the student and organizing learning schedules as the most important forms of parental engagement. However, these studies regarded schools

where students voluntarily enrolled in virtual schooling, unlike ERE. Building on the home involvement model by Dumont et al. (2014) as well as findings by Borup (2016), we considered two factors to cover a broad range of different PI strategies. *Demanding-structuring parental involvement* comprises behaviors aimed at providing structure, setting rules and formulating clear expectations regarding the child's schoolwork. In contrast, *responsive-motivational parental involvement* focuses on parents meeting their children's needs regarding ERE, emotionally supporting, and motivating them.

Another important family process variable is perceived *parental responsibility* for their child's learning during ERE, capturing how much responsibility for their child's learning success parents ascribe to themselves, as opposed to teachers or the students themselves. While research on the association between perceived responsibility and student outcomes is scarce, several studies have found a positive association with PI (e.g., Helker & Wosnitza, 2016; Park & Holloway, 2013). Helker and Wosnitza (2016) additionally found positive relations with students' relatedness, competence and autonomy, which are prerequisites for intrinsic motivation according to self-determination theory (Ryan & Deci, 2000), thus indicating that perceived responsibility affects student outcomes independently of its relation with PI. In ERE, where parents had to compensate for students' reduced teacher contacts (Knopik et al., 2021; Thorell et al., 2021), whether parents felt responsible for their child's learning was presumably of even greater importance and should therefore be considered as a relevant factor affecting students' ERE experience.

2.5 Relevant family structure variables

When examining the relation between family process and individual student variables, it is also important to consider family structure variables that influence family process variables and, indirectly or directly, students' educational outcomes. One structure variable of interest is *socio-economic status*. Specifically, we examine parents' occupations, which not only captures information about the family's economic status but is also closely related to parents' level of education (e.g., Ganzeboom, 2010; J. Lee et al., 2019). Various international studies have shown more negative effects of ERE for socio-economically disadvantaged students at all school levels. During ERE, they spent comparatively less time learning (Dietrich et al., 2021; Bayrakdar & Guveli, 2020), received less support from schools (Cullinane & Montacute, 2020) and had less access to important resources (Gao et al., 2020) than their peers from less disadvantaged families, underlining the importance of investigating socio-economically disadvantaged students specifically.

Extant research on SES's relation to PI is ambiguous. Some studies showed no relations (e.g., Dumont et al., 2014; Yotyodying & Wild, 2014 for German sub-sample), or associations of lower SES with more home PI (e.g., Park & Holloway, 2013; Sui-Chu & Willms, 1996). Most studies, however, found that higher SES related to more PI (e.g., Çoban, 2020; Tan, 2019; Zhang et al., 2021) as well as more supportive and less interfering involvement strategies (e.g., Cooper et al., 2000; X. Li et al., 2020). Qualitative research pointed out that parents from higher-SES backgrounds get more involved because they are more confident in their educational capabilities and

see themselves as teachers' equals (e.g., Lareau, 1987). For ERE, Sari et al. (2021) found a positive association between SES and parents' self-rated ability to help their teenage children with schoolwork. This relation turned insignificant when parents' education was included as mediator, again demonstrating the close association of SES and parents' education. In summary, assuming a positive relation of SES and PI during ERE seems most plausible. Additionally, SES and parents' perceived educational responsibility appear to be unrelated (Curry & Adams, 2014), and qualitative research suggests that low-SES parents see a high responsibility for parents to be involved in their child's educational process (Drummond & Stipek, 2004). Regarding student outcomes, students from low-SES households spent less time on schoolwork during ERE (Dietrich et al., 2021) than students from high-SES households as measured by father's vocational degree, suggesting an overall lower participation in learning activities. Students from lower SES backgrounds also showed reduced levels of motivation in general (Kormos & Kiddle, 2013) and learning motivation in ERE specifically (Poulain et al., 2021).

