MENTAL HEALTH OUTCOMES FOR CHILDREN ENGAGING IN HOME-BASED LEARNING DURING COVID-19: THE ROLE OF ROUTINES AND HOUSEHOLD CHAOS

by

Danika DesRoches

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Dalhousie University is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq. We are all Treaty people**.**

DEDICATION PAGE

This thesis is dedicated to my partner, Alex Noseworthy, for all of his unconditional love and encouragement.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

The current thesis examined the impact of mandated home-based learning (HBL) on children's mental health as well as the moderating role of routines and household chaos in this relation. Romantic couples (N = 717) with a child in grades 1-5 retrospectively reported online about their child's emotions/behaviors during the period between January 15th - February 15th, 2021. Parent-reported levels of child internalizing and externalizing problems did not differ between mandated home-based and in-person learners. Mandated home-based learners showed more peer problems than in-person learners, as well as more externalizing problems generally (and conduct problems specifically) when following low levels of routine. Routine compensated for HBL's adverse impact on peer problems and attenuated the relation between HBL and increased externalizing (and conduct) problems. Higher household chaos was associated with more internalizing and externalizing problems in all children but was not a particular risk factor for these problems during mandated HBL.

LIST OF ABBREVIATIONS USED

B	Unstandardized beta coefficients
CI	Confidence interval
COVID-19	Coronavirus Disease 2019
Df	Degrees of freedom
DV	Dependent variable
HBL	Home-based learning
F	*F* test statistic
IV	Independent variable
N	Total sample size
p	*p*-value indicating statistical probability
R^2	Measure of proportion of variance explained by the independent variable
SD	Standard deviation
SDQ	Strengths and Difficulties Questionnaire
SE	Standard error
SES	Social economic status
t	*t* test statistic
TSAH	Time spent schooled at-home

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CHAPTER 1 INTRODUCTION

1.1 Child Mental Health During the COVID-19 Pandemic

In March 2020, the World Health Organization (2020) declared Coronavirus Disease 2019 (COVID-19) a global pandemic and in response, massive containment measures, including mandated home-based learning (HBL), were implemented throughout North America, among other countries. Experts have suggested that the COVID-19 pandemic and its associated containment measures are a threat to children's mental health (e.g., Ashikkali et al., 2020)). Indeed, studies have confirmed an increase in mental health difficulties in children during the pandemic (e.g., Crescentini et al., 2020; Di Giorgio et al., 2020). Whether these effects are due to the unintended consequences of mandated HBL due to COVID-19 has yet to be determined, although this has been speculated to be the case (e.g., Schmidt et al., 2020).

To better capture the impact of mandated HBL on child mental health, the current study will build on gaps in the literature by comparing mandated home-based learners to in-person learners. As a result, it will answer to recent calls for research comparing the mental health of children who are exposed to varying levels of containment measures (Racine et al., 2020). The COVID-19 pandemic and its restrictions have caused significant changes to two factors that are known to influence children's mental health: routines and household chaos (e.g., Bridley & Jordan, 2012; Larsen & Jordan, 2020). With regards to routines, children engaging in mandated HBL are not able to benefit fully from the structure provided by spending their day at school. As for household chaos, children, especially those being schooled at-home, are spending more time in households that research suggests might have become more chaotic during the pandemic (e.g., Kracht

et al., 2021). Given the established role of high of levels of routine and low household chaos in promoting child mental health in typical times (e.g., Bridley & Jordan, 2012; Larsen & Jordan, 2020), it is imperative to see whether these effects extend to more challenging contexts like the COVID-19 pandemic and mandated HBL. Accordingly, the present study aimed to examine the impact of mandated HBL due to COVID-19 on child mental health while considering a potential protective factor (child routines) and a potential risk factor (household chaos) for children's mental health difficulties, during the pandemic.

There is good evidence that emergencies and disasters negatively impact two major dimensions of child mental health: internalizing and externalizing problems (Goodman et al., 2010; Rubens et al., 2018; Sprang & Silman, 2013). Accordingly, the current study conceptualized child mental health as involving both internalizing and externalizing problems, each with specific facets of mental health difficulties. We conceptualized internalizing problems to comprise emotional (e.g., worrying, feeling unhappy) and peer problems (e.g., preferring to play alone, being frequently bullied; Goodman et al., 2010). Further, we conceptualized externalizing problems to comprise conduct (e.g., lying or cheating, losing temper) and hyperactivity (e.g., easily distracted, restless) problems (Goodman et al., 2010). These conceptualizations are consistent with past research on internalizing and externalizing problems in children (Goodman et al., 2010), which are expected to worsen in response to COVID-19 and its associated restrictions (e.g., Ashikkali et al., 2020; Brooks et al., 2020; Golberstein et al., 2020).

Consistent with expert predictions (e.g., Brooks et al., 2020), studies conducted during the first wave of COVID-19 confirmed that children showed increased rates of

internalizing and externalizing problems. Parents reported an increase in these problems in their children during the COVID-19 pandemic (Crescentini et al., 2020; Patrick et al., 2020; Zhao et al., 2020), compared to retrospective reports of their child's internalizing and externalizing problems prior to the first wave of COVID-19. For instance, Di Giorgio et al. (2020) compared Italian mothers' reports on their child's mental health before and after the pandemic restrictions had taken effect (i.e., retrospective reports on February 2020 versus current reports of April 2020); they found that children experienced more emotional, conduct, and hyperactivity problems in April 2020 compared to February 2020. Other studies conducted during the COVID-19 pandemic reported similar findings (e.g., Crescentini et al., 2020), highlighting the negative association between the COVID-19 pandemic and negative child mental health.

The observed decline in children's mental health during the COVID-19 pandemic is concerning given that internalizing and externalizing problems can have negative impacts on both children and their parents (e.g., Elgar et al., 2007; Reef et al., 2011). In children, internalizing and externalizing problems are found be associated with poor self-esteem (Donnellan et al., 2005; Leeuwis et al., 2015) and academic performance (Moilanen et al., 2010; Riglin et al., 2013) as well as worsened physical health (Jamnik & DiLalla, 2019). Further, chronic internalizing and externalizing problems put children at an increased risk for psychopathology in adulthood (Barlow, 2002; Reef et al., 2011). For instance, a recent meta-analysis revealed that internalizing and externalizing problems in childhood and/or adolescence increased the risk of young adult alcohol use disorders by 21% and 62%, respectively (Meque et al., 2019). Longitudinal data also shows that adults who exhibited internalizing or externalizing problems as children showed less life

satisfaction (Zhu & Shek, 2020) and more work incapacity (Narusyte et al., 2017). With regards to impacts on parents, research supports a positive association between elevated internalizing and externalizing problems in children and parental depressive symptomatology (Elgar et al., 2007). Moreover, research finds that this relation is bidirectional (i.e., maternal depressive symptoms increase the risk of worse child mental health and vice-versa) (Elgar et al., 2003). Given all of these potential consequences, research should examine whether and how factors associated with the COVID-19 pandemic decrease child mental health.

It is possible that the reduction in child mental health during the pandemic is one of the unintended consequences of government mandated HBL. Indeed, the limited research to date suggests a negative impact of mandated HBL on child internalizing and externalizing problems (e.g., Schmidt et al., 2020). For instance, a study conducted in China by Zhao et al. (2020) with children engaging in mandated HBL due to COVID-19 found that internalizing (i.e., emotional and peer) and externalizing (i.e., conduct and hyperactivity) problems were more prevalent relative to rates found before the pandemic, when children were still in school (Du et al., 2008). Further, in the Di Giorgio et al. (2020) study, Italian mothers were surveyed during the initial implementation of nation-wide school closures (April 2020); thus, it is possible that the resulting negative impact reported on child mental health was due to mandated HBL. Although these findings are suggestive of an adverse effect of mandated HBL on child mental health, they do not directly compare the mental health of children engaging in HBL to that of children attending school in-person during the pandemic. The latter makes it difficult to discern whether the adverse effects on child mental health are due to the pandemic generally

(e.g., reduced access to activities, increased parental stress) or mandated HBL specifically. Accordingly, this study builds on the current gaps in the literature by comparing children who are attending school in-person to those being schooled at-home due to COVID-19 to better capture the true impact of mandated HBL.

1.2 Child Routines and Child Mental Health During the COVID-19 Pandemic

While considering the impact of mandated HBL due to COVID-19 restrictions on child mental health outcomes, it is important to determine the factors that play a role in this relation. It is critical to identify both protective and risk factors for child mental health during mandated HBL as these can help in the development of strategies or interventions to decrease the occurrence of internalizing and externalizing problems in children. Yet, no studies to date have looked at which factors might protect, and which might exacerbate the potential adverse impact of mandated HBL on child mental health.