A second family structure variable of interest is the family's *immigrant background*. Especially when divergent cultural or language backgrounds are given, immigrant students' achievement and psychosocial outcomes in school can be negatively affected (e.g., Marks, 2005; Motti-Stefanidi et al., 2015), depending on factors like cultural identity and orientation, stereotyping and experiences of ethnic discrimination (e.g., Baysu et al., 2011; Frankenberg et al., 2013; Wong et al., 2003). In contrast, both parental psychological engagement and behavioral involvement (Kim et al., 2020) as well as meaningful relationships in school (Suárez-Orozco et al., 2009) can be considered as protective factors countering the aforementioned negative effects. With the shift to remote education, and thus reduced contact to teachers and peers, relationships in school presumably became less relevant, while the importance of sufficient parental support, especially for immigrant students, rose. However, while far from a homogenous group, most immigrant parents face additional challenges compared to native-born parents, such as language barriers, adjusting to a different culture and the loss of social capital accumulated in the country of origin (e.g., Antony-Newman, 2019). Additionally, immigrant parents often lack experience with the host country's educational system, hampering supporting their children regarding school. Accordingly, most previous research found immigrant background negatively related to aspects of PI like homework support (Dumont et al., 2012; Rønning, 2011). Qualitative studies suggest that cultural differences and language difficulties often cause differences in immigrant parents' PI, leading to more informal strategies of involvement and an impaired ability to help their children with homework directly when compared to their native-born counterparts for example (Pérez Carreón et al., 2005; Sainsbury & Renzaho, 2011), while schools' narrow criteria for judging PI uphold them (López et al., 2001). Therefore, disparities should arise for more formal, structural aspects of involvement. Parents' perceived responsibility for education, however, seems unrelated to immigrant background but instead dependent on parents' own level of experience with the school system (Kohl et al., 2014). With respect to student variables, Steinmayr et al. (2021) showed that immigrant background was not directly related to either students' motivation or participation in learning activi-

ties during ERE. However, the research presented earlier suggests a potential indirect negative association with student outcomes mediated by PI.

2.6 Research questions and hypotheses

Important student outcomes like learning motivation and participation in learning activities, which in turn relate to other central facets of students' learning experience and are highly relevant for educational success, are influenced by parent variables, such as PI and perceived responsibility for the child's learning. However, it is unclear how the aforementioned constructs relate to each other under the special circumstances of ERE that became the norm for many students during the COVID-19 pandemic. Additionally, family structure variables need to be considered, and findings that socio-economically disadvantaged students were affected more negatively by ERE underline the importance of examining the aforementioned variables in this particular group. Based on theory and prior empirical findings, we formulated the following research questions and hypotheses:

Research Question 1) How are student outcome variables (extrinsic motivation, intrinsic motivation, participation in learning activities) during ERE related to parent-focused family process variables (demanding-structuring PI, responsive-motivational PI, parental responsibility for learning) in a sample of predominantly socio-economically disadvantaged high school students?

Hypothesis 1) All parent-focused family process variables are positively related to the individual student variables when considered simultaneously.

Research Question 2) What are the relations between parent-focused family process variables (demanding-structuring PI, responsive-motivational PI, parental responsibility for learning) and family structure variables (SES, immigrant background) during ERE in a predominantly socio-economically disadvantaged sample?

Hypothesis 2a) Family SES is positively related to both dimensions of PI, but not statistically significantly related to parental responsibility for learning.

Hypothesis 2b) The family's immigrant background is negatively related to demanding-structuring PI, but not statistically significantly related to responsive-motivational PI and parental responsibility for learning.

Research Question 3) How are the family structure variables (SES, immigrant background) associated with student outcome variables (extrinsic motivation, intrinsic motivation, participation in learning activities) during ERE, directly and indirectly, in a predominantly socio-economically disadvantaged sample?

Hypothesis 3a) Family SES is directly positively related to the student outcomes.

Hypothesis 3b) The family's immigrant background is not directly related to the student outcomes. There is an indirect negative association between immigrant background and the student variables via demanding-structuring PI.

3 Methods

3.1 Participants and procedure

A total of 126 students took part in the study, nine were excluded because of missing values on all outcome variables of interest. Thus, the final sample comprised 117 students from ninth (56 students), 10th (38 students), and 11th grades (23 students). The students' ages ranged from 14 to 18 years, with an average age of 15.14 years ($SD = 0.93$), and 49.6% of the sample was female (male: 47.0%, diverse: 3.4%). The study was conducted in August 2020 in six classes and, in the 11th grade, learning groups from one school in an urban area with below-average income in North Rhine-Westphalia, Germany. The school was a *Gesamtschule* (comprehensive school), one of several secondary school types students can visit after completing four years of elementary school. Compared with other secondary schools which usually comprise only one of three school tracks (vocational, intermediate, academic), this school type is characterized by the differentiation between school tracks within one school, meaning that students from different secondary school tracks are educated together most of the time (for a more in-depth overview, see for example Becker et al., 2016). Based on the language spoken at home (see 3.2 Measures), 40.2% of students had an immigrant background which is close to the average for comprehensive schools in North Rhine-Westphalia for that school year ($M = 44.4\%$; Information und Technik Nordrhein-Westfalen, 2020). The sample's SES was measured using the *International Socio-Economic Index of Occupational Status* (Ganzeboom, 2010; see 3.2 Measures) and was relatively low ($M = 38.5$, $SD = 15.2$) compared to a representative sample of German comprehensive schools in 2015 ($M = 46.6$; Autorengruppe Bildungsberichterstattung, 2018). All data were gathered in August 2020 using paper-and-pencil self-report student questionnaires to retrospectively assess the students' ERE experiences during the first school closure period due to COVID-19 during the preceding school year. A teacher was trained as test administrator beforehand and administered the questionnaires in the classroom during regular instructional time. Students were given 30 minutes to answer the questionnaire. Participation in the study was voluntary and students provided written consent before participation.

3.2 Measures

Descriptive information, reliabilities and example items for all measures can be found in Table 1. As individual student variables, we assessed *extrinsic learning motivation*, or students' motivation based on external incentives, with three items taken from the German version of the PIRLS 2001 survey (Bos et al., 2005) and adapted to assess the specific ERE situation. *Intrinsic learning motivation*, capturing students'

Table 1 *Descriptive Information, Reliabilities and Example Items for Measures*

Measure	*n*	*M*	*SD*	α	Example
Extrinsic learning motivation	113	3.47 [a]	1.10	0.76	During remote education, I wanted to be praised by my teachers.
Intrinsic learning motivation	112	2.90 [a]	0.98	0.67	During remote education, I enjoyed learning more and more new things.
Participation in learning activities	117	2.84 [b]	0.77	0.82	How often did you do the following things during remote education: Repeat learning content?
Demanding-structuring PI	117	3.03 [c]	0.72	0.86	My parents expected me to really engage with the remote education tasks.
Responsive-motivational PI	117	2.45 [c]	0.78	0.88	My parents motivated me to engage the remote education tasks.
Parental responsibility for learning	114	2.69 [c]	0.92	-	My parents felt very much responsible that I learn things during remote education.
SES	117	38.22 [d]	15.90	-	What occupation are your parents currently working in? Mother:
Immigrant background	117	0.40 [e]	-	-	How often do you speak German at home?

[a] 1=*not at all* to 5=*exactly right*. [b] 1=*never* to 5=*all the time*. [c] 1=*completely disagree* to 4=*completely agree*. [d] Coded from free-text answers. [e] 1=*I always or almost always speak German at home* to 4=*I never speak German at home*, dummy-coded as 0=*no immigrant background* (*exclusively/ mostly German at home)*, 1=*immigrant background (exclusively/ mostly a different language at home)*

joy when learning, was also measured with three items from the German version of the PIRLS 2001 survey (Bos et al., 2005) and adapted for ERE. A confirmatory factor analysis (CFA) supported the assumed two-dimensional factor structure of learning motivation as opposed to a global model (2-factor model: $\chi^2(7,113)=10.52$, $p=.161$; RMSEA=0.07; CFI=0.98; AIC=2090.39; global model: $\chi^2(9,113)=42.71$, $p<.001$; RMSEA=0.18; CFI=0.81; AIC=2118.59). Students' frequency of *participation in learning activities* was assessed with nine items developed for the purpose of this study, focusing on a variety of core educational activities like discussing lesson content with the teacher, practicing things learned in ERE, or acquiring knowledge of new learning content.