Here we explore two factors that play a role in child mental health and that are significantly impacted by the pandemic and its associated school closures: child routines and household chaos. Broadly, child routines represent observable behaviors performed habitually that directly involve the child and happen with predictable regularity, daily and/or weekly (Sytsma et al., 2001). Household chaos represents the level of disorder or environmental confusion in the home and is characterized by a lack of predictability and structure in daily activities, high levels of background stimulation and crowding in the home, and an excessively fast-paced family life (Ackerman & Brown, 2010; Wachs & Evans, 2010). Some scholars have suggested that a lack of routine and household chaos are similar constructs or that routine and chaos in the home are simply the opposite of each other (Fiese et al., 2002). In contrast, others have maintained that the constructs are

distinct from one another – specifically, that the concept of household chaos is much broader than that captured by child routines (Coldwell, Pike, & Dunn, 2006; Matheny, Wachs, Ludwig, & Phillips, 1995; Wachs & Evans, 2010). On the one hand, household chaos encompasses several indices that characterize the home (e.g., crowding, background noise) that are not captured by routine; on the other hand, routines are more precisely defined as children completing an activity at a regular time, in the same environment, with the same caregiver (Sytsma et al. 2001). To our knowledge, the only two studies examining the correlation between child routines and household chaos found them to be moderately negatively correlated (r = -0.37; Larsen, 2019; Larsen & Jordan, 2020), supporting the distinction between household chaos and child routines and suggesting the potential for their distinctive effects on mental health.

Certainly, the COVID-19 pandemic and its associated containment measures have disrupted children's routines. Disruptions to routines can be detrimental to children's mental health, particularly for those with pre-existing mental health issues (Lee, 2020). Accordingly, many scholars have begun to voice their concerns over the potential negative impacts of school closures and the associated disruptions to children's routines (e.g., Lee, 2020; Viner et al., 2020). Attending school in-person grants children a substantial amount of routine and shapes their day (e.g., routines in-class, scheduled time for recess and lunch, routines in going to and coming home from school). Routines at-home might be especially important for children engaging mandated HBL, given that they are no longer benefitting from the structure provided by spending their day at school, and because routines have been suggested as a potential protective factor for child mental health during the COVID-19 pandemic (Bartlett & Vivrette, 2020).

It is well-established that children who follow more routines exhibit fewer externalizing problems (Bater & Jordan, 2017; Bridley & Jordan, 2012; Guterman & Neuman, 2020; Harris et al., 2013; Larsen & Jordan, 2020; Sytsma et al., 2001), a relationship that might be due to the increased stability that routines offer. For instance, Bridley and Jordan (2012) found that children aged 8 through 12 years who followed more routines in daily living (i.e., in household responsibilities, discipline, and homework) exhibited fewer externalizing problems, including less rule-breaking and aggressive behaviors (i.e., conduct problems). Further, higher levels of child routines are found to be associated with reduced severity of symptoms of attention-deficit/hyperactivity disorder (ADHD) (e.g., Landry, 2010), a hallmark of which is inattention and hyperactivity problems. It has been theorized that routines increase child compliance by improving the predictability of expectations, assisting in the development of rule-governed behavior (Systma et al., 2001) and diminishing the probability of aggressive and impulsive behaviors that can be triggered by boredom (Freund et al., 2021). Further, child routines might have a protective effect against the development of externalizing disorders by providing children with consequences that are predictable and the opportunity to learn coping strategies (Lanza & Drabick, 2011). Contrastingly, the pandemic and its associated restrictions (including mandated HBL) might present irregular circumstances that are disruptive to routines and are hard for children to predict and cope with.

Further, research shows that more routines are associated with fewer internalizing problems, though there is less evidence for this as compared to externalizing problems, and that it can be protective against the development of such problems in high stress

situations. Though some studies have found no relation between routines and internalizing problems (e.g., Koblinsky et al., 2006; McRae et al., 2018), many others have shown that children who follow more routines exhibit fewer internalizing problems (e.g., Bridley & Jordan, 2012; Guterman & Neuman, 2020; Jordan, 2003; Murphy & Williams, 2009). Child routines might also be protective against the development of internalizing disorders or symptoms of internalizing disorders under stressful circumstances. For example, Bridley and Jordan (2012) found that child routines moderated (i.e., buffered) the relation between daily hassles and internalizing problems, including reduced anxiety and depressive symptoms, and somatic complaints (i.e., emotional problems) as well as social problems. Given the heightened stress of COVID-19 and its associated disruptions (particularly for those engaging in mandated HBL), routines might have an important impact on children's internalizing problems.

For children who experience internalizing problems like depression, anxiety, or social isolation, routines might relieve some of these symptoms by providing consistency and predictability to their day (Ivanova & Israel, 2006). For instance, an anxious child without consistent routines may worry about getting to spend time with friends or completing their schoolwork, not knowing if and when they will be able to so, whereas a child with routines might be reassured by knowing that there is time in their day allocated to these activities, thus reducing anxiety (Bridley & Jordan, 2012). Further, research finds that routines promote better self-regulation in children (Ren & Fan, 2018) and that self-regulation increases competence in social interactions (McKown, 2013); therefore, routines may help reduce peer problems in children.

In summary, research to date has established an association between both routines and each of internalizing and externalizing problems in non-pandemic times (e.g., Bridley & Jordan, 2012). Given the observed negative impact of the COVID-19 pandemic on child mental health (e.g., Crescentini et al., 2020), the current study was designed to examine the effects of routines on both internalizing and externalizing problems during the COVID-19 pandemic, with a specific focus on determining whether it interacts with (i.e., protects against) mandated HBL in predicting either of these types of adverse mental health outcomes in children.

1.3 Household Chaos and Child Mental Health During the COVID-19 Pandemic

Due to the restrictions associated with the COVID-19 pandemic, children might be at greater risk of encountering chaos in the home. This is in part because the psychological consequences of the pandemic and its associated restrictions are predicted to be especially negative for adults who have children at-home (e.g., Brooks et al., 2020; Wenham et al., 2020) and research has shown that the homes of adults with poor mental health are more likely to be chaotic than homes of parents without mental health problems (e.g., Madigan et al., 2017; Thomas & Spieker, 2016). Increased levels of household chaos might be especially worrisome for children who are engaging in mandated HBL who are now spending more time at-home as compared to their school-attending peers (Berry et al., 2016).

Indeed, children living in more chaotic homes have been found to show worse mental health. Higher levels of chaos in the child's home are associated with more internalizing problems (Akram & Shamama-tus-Sabah, 2020; Dumas et al., 2005; Evans et al., 2005), even in children as young as 2 and 3 years (Crespo et al., 2019).

Specifically, increased household chaos has been associated with more anxiety symptoms, depressive symptoms, and somatic complaints (i.e., emotional problems), as well as more social problems in children (Crespo et al., 2019). Further, extensive pre-pandemic research has linked household chaos to externalizing problems in children both concurrently (Coldwell et al., 2006; Dumas et al., 2005; Larsen & Jordan, 2020) and longitudinally (Pike et al., 2016; Supplee et al., 2007). For instance, high levels of chaos in the home are associated with more conduct and hyperactivity problems in children in kindergarten and grade 1, and are predictive of these problems both one and two years later (Deater-Deckard et al., 2009). Research suggests that exposure to stressful contexts, including chaotic homes, can alter a child's physiological response to stress (Evans et al., 2007; Evans & Kim, 2007). Evans et al. (2005) proposed that being raised in a chaotic household, characterized by overcrowding, high levels of noise, etc. may interfere with socio-emotional development. These researchers suggested that living in a chaotic household may lead to the development of internalizing problems (e.g., feelings of helplessness, sadness) in children and may compromise a child's ability to self-regulate their emotions.

Interestingly, research showed that the positive association between chaos in the home and both internalizing (i.e., peer) and externalizing (i.e., conduct) problems was weaker for children who spent more time outside of the home (Berry et al., 2016). Specifically, Barry et al. (2016) recruited children in infancy and asked parents to report on the type, quantity, and quality of childcare their child received, the chaos in their home and their child's internalizing and externalizing problems. The study showed that that the average number of hours spent in childcare between infancy and 5 years of age, but not

the type or quality of the childcare, moderated the relationship between household chaos and internalizing (and externalizing) problems at age 5. This suggests that spending greater amounts of time in childcare might attenuate the harmful association between household chaos and internalizing (and externalizing) problems. This finding is worrisome given that spending reduced time outside of the home is a direct consequence of mandated HBL.

In summary, evidence suggests that household chaos is associated with worse child mental health (e.g., Akram & Shamama-tus-Sabah, 2020; Larsen & Jordan, 2020) and that household chaos may have increased during the pandemic. Accordingly, the current study will assess the importance of household chaos in child mental health during the COVID-19 pandemic, including exploring its role in the mental health of those engaging in mandated HBL.

1.4 Protective and Risk Factors

As we consider the roles of routines and household chaos in child mental health, we turn to examine *how* they can work to impact the mental health of children during the pandemic (particularly in those engaging in mandated HBL). Research on resiliency suggests two models for how resilience (i.e., protective) factors can operate: the protective versus the compensatory model (Strickland et al., 2019; Fergus & Zimmerman, 2005). In the protective model, the resilience factor attenuates (i.e., moderates) the relation between the stressor and the negative outcome. For instance, routines might attenuate the expected link between mandated HBL and poor child mental health, such that the effect of mandated HBL versus in-person learning on adverse child mental health is stronger in children following low daily routine and weaker in children following high

daily routine. In the compensatory model, the resilience factor counteracts (i.e., compensates for) the effect of the stressor on the outcome (e.g., routines counteracting the predicted negative effect of mandated HBL on child mental health). In contrast to the protective model, the resilience factor and stressor would not interact but instead would act in opposite directions on the outcome, leading the resilience factor to compensate for the adverse effects of the stressor (Fergus & Zimmerman, 2005).