Regarding family process variables, *parental demanding-structuring involvement* addressed how involved parents were during ERE by setting expectations and providing a clear structure. It was assessed with seven items from the German National Educational Panel Study (NEPS; Blossfeld et al., 2011) and Dumont et al. (2014), adapted for ERE. We assessed *parental responsive-motivational involvement*, capturing parents' emotional and motivational support of their children during ERE, with

items from NEPS (Blossfeld et al., 2011), the MARKUS study (Helmke & Jäger, 2002) and one item specifically developed for the study. All seven items were adapted to fit the ERE situation. A CFA supported the two-dimensional factor structure of PI, as opposed to a global model (2-factor model: $\chi^2(74,117)=119.05$, $p<.001$; RMSEA=0.07; CFI=0.94; AIC=3882.37; global model: $\chi^2(77,117)=272.30$, $p<.001$; RMSEA=0.15; CFI=0.73; AIC=4029.62). Furthermore, we assessed the students' judgement of *parental perceived responsibility for learning* during ERE with one self-constructed item.

As family structure variables, we assessed families' *socio-economic status* with the updated version of the International Socio-Economic Index of Occupational Status (ISEI; Ganzeboom, 2010; see also Ganzeboom et al., 1992). ISEI scores range from 10 to 90, with higher values indicating higher SES. To determine ISEI scores, the participants answered four items about their parents' occupation, and we considered the higher of the two parent scores (HISEI) to determine SES. For $n=17$ cases, no meaningful information on parents' occupation was provided; therefore, we estimated values with multiple imputation instead. Finally, we used one item regarding the family's language spoken at home as an indicator of *immigrant background*.

3.3 Analytic approach

All statistical analyses were conducted with IBM SPSS Statistics (Version 27.0) and M*plus* 8.1 (Muthén & Muthén, 2018). Due to sample composition, we conducted multiple analyses of variance (MANOVA) to check for potential influences of students' gender, grade in school and living in a single-parent household on the family process variables and student outcomes, including only main effects (Online Resource 1). In consequence, living in a single-parent household was included as a control variable for the family process variables.

Structural equation models were specified in all analyses. Based on the intraclass correlations for family process variables (all ≤0.023) and student outcomes (all ≤0.018), we decided against clustering the data by school classes. Goodness of fit was evaluated with χ^2, CFI, RMSEA and its 90% confidence intervals (Hu & Bentler, 1999; Schermelleh-Engel et al., 2003), while the AIC (Akaike, 1974) was used to compare models. Missing data were handled with full information maximum likelihood estimation where applicable. Due to the sample size, all variables were modeled as manifest indicators. To answer our first research question, we specified a model including all family process variables as independent variables and all student outcomes as dependent variables (Model 1). For research questions 2 and 3, we additionally incorporated the family structure variables and regression paths for their relations with all family process variables, as well as direct and indirect associations with all individual student variables (Model 2). Both models included intercorrelations between the family structure, family process, and individual student variables, respectively. We additionally calculated a model regarding only family structure and process variables to verify the findings of the general model (Online Resource 2).

Table 2 *Bivariate Correlations of Measures*

Measure	1	2	3	4	5	6	7
1. Extrinsic learning motivation	-						
2. Intrinsic learning motivation	.48***	-					
3. Participation in learning activities	.39***	.50***	-				
4. Demanding-structuring PI	.34***	.39***	.43***	-			
5. Responsive-motivational PI	.16†	.50***	.48***	.52***	-		
6. Parental responsibility for learning	.29**	.29**	.38***	.45***	.34***	-	
7. SES	-.09	.00	-.11	.08	.04	-.09	-
8. Immigrant background	-.03	-.04	-.10	-.21*	-.02	-.18†	-.04

†$p<.10$. *$p<.05$. **$p<.01$. ***$p<.001$

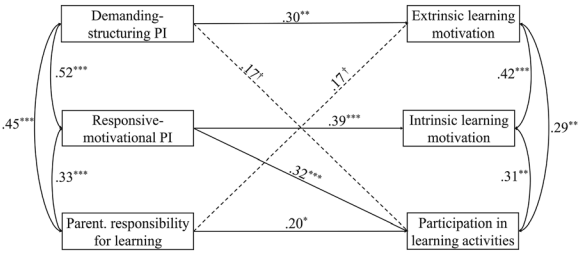

Fig. 2 *Relations Between Family Process Variables and Individual Student Outcomes (Model 1)*
Note. Regression coefficients are standardized. Non-significant paths are not depicted. Dashed arrows represent paths significant at $p<.10$
†$p<.10$. *$p<.05$. **$p<.01$. ***$p<.001$

4 Results

4.1 Descriptive results

Table 2 displays bivariate correlations for all measures. Students reported significantly more demanding-structuring than responsive-motivational PI on average, $t(116)=8.60$, $p<.001$, $d=0.80$, and significantly higher extrinsic compared to intrinsic learning motivation, $t(111)=5.58$, $p<.001$, $d=0.53$. In this mostly low-SES group of students, no relation was found between the family structure variables SES and immigrant background.