The same logic behind the two models for protective factors applies to risk factors (i.e., the risk versus the additive model). While the risk model would involve the risk factor moderating (in this case exacerbating) the link between the stressor and the negative outcome, the additive model would involve the risk factor having an independent negative effect on the adverse outcome in addition to the stressor. For example, in the risk model, household chaos would exacerbate the expected link between mandated HBL and poor child mental health, such that the effect of mandated home-based versus in-person learning on adverse child mental health is stronger in highly chaotic households and weaker in less chaotic households. In the additive model, household chaos would have a negative impact on child mental health that is independent from the negative impact of mandated HBL on child mental health.

1.5 The Present Study

Our team conducted a web search in March 2021 to identify a one-month time-period when both home-based and in-person learning were happening in Canada and the United States at the same time. We found that the only overlap between these two countries when both home-based and in-person learning were happening was the 30-day period between January 15th and February 15th, 2021. We then targeted recruitment in

specific areas in each country to ensure that sufficient sample sizes of children engaging in each type of learning were gathered.

Collectively, we recruited couples with a child in grades 1 to 5 residing in Canada or the United States, half of which were engaging in HBL, to complete an online survey on their children's mental health, the level of routine their child follows at-home as well as the level of chaos in their home. Both parents were surveyed and asked to retrospectively report on the 30-day period between January 15th and February 15th, 2021. Given that routines and household chaos are both *family level* variables, such that both parents contribute to the degree of routine that the child follows (e.g., Jansen et al., 2019; Ragni et al., 2019) and to the degree of chaos in the home (e.g., Wachs & Evans, 2010) we included both parents' perspectives in our measures of child routines and household chaos. Further, we chose school-aged children because of the research showing that younger children are more vulnerable than their older peers to internalizing and externalizing symptoms in response to high stress situations like COVID-19 (e.g., Zhao et al., 2020).

Overall, the present study aimed to examine the impact of mandated HBL due to COVID-19 on child mental health, while considering the role of routines and chaos in these relations. Further, we investigated the role of child routines and household chaos in child mental health generally as well as during mandated HBL specifically. Three major research questions were addressed. Our first research question was whether mandated HBL due to COVID-19 has a negative effect on child mental health. It was hypothesized that children learning at-home due to COVID-19 would show more (H1a) internalizing (i.e., emotional and peer problems) and (H1b) externalizing problems (i.e., conduct and

hyperactivity problems) than children attending school in-person. Our second research question was *whether* and *how* are routines associated with better child mental health during the COVID-19 pandemic. It was expected that higher levels of routine would be associated with better child mental health, i.e., less (H2a) internalizing and (H2b) externalizing problems. While it was hypothesized that routines would protect against the negative impact of mandated HBL on (H3a) internalizing and (H3b) externalizing problems, whether it would do this through a protective (i.e., moderation) vs compensatory effect was more exploratory in nature (Figure 1.1). This has not been examined previously, which made it difficult to discern how routines would operate as a protective factor, so no hypothesis was made a priori. Our third research question was *whether* and *how* is chaos in the home associated with worse child mental health during the COVID-19 pandemic? It was expected that more chaos in the home would be associated with more (H4a) internalizing and (H4b) externalizing problems, for all children. While it was hypothesized that household chaos would exacerbate the negative impact of mandated HBL on (H5a) internalizing and (H5b) externalizing problems, whether it would do this through a risk (i.e., moderation) versus additive effect was more exploratory in nature (Figure 1.2). This has not been examined previously, which made it difficult to discern how household chaos would operate as a risk factor, so no hypothesis was made a priori.

Figure 2.1

Theoretical Models of Routines as a Protective Factor for Child Mental Health

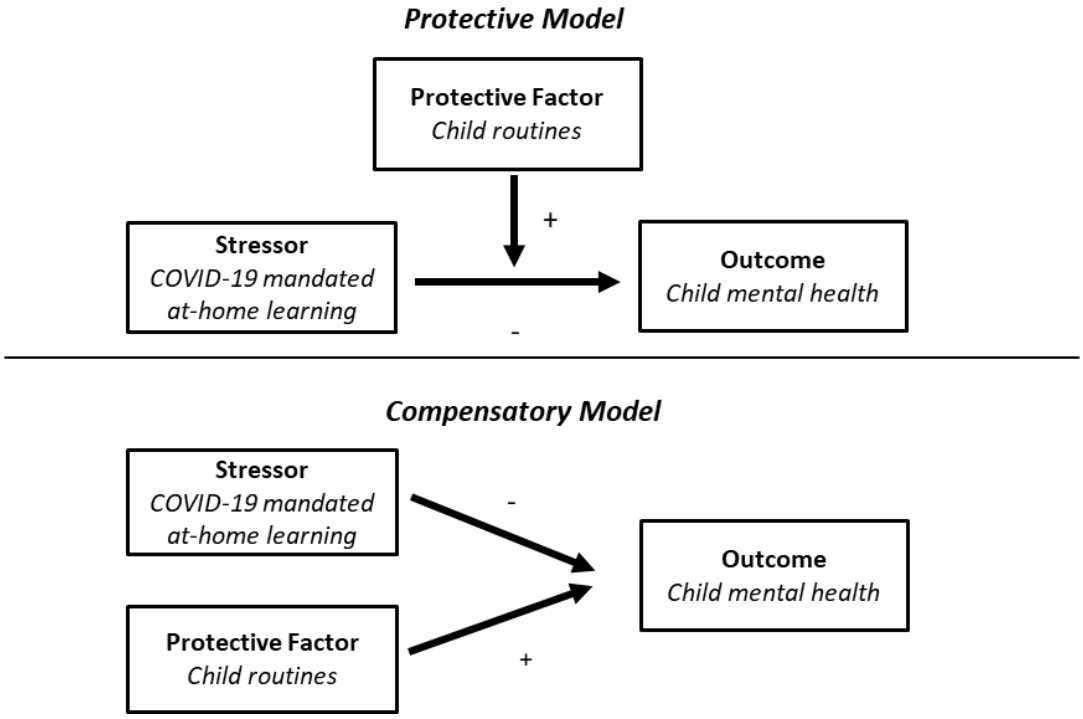
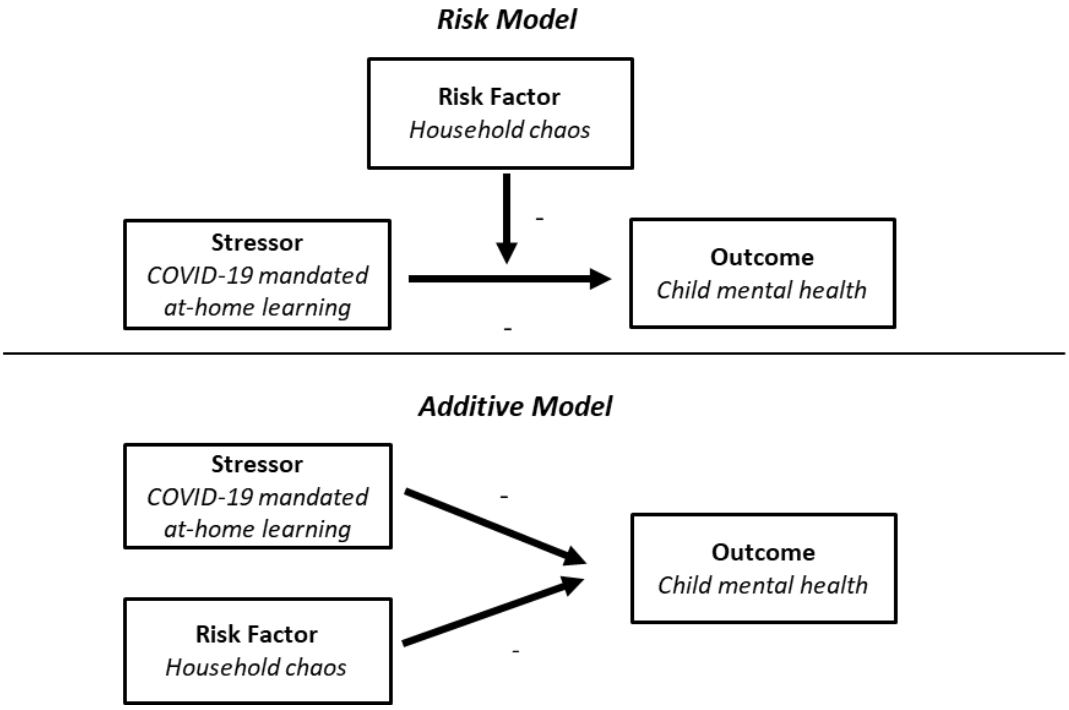


Figure 2.2

Theoretical Models of Household Chaos as a Risk Factor for Child Mental Health



As we considered these relations, we took into account some potentially relevant variables. Research has shown that child age (Chan et al., 2008; Zhao et al., 2020), the number of children living in the home (e.g., Liu et al., 2015), and family income (e.g., Noonan et al., 2018) impact both internalizing and externalizing problems. Specifically, older children with fewer siblings, from low SES families are more likely to exhibit internalizing and externalizing problems than younger children who have more siblings and who are from high SES families. Further, child gender is associated with mental health, with boys experiencing relatively more externalizing problems than girls (Merikangas et al., 2010) and girls more internalizing problems than boys (Rescorla et al., 2007). In line with these findings and previous research looking at routines and household chaos which controlled for the variables mentioned above (e.g., Coldwell et al., 2006; Guterman & Neuman, 2020), we included the following variables as controls in all analyses: child age, child gender, family income, and the number of children in the home

CHAPTER 2 METHODOLOGY

2.1 Measures

Parents with more than one eligible child were asked to report on their youngest child in grades 1 to 5. Only one parent (Parent A) reported on the child's schooling status, child demographics and completed the child mental health measure. Both parents (Parent A and Parent B) completed the parental demographics, child routines, and household chaos measures. Parents were asked to respond thinking about the 30-day period between January 15th and February 15th, 2021, while completing all measures save child and parental demographics.