4.2 Relations between family process variables and individual student variables

The relation between the family process and individual student variables specified in Model 1 is depicted in Fig. 2[1]. The model was saturated. Demanding-structuring PI was statistically significantly positively related to extrinsic learning motivation and marginally statistically significantly positively related to participation in learning activities, meaning that higher levels of demanding-structuring PI were associated with students' higher extrinsic learning motivation and more frequent participation in learning activities. Responsive-motivational PI had a statistically significant positive relation to intrinsic learning motivation as well as participation in learning activities, meaning that students reporting higher levels of responsive-motivational PI also

[1] To check for potential parameter and standard error bias due to the relatively small sample size, we conducted a post-hoc Monte Carlo analysis which indicated no systematic bias.

reported being more intrinsically motivated and took part in learning activities more often. Lastly, parental responsibility for learning was positively associated with students' participation in learning activities and marginally significantly with extrinsic learning motivation, indicating that students were more extrinsically motivated and participated in more learning activities when they believed that their parents felt more responsible for their learning. All family process variables, as well as all student outcomes, displayed significant positive correlations with one another.

The data partially support Hypothesis 1 that parent-related family process variables were significantly positively related to students' motivation and participation in learning activities during ERE, but not all relations between family process variables and individual student outcomes were statistically significant. The model explained 14.4% of the variance in extrinsic learning motivation, 27.0% of the variance in intrinsic learning motivation, and 30.2% of the variance in participation in learning activities. Therefore, variations in student outcome variables during ERE, especially intrinsic motivation and participation in learning activities, could be explained to a substantial extent by differences in parent-focused family process variables.

4.3 Complex model of relations between family structure and process variables and individual student variables

The relations among family structure, family process and individual student variables specified in Model 2 are depicted in Fig. 3[2]. Fit indices indicated an excellent model fit to the data ($\chi^2(5,114)=2.28$, $p=.81$; RMSEA=0.00, 90% CI [0.00,

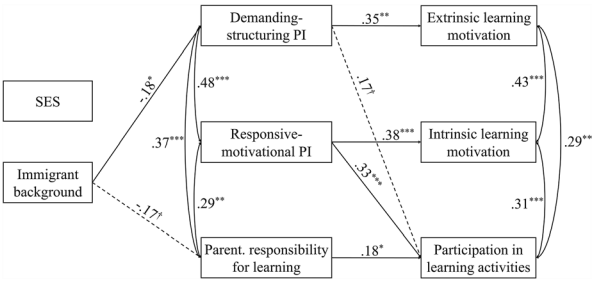

Fig. 3 *Relations Between Family Structure and Process Variables and Individual Student Outcomes (Model 2)*

Note. The influence of living in a single-parent household on family process variables was controlled for. Regression coefficients are standardized. Non-significant paths are not depicted. Dashed arrows represent paths significant at $p<.10$

$^{\dagger}p<.10$. $^{*}p<.05$. $^{**}p<.01$. $^{***}p<.001$

[2] To check for potential parameter and standard error bias due to the relatively small sample size, we conducted a post-hoc Monte Carlo analysis. Since the analysis could not rule out the presence of systematic biases, we further conducted an additional Bayesian model estimation including prior information which is less susceptible to bias in small samples (Smid et al., 2020). Results can be found in Online Resource 3 and were generally similar to the results reported here, implying that potential biases due to sample size were small. Some additional paths reached significance, implying that some smaller effects might