Child demographics

Parent A reported on the child's age, gender, ethnicity, the number of children living in the home, the percentage of time the child had been schooled at-home due to COVID-19 restrictions between September 2020 and February 15th, 2021, and since February 15th, 2021, as well as how the child was being schooled at survey completion (i.e., in-person, at-home for reasons related to COVID-19 or at-home for reasons unrelated to COVID-19). Both parents reported on family income and location (province, territory, or state). Any discrepancies in reports of family income between Parent A and Parent B (8.78% of total sample) were corrected by using the highest reported family income bracket assuming that the other parent reported on individual instead of family income. There were no discrepancies between Parent A and B in terms of indicating which territory, province, or state they lived in with their child.

Parent demographics

Parent A and Parent B were both asked to self-report their own age, highest level of education completed[1], as well as their employment status[2].

Independent variables (IVs)

Child's schooling status

Parent A reported on the child's schooling status by answering how they were being schooled (i.e., attending school in-person full-time [in-person learners], schooled at-home at least part of the school week due to COVID-19 restrictions [mandated home-based learners] or schooled at-home at least part of the school week for reasons unrelated to COVID-19 restrictions [voluntary home-based learners]).

Child routines

Both parents each answered two questions assessing child routines that were author compiled and are consistent with past research (Guterman & Neuman, 2020). The two questions measured the degree of routine when completing (a) general (i.e., non-schooling) and (b) schooling activities at-home (i.e., "To what extent do you have a routine in activities like mealtimes, play times, bath times, etc. with your child (excluding school activities)?" and "To what extent do you have a routine in completing schooling activities with your child at-home?"). Parents rated the extent to which each question applied to their child on a 7-point Likert scale (0 = "not at all"; 6 = "very much"). There

[1] Categories offered: elementary school, some high school, high school graduate, some college/university, college/university graduate, some post-graduate, post-graduate degree (e.g., Master's, Ph.D., LLB, MD) and prefer not to answer. Participants selected all categories that applied to them.
[2] Categories offered: employed full time, employed part time, unemployed (e.g., not working, but looking for paid work), not in the labor force (e.g., not doing paid work, not looking for paid work, such as full-time at-home caregiver), full-time student and part-time student. Participants selected all categories that applied to them.

was a strong correlation between the questions (i.e., general and schooling activities), both for Parent A, $r(715) = 0.52$, $p < .001$, 95% CI [0.46, 0.57], and Parent B, $r(715) = 0.66$, $p < .001$, 95% CI [0.62, 0.70]. Parent A and Parent B's ratings of routine for general activities were moderately correlated with each other, $r(715) = 0.39$, $p < .001$, CI [0.33, 0.45], as were their ratings of routine for schooling activities, $r(715) = 0.40$, $p < .001$, CI [0.33, 0.45]. Given that routines are a family level variable (i.e., both parents are anticipated to contribute to the degree of routine that the child follows) and the significant correlation between both parents' routine ratings, we felt justified in creating combined routines scores for each of Parent A and Parent B. This was accomplished by summing each parents' individual responses on the two questions assessing routines; a total routines score for the child (ranging from 0 to 24) was then computed by summing combined routines scores from Parent A and Parent B.

Household chaos

Both parents (Parent A and Parent B) each completed a short version (6-items) of the Confusion, Hubbub, and Order Scale (CHAOS) to measure disorder and environmental confusion in the child's home (Matheny et al., 1995). The short version uses a 5-point Likert scale (1 = Definitely untrue; 5 = Definitely true) in lieu of Matheny et al. (1995) binary (yes or no) scale (Coldwell et al., 2006; Deater-Deckard et al., 2009; Matheny et al., 1995) to increase precision in measurement. An example item is "It's a real zoo in our home". The original scale is reliable (test-retest correlation of 0.74) and internally consistent ($a = .79$) (Matheny et al., 1995). The short version has been validated for self-administration in an adult population ($a = .67$; Wong et al., 2007). For each parent, a household chaos score with a possible range of 6 to 30 was computed by

summing item responses (after reverse scoring of the three inversely keyed items, e.g., "The atmosphere in our house is calm"). The internal consistencies of Parent A (a = .64) and Parent B's ratings (a = .61) are in line with past research using the short version (e.g., Pike et al., 2016, a = .63). Further, although lower than the standardly accepted value of .70 for acceptable internal consistency, alpha values > .60 are acceptable for short scales of 10 items or less (Loewenthal, 1996). The correlation between Parent A and Parent B's ratings was strong, $r(715) = 0.73$, $p < .001$, 95% CI [0.70, 0.77]. Due to this substantial overlap and that household chaos is a family level variable (i.e., both parents are anticipated to contribute to the degree of chaos in the home), we felt justified in creating combined household chaos scores for each of Parent A and Parent B. A total household chaos score, ranging from 12 to 60, was computed by summing the total scores of Parent A and Parent B, with a higher score indicating a more chaotic household. Cronbach alpha for total household chaos was .79 (12 items across two parents).

Dependent variable (DV)

Child mental health

The child's mental health was assessed using the higher order internalizing (i.e., includes emotional and peer problems subscales) and externalizing problems (i.e., includes conduct and hyperactivity problems subscales) scales of the 33-item Strengths and Difficulties Questionnaire (SDQ) (Goodman et al., 2010). The SDQ is standardized for 4- to 16-year-olds, has shown good internal consistency (e.g., Borg, 2012) and good convergent and discriminant validity (Goodman et al., 2010). Parent A was asked to indicate how true each item was on a 3-point scale (1 = "Not true"; 3 = "Certainly true"). Twenty items asked about the child's internalizing problem: ten assessing emotional

problems (e.g., “Many worries or often seems worried”) and ten measuring peer problems (e.g., “Picked on or bullied”). Another twenty items asked about the child’s externalizing problems: ten inquired about conduct problems (e.g., “Often loses temper”) and ten measured hyperactivity problems (e.g., “Easily distracted”). The parent’s responses for each of the four subscales were summed and total scores for each of emotional, peer, conduct, and hyperactivity problems were computed, which could each range from 0 to 10. An internalizing score (0 to 20) was computed by summing scores from the emotional and peer problems subscales, with a higher score indicating more internalizing problems; and an externalizing score (0 to 20) was computed by summing conduct and hyperactivity problems (0 to 10), with a higher score indicating more externalizing problems (Goodman et al., 2010). In the current sample, the internal consistency of the higher order internalizing and externalizing scales ranged from good to acceptable (a = .83; a = .70). With regards to the subscales, emotional (a = .84), conduct (a = .70), and hyperactivity (a = .69) problems showed acceptable internal consistencies. Though the peer problems subscale showed lower internal consistency (a = .58), this falls in line with past research (Goodman et al., 2010; a = .58) and it is very close to the acceptable cutoff of .60 for short scales of 10 items or less (Loewenthal, 1996).

2.2 Procedure

This data was collected as part of a larger study on the factors that promote and impede family wellbeing during the COVID-19 pandemic. Ethical approval was obtained from the Dalhousie University Social Sciences and Humanities Research Ethics Board prior to data collection (#2020-5166).

Participants completed the survey via Qualtrics Survey Panels, between March 18th - May 18th, 2021. We identified areas where mandated HBL was in effect (i.e., Canada: Toronto; USA: Los Angeles, Philadelphia, San Diego and Boston) and areas where in-person learning (i.e., Canada: Edmonton, Calgary, Vancouver, Halifax, Montreal; USA: Miami and Jacksonville) was happening for the entire one-month period between January 15th and February 15th, 2021 and requested targeted recruitment by Qualtrics Surveys in these cities. However, to ensure adequate numbers, our survey was open to all of Canada and the United States.