0.08]; CFI = 1.00). Relations between family process variables and student variables were similar to Model 1, although effect sizes differed slightly and the association between parental responsibility for learning and extrinsic learning motivation no longer reached statistical significance. A statistically significant negative association between immigrant background and demanding-structuring PI emerged, as did a marginally significant relation with perceived parental responsibility for learning, meaning that students from immigrant backgrounds reported less demanding-structuring involvement and perceived responsibility by their parents on average. Neither SES nor immigrant background were statistically significantly associated with any student variable directly. However, analyses revealed a fully mediated indirect negative influence of immigrant background on extrinsic learning motivation, $\beta = -0.09$, $p = .033$, mainly via demanding-structuring PI, $\beta = -0.06$, $p = .089$. In other words, children from immigrant families showed lower extrinsic learning motivation on average because they experienced less demanding-structuring PI.

Contrary to Hypothesis 2a, we found no statistically significant relation between SES and any family process variable. Immigrant background was significantly negatively related to demanding-structuring PI, but also, unexpectedly, to parental responsibility for learning, thus only partially supporting Hypothesis 2b. Since no statistically significant relation between SES and the student outcomes was found, Hypothesis 3a was not supported. An indirect relation between immigrant background and extrinsic learning motivation partially supported Hypothesis 3b. Overall, the model explained 16.8% of variance in extrinsic learning motivation, 25.0% of the variance in intrinsic learning motivation, and 30.0% of the variance in participation in learning activities, but only small amounts of variance in demanding-structuring (8.7%), responsive-motivational PI (2.9%), and parental responsibility for learning (8.1%), indicating that within this group of students with relatively low SES, family structure variables played only a minor role in education-related family processes during ERE.

5 Discussion

5.1 Discussion of findings

In light of the relevance of students' learning motivation and learning activities for educational success, this study aimed at determining what role parent-focused family process variables (demanding-structuring and responsive-motivational PI, parental perceived responsibility for learning) played in shaping students' motivational and behavioral outcomes (extrinsic and intrinsic learning motivation, participation in learning activities) in socio-economically disadvantaged school environments during the extraordinary situation of ERE. We also sought to explore how family process and individual student variables related to family structure variables (SES, immigrant background), and the potential mediating role of family process variables for this

have gone undetected or underestimated in our main analyses due to sample size and the statistical power resulting from it.

group of particularly vulnerable students. We applied structural equation modeling to address the posed research questions.

The results confirmed positive associations between process variables and student outcomes in our sample (Hypothesis 1), in line with earlier findings regarding PI at home (e.g., Dumont et al., 2014; Shukla et al., 2015) and parental responsibility for learning (Helker & Wosnitza, 2016) in the absence of a worldwide pandemic. Analyses revealed that participation in learning activities had at least marginally statistically significant associations with all parent process variables. Extrinsic motivation was positively associated with demanding-structuring PI and marginally significantly with perceived responsibility, whereas intrinsic motivation was positively related to responsive-motivational PI. Self-determination theory (Ryan & Deci, 2000) explains these results: Responsive-motivational PI meets students' individual needs without restricting their autonomy, a key condition for intrinsic motivation, which is not only an important outcome itself but also positively related to a variety of other school outcomes (e.g., Froiland & Worrell, 2016; Taylor et al., 2014), underlining the importance of responsive-motivational PI especially. Demanding-structuring PI on the other hand limits autonomy by providing clear structures and expectations, thus introducing more external incentives. While this introduction of heteronomy through demanding-structuring PI could, in theory, also be detrimental to intrinsic motivation, the results did not suggest such a relation.

Contrary to our expectations, no statistically significant relation between SES and either dimension of PI emerged (Hypothesis 2a), adding to previous conflicting findings (e.g., Park & Holloway, 2013; Sari et al., 2021; Tan, 2019). Our results are of particular interest, as we focused on a socio-economically disadvantaged school environment with few mid- to high-SES families, which might explain the absent relation between SES and family processes. As expected, immigrant background was negatively associated with demanding-structuring (e.g., Rønning, 2011), but not responsive-motivational PI (Hypothesis 2b). This contradicts findings on responsive PI by Dumont et al. (2014), but not qualitative findings by Kavanagh and Hickey (2013) regarding parents speaking a different language at home than the language of instruction, who often believed home involvement should, similar to lessons in school, occur in the instructional language. Feeling mostly unable to support their children in that way, they instead relied on more informal types of involvement. Therefore, parents with an immigrant background in our sample, which was assessed via family language, might have felt less competent in providing a structure similar to regular schooling (demanding-structuring PI), but not in motivating their child and offering emotional support (responsive-motivational PI). Furthermore, an unexpected negative relation between immigrant background and parental responsibility emerged, contrasting previous research (e.g., Curry & Adams, 2014). Lack of familiarity with the German school system might explain this relation. Kohl et al. (2014), comparing Turkish immigrant with German native-born mothers, found that the former's perceived responsibility for their children's schooling was lower only when they had attended German schools for less than three years themselves. Other research likewise suggests that differences within the immigrant population, for example culture of origin (Sainsbury & Renzaho, 2011; de Haan, 2011), may further explain varying relations between immigrant background and parent variables.