Participant selection

Qualtrics Survey Panels is a survey management service that recruits from a large pool of prospective participants based on criteria specified by the researcher. Participants were first screened for eligibility and were required to meet the following criteria for reasons related to the larger study: a) be at least 19 years of age; b) involved in a romantic relationship for 3 months or more c) with a partner who is at least 19 years of age; d) have a child at-home in grades 1 to 5; e) the panel respondent (Parent A) and f) their romantic Parent (Parent B) were both willing and available to participate in the research. Eligible participants completed informed consent and then completed the survey through Qualtrics Survey Panels.

All panelists who started the survey (N = 4817) answered eligibility questions and were asked to give informed consent. Couples with a member who did not meet eligibility, did not provide consent, or who failed an attention or speeder check were excluded. Respondents were asked two filter questions. The first asked respondents to commit to providing thoughtful and honest answers by selecting “I will provide my best

answers". The second acted as an attention check (Oppenheimer et al., 2009) and required respondents to select a particular answer (i.e., "Please select really true"). Further, Qualtrics performed a speeder check to verify that respondents spent a reasonable amount of time completing the survey. The upcoming constitutes the breakdown of excluded participants (*n* = 4100): panelist was unwilling to give informed consent (n = 83); Parent B was unwilling to participate in the survey (*n* = 1234); Parent B was unwilling to give informed consent (*n* = 14); couple did not have a child in grades 1 to 5 (*n* = 762); at least one member did not meet the age inclusion criteria (*n* = 216); the panelist was not in romantic relationship (*n* = 333); the panelist and Parent B were in a romantic relationship for less than 3 months (*n* = 3); at least one member failed the attention and/or speeder check (*n* = 425); at least one member of the couple only partially completed the measures (i.e., dropouts; *n* = 984); the child in grades 1 to 5 was engaging in HBL between January 15th and February 15th, 2021 due to reasons unrelated to COVID-19-restrictions (i.e., voluntary home-based learners) (*n* = 46). We did not include data for voluntary home-based learners in the present study as the sample size was too small to run separate analyses on this group and because there are important differences between mandated and voluntary home-based learners that would need to be considered.

CHAPTER 3 RESULTS

3.1 Data Analysis

All analyses were conducted using Version 1.3.1073 of RStudio. Prior to analyzing research questions, relevant statistical assumptions were tested. Raw data were screened for normality of residuals (i.e., observation of QQ plots and Cook's distance), univariate and multivariate outliers (i.e., observation of box plots and Cook's distance), homogeneity of variance (i.e., Levene's tests all non-significant, > .05), collinearity (i.e., variance inflation factors all less than 1.01), and heteroskedasticity (i.e., observation of residuals vs. fitted plots). Overall, all statistical assumptions were met, and no influential univariate or multivariate outliers were identified.

To see if mandated home-based and in-person learners differed on any child or parental demographics, Welch independent *t*-tests (which are robust to unequal sample sizes and variances between groups; Delacre et al., 2017), and chi-squares were run. To further assess relations between all variables, we ran Pearson correlations (initially using the entire sample and then differentiating by the child's schooling status). The current study used an alpha level of $p < .05$ to determine statistical significance. Only marginally significant interactions ($p < .10$) predicted a priori were probed (Ziliak & McCloskey, 2008).

RQ 1: Child mental health during mandated HBL versus in-person learning

To determine whether parent-reported measures of child mental health differed based on the child's schooling status, one-way analyses of covariance (ANCOVAs) were conducted for internalizing and externalizing problems, as well as their respective

subscales. Child age, gender, the number of children living in the home and family income were included as covariates in all models conducted.

RQ2 and RQ3: The roles of routines and household chaos in child mental health

To examine the role of routines and household chaos in child mental health measures, six three-step multivariate hierarchical regressions were performed for each IV (twelve in total). For each of routine and household chaos, two hierarchical regressions were run (one for internalizing problems and one for externalizing problems), along with one for each of the four subscales of emotional, peer, conduct and hyperactivity problems. The child's schooling status (IV_1) was effect-coded (-1 = in-person learners; 1 = mandated home-based learners) as was gender (-1 = male; 1 = female, non-binary or preferred not to answer). Routines (IV_2) and household chaos (IV_3) were grand mean centered. All twelve hierarchical regressions added child age, child gender, the number of children living in the home, and family income as covariates in Step 1 and the main effects of the IVs in Step 2 (i.e., child's schooling status and routines OR household chaos). The interaction between the IVs (schooling status x routines OR schooling status x household chaos) was added in Step 3. Main effects of both routines (or household chaos) and schooling status in Step 2 would favor the compensatory model of routines (or additive model of household chaos) as a protective factor (or risk factor) for mandated home-based learners (Fergus & Zimmerman, 2005). An interactive effect in Step 3 2 would favor the protective model (or the risk model) (Fergus & Zimmerman, 2005).

3.2 Participants

Participants were 717 romantic couples (parent mean age = 38.93 years, *SD* = 7.00, Range = 19 to 67 years) with a child in grades 1 to 5 (child mean age = 7.95 years, *SD* =

1.78, Range = 5 to 12 years) and who were living in Canada (90.1% [n = 646]) or in the United States (9.9% [n = 71]). The median family income of the current sample fell between $101,000 and $125,000 a year. The sample included 332 children who learned at-home due to reasons related to the COVID-19 pandemic (i.e., mandated home-based learners) and 385 children who attended school in-person (i.e., in-person learners; controls) between January 15th and February 15th, 2021. Child demographics and schooling information by the child's schooling status are presented in Table 3.1. To determine whether the two groups of children differed on any variables, Welch independent *t*-tests and chi-square tests were conducted to compare children engaging in mandated HBL versus in-person learning. There were no differences between home-based versus in-person learners in terms of child age, $t(695.55) = -0.95$, $p = .340$, 95% CI [-0.39, 0.13], child gender[3], $X^2(1, N = 717) = 0.48$, $p = .488$, the number of children living in the home, $t(711.68) = 1.58$, $p = .115$, 95% CI [-0.03, 0.24], family income, $X^2(7, N = 717) = 6.36$, $p = .499$, or whether parents reported the child to identify as White or not, $X^2(7, N = 717) = 1.99$, $p = .158$. In the current sample, a greater proportion of children engaging in mandated HBL lived in the United States than in Canada, $X^2(1, N = 717) = 17.40$, $p < .001$.

Further, the percentage of time the child had been schooled at-home due to COVID-19 restrictions between September 2020 and February 15th, 2021 was significantly lower in in-person learners than in mandated home-based learners, $t(688.61) = -14.73$, $p < .001$, 95% CI [-39.94, -30.54]. Similarly, the percentage of time the child

[3] Child gender was effect coded as males versus other genders (i.e., females, non-binary and prefer not to answer) due to a low number of children identifying as non-binary or not having a gender reported.

had been schooled at-home due to COVID-19 restrictions between February 15th, 2021, and survey completion was significantly lower in in-person learners, than in home-based learners, $t(674.02) = -13.46$, $p < .001$, 95% CI [-40.38, -30.10]. These findings suggest that we captured two groups with largely different schooling experiences (since September 2020). Indeed, mandated home-based ($n = 66/332$ switched to in-person learning) and in-person learners ($n = 98/385$ switched to HBL) differed in whether or not they were engaging in HBL at time of survey completion, $X^2(1, N = 717) = 170$, $p < .001$. It should be noted that $n = 43/717$ participants did not provide data on how their child was being schooled at the time of survey completion. When comparing how children were being schooled at survey completion to their schooling status during the January 15th-February 15th, 2021 time-period, we find that the majority of children remained engaging in the same type of learning (HBL or in-person learning). Accordingly, it was impossible to determine the influence of more chronic HBL versus shorter periods of HBL on mental health outcomes.

As seen in Table 3.2, parents (including both Parent A and Parent B) of mandated home-based versus in-person learners did not differ in terms of age, $t(1364.5) = 1.96$, $p = .051$, 95% CI [0.00, 1.45], whether or not they completed post-secondary education, $X^2(1, N = 1434) = 0.18$, $p = .673$, or were employed, $X^2(1, N = 1434) = 1.13$, $p = .288$. Further, when looking at Parent A only, there were no differences in Parent A between mandated home-based versus in-person learners in terms of whether or not they completed post-secondary education, $X^2(1, N = 717) = 0.01$, $p = .962$, or were employed, $X^2(1, N = 717) = 0.23$, $p = .629$. There was a significant difference in the age of Parent A between mandated home-based and in-person learners, with Parent A of in-person learners ($M =$

39.05, *SD* = 6.74) being older than Parent A of mandated home-based learners (*M* = 38.65, *SD* = 6.99), $t(723.58) = 149.56$, $p < .001$, 95% CI [37.90, 38.91], $d = .058$. Parent A (male: $n = 336$; female, non-binary or preferred not to answer: $n = 381$) was more likely to identify as female or non-binary or preferred not to report on their gender than to identify as male, $X^2(1, N = 717) = 329$, $p < .001$, relative to Parent B (male: $n = 385$; female, non-binary or preferred not to answer: $n = 332$). There was also a significant difference between Parent A and Parent B in the amount of hours they reported schooling their child at home per week, such that Parent A ($M = 14.90$, $SD = 12.07$) reported spending more hours than Parent B ($M = 11.54$, $SD = 12.72$), $t(722) = 3.65$, $p < .001$, 95% CI [1.56, 5.17], $d = .27$.