The expected negative relation between SES and student outcomes, based on theory and previous research (e.g., Dietrich et al., 2021; Kormos & Kiddle, 2013), could not be found (Hypothesis 3a). One possible explanation might again be the sample's low SES overall. Immigrant background was not directly associated with any student outcome, in line with our expectations and findings by Steinmayr et al. (2021), and related indirectly negatively to extrinsic learning motivation (Hypothesis 3b).

To summarize, the model of family structure, family process and individual student variables we adapted from McElvany et al. (2009) based on prior literature proved suitable for examining relations among those variables during ERE, particularly regarding variation in the student variables. Analyses revealed positive relations between parent variables and student outcomes, while underlining the importance of considering family structure variables as potential influences during the unique ERE situation.

5.2 Limitations and strengths

Several points of limitation should be considered for the present study. Due to its cross-sectional design, causal assumptions cannot be verified with the data, and the lack of a second time point of data collection before ERE means that we cannot directly draw comparisons between the situations of regular schooling and ERE, meaning that while our findings are still valid and important for low-SES students in this situation, we cannot say for sure whether they are unique to ERE. Another limitation is the recruitment approach and the resulting relatively small sample size. First, while there were advantages to recruiting the sample from just one school, as discussed below, this in turn also means that appropriate caution needs to be applied when generalizing the results, as the findings might be biased by factors specific to that school. Second, additional post-hoc Monte Carlo analyses showed that the sample provided insufficient statistical power to reliably reveal smaller effects potentially present in the population. Moreover, for Model 2 we cannot rule out systematic parameter or standard error biases occurring due to sample size. Nonetheless, we found evidence for many of the assumed relations, especially between family process variables and student outcomes, which suggests that our findings are robust and would be found in larger samples as well. Additionally, the similarity of findings regarding the overall model and the partial models (Model 1; Online Resource 2) as well as additional Bayesian model estimation (Online Resource 3) suggest that the full model was not plagued by systematic bias.

Gathering self-reported student data meant relying on students' knowledge of the parent variables of interest. This unfortunately led to a substantial amount of missing information on parents' education, which was in turn excluded from our analyses. Although parental education and SES are strongly related (J. Lee et al., 2019), including the former as well would have been desirable. Other potential problems associated with retrospective self-report measures include misremembering, social desirability or skewed self-perceptions. However, the use of student's assessment is justified since Liu et al. (2021) found only minimal differences in reported PI during ERE between a sample of Chinese middle schoolers and their parents. Additionally,

not just for ERE, students' assessment of PI is potentially more important for individual student outcomes than an objective measurement of involvement.

Collecting data at a comprehensive school allowed us to include students from different German secondary school tracks within a single school and ensure comparability with other countries' single-track school systems. Additionally, while coming at the cost of a relatively small sample size, focusing on this particular school enabled us to assess a socio-economically disadvantaged population specifically. Judging from previous research, students from disadvantaged backgrounds are more negatively affected by ERE (e.g., Zancajo, 2021), making it especially important to investigate how family background and parental behavior influence ERE outcomes among these students.

Another strength of the present study is the application of structural equation modeling. While most previous studies regarding ERE utilized descriptive statistics, correlations or regression analyses, SEM allows for a more comprehensive approach of testing complex assumptions about the relations between family structure, process and student variables. Additionally, previous studies investigating family structure and student variables during ERE rarely also incorporated parent-focused process variables, particularly PI (e.g., Lawrence & Fakuade, 2021).