Table 3.1

Child Demographics and Schooling Information by Child Schooling Status

Variable	Schooling status	
	In-person ($n = 385$)	HBL ($n = 332$)
Mean child age in years (*SD*)	7.90 (1.77)	8.02 (1.80)
Child gender		
Male	200 (51.95%)	182 (54.82%)
Other (i.e., female, non-binary or prefer not to answer)	185 (48.05%)	150 (45.18%)
Child ethnicity		
White	265 (68.83%)	211 (63.55%)
Asian or Arab / West Asian (e.g., Armenian, Egyptian, Iranian, Lebanese, Moroccan)[a]	55 (14.29%)	58 (17.47%)
Latin America or Black or First Nations[a]	23 (5.97%)	23 (6.93%)
Other	7 (1.82%)	6 (1.80%)
Prefer not to answer	4 (1.04%)	3 (0.90%)
Multiracial	31 (8.05%)	31 (9.34%)
Child's location***		
Canada	365 (94.81%)	282 (84.94%)
British Columbia	38 (9.87%)	15 (4.52%)
Alberta	73 (18.96%)	25 (7.53%)

Variable	Schooling status	
	In-person (n = 385)	HBL (n = 332)
Saskatchewan	14 (3.64%)	5 (1.51%)
Manitoba	21 (5.45%)	9 (2.71%)
Ontario	104 (27.01%)	199 (59.94%)
Quebec	67 (17.40%)	21 (6.33%)
Atlantic Provinces[b]	43 (11.17%)	8 (2.41%)
Territories[b]	2 (0.52%)	-
United States	21 (5.45%)	50 (15.06%)
California	13 (3.38%)	33 (9.94%)
Florida	5 (1.30%)	10 (3.01%)
Pennsylvania and New York[b]	3 (0.78%)	7 (2.11%)
Family income		
$25,000 or less per year	15 (3.90%)	13 (3.92%)
Between $26,000 and $50,000	37 (9.61%)	33 (9.94%)
Between $51,000 and $75,000	49 (12.72%)	55 (16.57%)
Between $76,000 and $100,000	85 (22.07%)	54 (16.27%)
Between $101,000 and $125,000	55 (14.29%)	45 (13.55%)
Between $126,000 and $150,00	61 (15.84%)	48 (14.46%)
$151,000 or more per year	65 (16.89%)	67 (20.18%)
Prefer not to answer	18 (4.68%)	17 (5.12%)
Mean number of children living at-home (*SD*)	2.07 (0.94)	1.96 (0.86)
Mean % of TSAH due to COVID-19 (Sep - Feb 15th)***	29.09% (31.12)	64.33% (32.63)
Mean % of TSAH due to COVID-19 since Feb 15th***	26.21% (33.05)	61.45% (36.51)

Notes. †p < .10, *p < .05, **p < .01, ***p < .001 indicates that there is a significant difference between mandated home-based and in-person learners. [a] Combined to maintain confidentiality of respondents due to low numbers in one or more of these categories. [b] Combined to maintain confidentiality of respondents due to low numbers in one or more of these provinces or states. TSAH = time spent schooled at-home.

Table 3.2

Demographics for all Parents (Parent A and Parent B) by Child Schooling Status (N = 1434)

Variable	Schooling status	
	In-person (n = 770)	HBL (n = 664)
Mean age (*SD*)*	39.26 (6.75)	38.54 (7.27)
Gender		
Male	386 (50.13%)	335 (50.45%)
Other (i.e., female, non-binary or prefer not to answer)	384 (49.87%)	327 (49.54%)
Highest level of education completed		
College or university graduate[a]	583 (75.71%)	510 (76.81%)
Other[b]	187 (24.29%)	154 (23.19%)
Employment status (Jan15th-Feb 15th)		
Employed[c]	636 (82.60%)	533 (80.27%)
Unemployed[d]	134 (17.40%)	131 (19.73%)

Notes. †p < .10, *p < .05, **p < .01, ***p < .001 indicates that there is a significant difference between parents of mandated home-based and of in-person learners. [a] Includes participants who indicated being a college/university graduate, having completed some post-graduate education or having a post-graduate degree. [b] Includes participants who indicated that they completed elementary school, some high school, are a high school graduate or completed some college/university. [c] Includes participants who indicated being employed full or part-time. [d] Includes participants who indicated being unemployed, not in the labor force, or a full- or part-time student.

Next, we computed differences across two of our independent variables: routines and household chaos between mandated home-based and in-person learners. In terms of routines, there were no significant differences between parents of mandated home-based and in-person learners in the amount of total daily routines reported, $t(710.08) = -1.82$, $p = .069$, 95% CI [-1.49, 0.06]. Parents of mandated home-based learners and in-person learners did not differ in their reports on the question asking about routines for general activities, $t(714.64) = 0.02$, $p = .988$, 95% CI [-0.40, 0.41], however, parents of in-person

learners reported lower levels of routines on the question specifically asking about schooling activities than parents of home-based learners, $t(694.08) = -3.16$, $p = .002$, 95% CI [-1.18, -0.27]. Turning to household chaos, there were no differences between parents of mandated home-based learners and in-person learners the amount of household chaos reported, $t(701.87) = -1.19$, $p = .236$, 95% CI [-1.80, 0.44].

Table 3.3

Mean Scores for Routines and Household chaos by Child Schooling Status

Measure (max.)	Schooling status			
	In-person (n = 385)		HBL (n = 332)	
	Mean	*(SD)*	*Mean*	*(SD)*
Routines (24)†	15.56	5.91	16.28	4.68
General (12)	8.26	2.99	8.26	2.52
Schooling (12)**	7.30	3.54	8.02	2.56
Household chaos (60)	29.94	7.68	30.62	7.59

Notes. †$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$ indicates that there is a significant difference between mandated home-based and in-person learners.

Correlations between measures for all children are presented in Table 3.4. There was a small negative correlation between routines and externalizing problems. There was also a small negative correlation between routines and both peer and hyperactivity problems. The positive correlation between internalizing problems and household chaos was moderate, while the positive correlation between externalizing problems and household chaos was large. Correlations by the child's schooling status are presented in Table 3.5. There were small negative correlations between routines and both internalizing

and externalizing problems (i.e., higher order scales) as well as with peer and conduct problems for mandated home-based learners only.

Table 3.4

Pearson Correlations Between Measures for All Children

Measure	1	2	3	4	5	6	7	8
1. Internalizing problems	-							
2. Externalizing problems	.65***	-						
3. Emotional problems	.92***	.63***	-					
4. Peer problems	.85***	.51***	.59***	-				
5. Conduct problems	.71***	.86***	.70***	.55***	-			
6. Hyperactivity problems	.44***	.89***	.42***	.35***	.53***	-		
7. Routines	-.04	-.09*	.00	-.09*	-.02	-.13***	-	
8. Household chaos	.44***	.53***	.43***	.35***	.47***	.46***	-.20***	-

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

Table 3.5

Pearson Correlations Between Measures by Child Schooling Status

Measure	1	2	3	4	5	6	7	8
1. Internalizing problems	-	.66***	.93***	.87***	.72***	.44***	.00	.44***
2. Externalizing problems	.64***	-	.66***	.50***	.86***	.89***	-.02	.50***
3. Emotional problems	.92***	.59***	-	.62***	.73***	.45***	.06	.45***
4. Peer problems	.84***	.53***	.55***	-	.55***	.33***	-.07	.32***
5. Conduct problems	.70***	.86***	.65***	.57***	-	.53***	-.09†	.46***
6. Hyperactivity problems	.43***	.89***	.39***	.36***	.52***	-	-.11*	.43***
7. Routines	-.12*	-.19***	-.08	-.13*	-.17**	-.17**	-	-.15**
8. Household chaos	.45***	.56***	.41***	.38***	.48***	.49***	-.29***	-

Notes. †$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$. Correlations for home-based learners are presented below the diagonal. Correlations for in-person learners are presented above the diagonal.

3.3 Child Mental Health During Mandated HBL Versus In-person Learning

Mean scores for child mental health measures by schooling status are presented in Table 3.6. Inconsistent with our hypotheses, the effect of schooling status (IV_1) was not significant on our DVs of internalizing **(H1a)**, $F(1, 715) = 0.56$, $p = .451$, or externalizing **(H1b)** problems, $F(1, 715) = 0.12$, $p = .730$. Turning to the sub-scales, emotional, $F(1, 715) = 0.14$, $p = .703$, conduct, $F(1, 715) = 0.02$, $p = .878$, and hyperactivity problems, $F(1, 715) = 0.18$, $p = .668$, did not differ between mandated home-based and in-person leaners. There was, however, a significant effect of schooling status on peer problems, $F(1, 715) = 4.47$, $p = .035$, $\eta_p^2 = 0.006$, with mandated home-based learners showing more peer problems than in-person learners. Given this finding, exploratory analyses looked at group differences on each item of the peer problems subscale separately. It was revealed that children engaging in mandated HBL indicated more problems than in-person leaners on two items: "Generally liked by other children" and "Gets along better with adults" (see Table 3.7). This suggests that parents of home-based learners as compared to those of in-person learners reported that their children were less generally liked by their peers and got along better with adults than other children.