5.3 Directions for future research

Continued study of the investigated variables with larger sample sizes is needed to confirm our findings and reveal associations previously undiscovered due to limited statistical power. The additional Bayesian estimation of Model 2 presented in Online Resource 3 detected (marginally) significant paths that weren't present in the model based on frequentist estimation presented in the main analyses, giving an indication which relations may have been overlooked. However, if anything, such hidden additional associations would mean that our results somewhat underestimate the importance of parents for adolescents of somewhat lower SES, and the general conclusions that we draw from our findings and present in our discussion would be of even greater importance.

Importantly, while our results are relevant for the ERE situation, the design of our study does not allow to conclude whether they are unique to this special situation. Thus, a comparison with students in face-to-face instruction is needed to give further insights regarding how these relations might differ between regular instruction and the unique ERE situation. Including not just the students', but also the parents' perspective on the ERE situation, for example by conducting interviews about their experience during ERE, could provide important insights extending beyond our findings as well. Future research should additionally cover a broader range of SES, ages and educational levels, but also other vulnerable groups like special education needs students, to investigate whether our findings apply to other populations as well. Additional family structure and process variables should be considered, such as parents' education and educational aspirations for their child. Moreover, variables capturing differences between immigrant families, like parents' experiences with the host country's school system, should be included in future research as well to further investigate the unexpected findings regarding immigrant background. Lastly, while our

study focused on a sample of socio-economically disadvantaged students to answer the important question how family and parent variables related to student outcomes in this particularly vulnerable group during ERE, the lack of a comparison group means we cannot be certain whether the found relations are unique for disadvantaged students, or whether similar results would be found for the general student population. Future studies should therefore include an additional group of students from an average socio-economic environment to allow for the comparison of the relations of family structure and process variables with student outcomes in both groups.

5.4 Implications for practice

The study results have important practical implications. First and foremost, parents are important for keeping their children motivated and participating in learning activities when investigating these constructs during ERE, possibly compensating the reduced student-teacher interactions. Accordingly, students whose parents felt responsible for their learning success reported more positive outcomes. Schools can encourage this by clearly communicating parents' responsibilities and supporting families in dealing with them. Additionally, both demanding-structuring and responsive-motivational PI were positively associated with desirable student outcomes, revealing the importance of different forms of parental support behaviors. Thus, schools providing information to parents on different ways to support their children at home can bring about more positive student outcomes, which can be important during both ERE and in-person instruction. Further barriers to PI arise from parents lacking confidence in their ability to adequately support their children (e.g., Cullinane & Montacute, 2020), and especially low-SES parents often being unable to work from home (Felstead & Reuschke, 2020), important factors to consider when developing strategies to ensure every parent can appropriately support their child that can be assumed to be especially relevant during ERE. For example, schools might offer online courses or materials informing parents about the importance of being involved while simultaneously imparting strategies for adequate involvement. For such low-threshold informative programs and PI interventions, it is central to consider the circumstances that may prevent parents from participating, not only in ERE situations, to reach as many parents as possible.

Such programs might be especially valuable for immigrant parents, since immigrant background was negatively related to both perceived responsibility and demanding-structuring PI. These negative associations presumably result from parents' lack of experience with the school system (Kohl et al., 2014) as well as cultural and language differences (Pérez Carreón et al., 2005; Sainsbury & Renzaho, 2011). Therefore, these parents, and their children in turn, would profit from schools providing information on school procedures and PI strategies, ideally offered in multiple languages and an easily accessible format.

5.5 Conclusions

Taken together, this study contributes to current research by examining the importance of parents being involved in their children's learning in different ways, providing structures and clear expectations as well as emotional and motivational support,

and their perceived responsibility for their child's learning in a sample of children experiencing ERE. Additionally, PI and perceived responsibility were related to immigrant background, a family structure variable. The findings especially have important implications for future research; furthermore, they can act as first indicators in the complex matter of preparing educational systems for future educational crises. All in all, the present study focused on a situation that was determined by one of the most disruptive events in education globally in recent years, the implementation of emergency remote education measures to counter the COVID-19 pandemic, and helped gain insights into the relation of family and parent variables with individual student outcomes.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s11218-023-09801-2.

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