Table 3.6

Mean Scores for Child Mental Health Measures by Child Schooling Status

Measure (max.)	Schooling status					
	In-person (n = 385)		HBL (n = 332)		Total (N = 717)	
	Mean	*(SD)*	*Mean*	*(SD)*	*Mean*	*(SD)*
Internalizing problems (20)	5.20	(4.33)	5.44	(3.97)	5.31	(4.16)

Measure (max.)	Schooling status				Total (N = 717)	
	In-person (n = 385)		HBL (n = 332)			
	Mean	*(SD)*	*Mean*	*(SD)*	*Mean*	*(SD)*
Emotional (10)	2.73	(2.78)	2.65	(2.58)	2.69	(2.69)
Peer (10)*	2.48	(2.01)	2.79	(1.90)	2.62	(1.97)
Externalizing problems (20)	6.73	(3.90)	6.83	(4.02)	6.77	(3.95)
Conduct (10)	2.29	(2.10)	2.31	(2.19)	2.30	(2.14)
Hyperactivity (10)	4.44	(2.35)	4.52	(2.42)	4.48	(2.38)

Notes. †p < .10, *p < .05, **p < .01, ***p < .001 indicates that there is a significant difference between mandated home-based and in-person learners

Table 3.7

Mean Scores on Individual Items of the Peer Problems Subscale by Schooling Status

Measure (max.)	Schooling status					
	In-person (n = 385)		HBL (n = 332)			
	Mean	*(SD)*	*Mean*	*(SD)*	*F(df)*	*p*
1. Rather solitary, prefers to play alone (2)	0.58	*(0.68)*	0.59	*(0.71)*	0.01(1, 715)	.909
2. Has at least one good friend (2)[a]	0.46	*(0.63)*	0.54	*(0.65)*	2.75(1, 715) †	.098
3. Generally liked by other children (2)[a]	0.38	*(0.53)*	0.47	*(0.56)*	4.36(1, 715)*	.037
4. Picked on or bullied (2)	0.36	*(0.60)*	0.37	*(0.61)*	0.01(1, 715)	.932
5. Gets along better with adults (2)	0.69	*(0.74)*	0.82	*(0.72)*	6.33(1, 715)*	.012

Notes. †p < .10, *p < .05, **p < .01, ***p < .001. [a] Item reverse coded such that a higher score indicates more peer problems.

3.4 The Role of Routines in Child Mental Health During COVID-19

Internalizing problems

The covariates added in Step 1 significantly predicted internalizing problems in children (see Table 3.8). Only child gender and the number of children at-home were significant predictors. Male gender, as opposed to other genders, was associated with more internalizing problems. The number of children in the home negatively contributed to internalizing problems (i.e., more children in home was associated with lower internalizing symptoms in the index child). The addition of the IVs in Step 2 (i.e., child's schooling status and routines **[H2a]**) **(H3a)** failed to add significant variance in explaining internalizing problems, $F(2, 710) = 0.92$, $p = .399$. When the interaction was added in Step 3, there was a trend towards it explaining for a significant amount of incremental variance in internalizing problems, $F(1, 709) = 2.73$, $p = .099$ **(H3a)**. Next, we examined the role of routines in predicting internalizing problems at the subscale level (i.e., emotional and peer problems).

Table 3.8

Hierarchical Regression Analysis of Routines as a Predictor of Internalizing Problems Controlling for Child Age, Child Gender, Number of Children Living in the Home and Family Income

Step	Predictors	Outcome: Internalizing problems			
		F(df)	*B*	*SE*	*p*
1.	**Marginal R^2 / Conditional R^2 = .019 / .013**	3.45(4, 712)			.008
	(Intercept)		7.96***	0.96	<.001
	Child age		-0.04	0.09	.608
	Child gender		-0.79**	.30	.009
	No. of children living at-home		-0.42*	0.17	.015

Step	Predictors	Outcome: Internalizing problems			
		F(df)	*B*	*SE*	*p*
	Family income		-0.06	0.08	.468
2.	**Marginal R^2 / Conditional R^2 = .022 / .013**	2.60 (6, 710)			.017
	(Intercept)		8.00***	0.96	<.001
	Child age		-0.05	0.09	.544
	Child gender		-0.81**	0.30	.007
	No. of children living at-home		-0.40*	0.17	.018
	Family income		-0.05	0.08	.519
	Schooling status		0.10	0.16	.533
	Routines		-0.04	0.03	.214
3.	**Marginal R^2 / Conditional R^2 = .025 / .016**	2.63 (7, 709)			.011
	(Intercept)		8.00***	0.96	<.001
	Child age		-0.05	0.09	.538
	Child gender		-0.80**	0.30	.008
	No. of children living at-home		-0.41*	0.17	.017
	Family income		-0.05	0.08	.562
	Schooling status		0.10	0.16	.506
	Routines		-0.05†	0.03	.093
	Schooling status x routines		-0.05†[4]	0.03	.099

Note. †p < .10, *p < .05, **p < .01, ***p < .001.

Emotional problems

The covariates entered in Step 1 did not significantly predict emotional problems (see Table 3.9). Only child gender contributed significantly, where males, as opposed to other genders, showed more emotional problems. The addition of the IVs in Step 2 (i.e., child's schooling status and routines) did not account for a significant increase in explained variance from Step 1, $F(2, 710) = .130$, $p = .878$. When the interaction was

[4] This marginally significant interaction was probed but the effect was not significant at any levels of the moderator and thus was not considered further.

added in Step 3, there was a trend towards it explaining for a significant amount of incremental variance in emotional problems, $F(1, 719) = 3.37$, $p = .067$.

Table 3.9

Hierarchical Regression Analysis of Routines as a Predictor of Emotional Problems Controlling for Child Age, Child Gender, Number of Children Living in the Home and Family Income

Step	Predictors	Outcome: Emotional problems			
		F(df)	*B*	*SE*	*p*
1.	**Marginal R^2 / Conditional R^2 = .012 / .006**	2.09(4, 712)†			.080
	(Intercept)		4.18***	0.62	<.001
	Child age		-0.07	0.06	.189
	Child gender		-0.42*	0.20	.034
	No. of children living at-home		-0.16	0.11	.154
	Family income		0.01	0.05	.911
2.	**Marginal R^2 / Conditional R^2 = .012 / .004**	1.43(6, 710)			.199
	(Intercept)		4.19***	0.62	<.001
	Child age		-0.07	0.06	.195
	Child gender		-0.42*	0.20	.032
	No. of children living at-home		-0.16	0.11	.148
	Family income		0.01	0.05	.903
	Schooling status		-0.05	0.10	.621
	Routines		-0.00	0.02	.925
3.	**Marginal R^2 / Conditional R^2 = .017 / .007**	1.71(7, 709)			.102
	(Intercept)		4.19***	0.62	<.001
	Child age		-0.07	0.06	.191
	Child gender		-0.41*	0.20	.034
	No. of children living at-home		-0.17	0.11	.136
	Family income		0.01	0.05	.846
	Schooling status		-0.05	0.10	.654
	Routines		-0.01	0.02	.525

Step	Predictors	Outcome: Emotional problems			
		F(df)	*B*	*SE*	*p*
	Schooling status x routines		-0.04†[5]	0.02	.067

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

Peer problems

The covariates added in Step 1 significantly predicted peer problems (see Table 3.10). Only child gender and the number of children at-home were significant predictors. Male gender, as opposed to other genders, was associated with more peer problems. The number of children in the home negatively contributed to peer problems. The addition of the IVs in Step 2 (i.e., child's schooling status and routines) added significant incremental variance in explaining peer problems, $F(2, 710) = 4.92$, $p = .008$. There were both significant main effects of schooling status (i.e., mandated HBL, as opposed to in-person learning, predicted more peer problems) and routines (i.e., more routines predicted fewer peer problems). The addition of the interaction in Step 3 did not account for a significant increase in explained variance in peer problems, $F(2, 710) = 0.97$, $p = .325$.

Table 3.10

Hierarchical Regression Analysis of Routines as a Predictor of Peer Problems Controlling for Child Age, Child Gender, Number of Children Living in the Home and Family Income

Step	Predictors	Outcome: Peer problems			
		F(df)	*B*	*SE*	*p*
1.	**Marginal R^2 / Conditional R^2 = .028 / .023**	5.20(4, 712)			<.001
	(Intercept)		3.77***	0.45	<.001

[5] This marginally significant interaction was probed but the effect was not significant at any levels of the moderator and thus was not considered further.

Step	Predictors	Outcome: Peer problems			
		F(df)	*B*	*SE*	*p*
	Child age		0.03	0.04	.473
	Child gender		-0.38**	0.14	.008
	No. of children living at-home		-0.26**	0.08	.001
	Family income		-0.07†	0.04	.089
2.	**Marginal R^2 / Conditional R^2 = .042 / .034**	5.15(6, 710)			<.001
	(Intercept)		3.82***	0.45	<.001
	Child age		0.02	0.04	.616
	Child gender		-0.39**	0.14	.006
	No. of children living at-home		-0.24**	0.08	.002
	Family income		-0.06	0.04	.122
	Schooling status		0.15*	0.07	.044
	Routines		-0.03*	0.01	.012
3.	**Marginal R^2 / Conditional R^2 = .043 / .034**	4.55(7, 709)			<.001
	(Intercept)		3.82***	0.45	<.001
	Child age		0.02	0.04	.619
	Child gender		-0.39**	0.14	.006
	No. of children living at-home		-0.25**	0.08	.002
	Family income		-0.06	0.04	.132
	Schooling status		0.15*	0.07	.041
	Routines		-0.04**	0.01	.007
	Schooling status x routines		-0.01	0.01	.325

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

Externalizing problems

The covariates added in Step 1 significantly predicted externalizing problems (see Table 3.11). Only child gender was a significant predictor, such that male gender, as opposed to other genders, was associated with more externalizing problems. Consistent with **H2b**, the addition of the IVs in Step 2 (i.e., child's schooling status and routines) explained a significant increase in the variance in externalizing problems, $F(2, 709) =$

3.71, p = .025. There was a main effect of routines on externalizing problems. The main effect of schooling status on externalizing problems was not significant. Consistent with **H3b**, the addition of the interaction in Step 3 added significant incremental variance in explaining externalizing problems, $F(1, 709) = 7.19$, p = .007. The interaction between the IVs significantly predicted externalizing problems, suggesting moderation.

Table 3.11

Hierarchical Regression Analysis of Routines as a Predictor of Externalizing Problems Controlling for Child Age, Child Gender, Number of Children Living in the Home and Family Income

Step	Predictors	Outcome: Externalizing problems			
		F(df)	*B*	*SE*	*p*
1.	**Marginal R^2 / Conditional R^2 = .018 / .012**	3.21(4, 712)			.013
	(Intercept)		9.44***	0.91	<.001
	Child age		-0.15†	0.08	.070
	Child gender		-0.74*	0.29	.010
	No. of children living at-home		-0.27†	0.16	.097
	Family income		0.03	0.08	.687
2.	**Marginal R^2 / Conditional R^2 = .028 / .020**	3.40(6, 710)			.003
	(Intercept)		9.54***	0.91	<.001
	Child age		-0.16*	0.08	.047
	Child gender		-0.79**	0.29	.006
	No. of children living at-home		-0.25	0.16	.118
	Family income		0.05	0.08	.559
	Schooling status		0.06	0.15	.693
	Routines		-0.07**	0.03	.007
3.	**Marginal R^2 / Conditional R^2 = .038 / .028**	3.96(7, 709)			<.001
	(Intercept)		9.54***	0.91	<.001
	Child age		-0.17*	0.08	.045

Step	Predictors	Outcome: Externalizing problems			
		F(df)	*B*	*SE*	*p*
	Child gender		-0.78**	0.28	.007
	No. of children living at-home		-0.26	0.16	.103
	Family income		0.05	0.08	.488
	Schooling status		0.07	0.15	.644
	Routines		-0.10***	0.03	.001
	Schooling status x routines		-0.08**	0.03	.007

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

Routine was examined as a moderator of the relation between externalizing problems and schooling status. We tested if the relation between schooling status and externalizing problems was significant for three levels of the moderator: low routine (i.e., -1 SD below the mean), average routine (i.e., mean) and high routine (i.e., + 1 SD above the mean). The estimated simple slopes models examining the relation between schooling status and externalizing problems based on routines are presented in Table 3.12. In summary, simple slopes analyses indicated that the relation between schooling status and externalizing problems was significant at low levels of routine but not at high or average levels. At low levels of routine, mandated HBL was associated with more externalizing problems relative to in-person learning. Relations between schooling status and externalizing problems plotted at the three different levels of the moderator (i.e., routines) are presented in Figure 3.1. Next, we examined the role of routines in predicting externalizing problems at the subscale level.

Table 3.12

Simple Slopes Models for Externalizing Problems

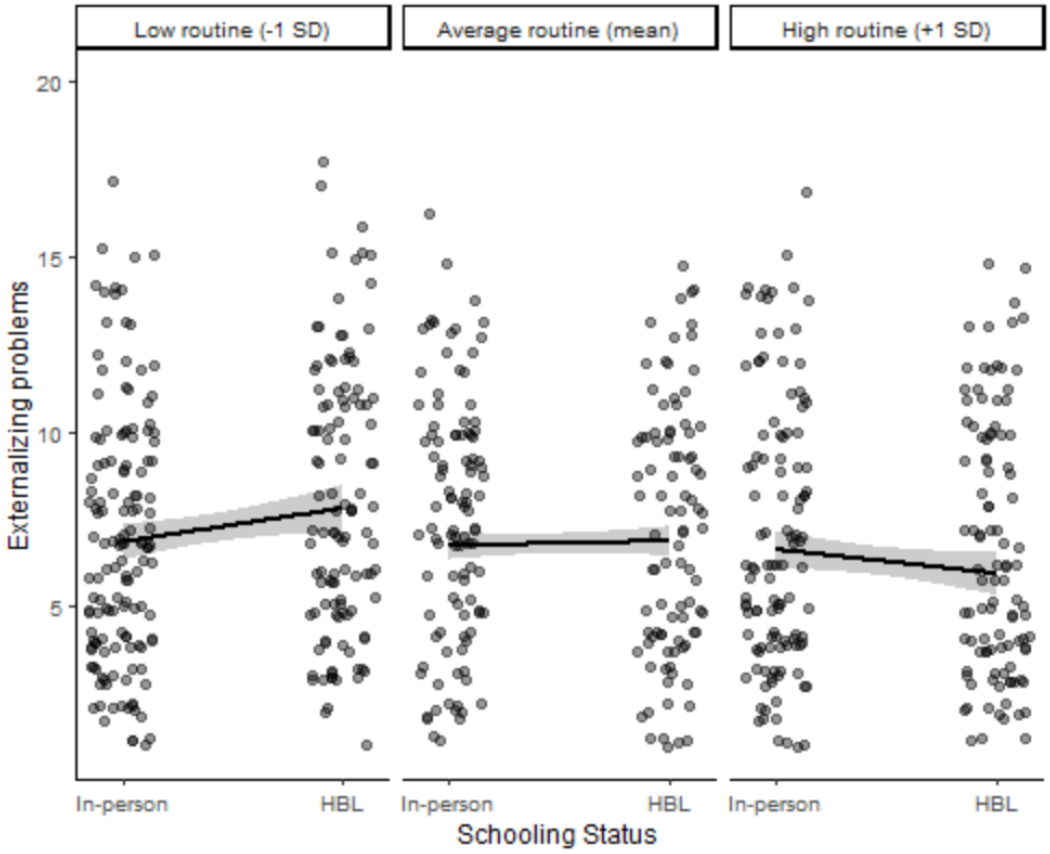
	b	*SE*	*t*	*p*

Low general routine (-1 SD)	0.48	0.21	2.23	.03*
Average routine (Mean)	0.07	0.15	0.46	.64
High general routine (+1 SD)	-0.34	0.21	-1.64	.10

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

Figure 3.1

Scatterplot of Schooling Status and Routines Predicting Externalizing Problems



Conduct problems

The covariates added in Step 1 significantly predicted conduct problems (see Table 3.13). Specifically, child age, child gender and the number of children at-home were all significant predictors of conduct problems. Male gender, as opposed to other genders, was associated with more conduct problems. Child age and the number of children in the home negatively contributed to conduct problems (fewer conduct

problems in older children and in those with more children in the family). The addition of the IVs in Step 2 (i.e., child's schooling status and routines) failed to explain a significant amount of variation in conduct problems, $F(2, 710) = 0.29$, $p = .746$. However, the addition of the interaction in Step 3 explained a significant amount of variance in conduct problems, $F(1, 709) = 13.27$, $p < .001$. The interaction between the IVs significantly predicted conduct problems, suggesting moderation.

Table 3.13

Hierarchical Regression Analysis of Routines as a Predictor of Conduct Problems Controlling for Child Age, Child Gender, Number of Children Living in the Home and Family Income

Step	Predictors	Outcome: Conduct problems			
		F(df)	*B*	*SE*	*p*
1.	**Marginal R^2 / Conditional R^2 = .023 / .018**	4.24(4, 712)			.002
	(Intercept)		4.00***	0.49	<.001
	Child age		-0.10*	0.04	.025
	Child gender		-0.42**	0.15	.006
	No. of children living at-home		-0.18*	0.09	.042
	Family income		0.02	0.04	.677
2.	**Marginal R^2 / Conditional R^2 = .024 / .016**	2.92(6, 710)			.008
	(Intercept)		4.01***	0.49	<.001
	Child age		-0.10*	0.04	.022
	Child gender		-0.43**	0.16	.005
	No. of children living at-home		-0.18*	0.09	.046
	Family income		0.02	0.04	.641
	Schooling status		0.00	0.08	.953
	Routines		-0.01	0.01	.444
3.	**Marginal R^2 / Conditional R^2 = .042 / .033**	4.44(4, 709)			<.001
	(Intercept)		4.01***	0.49	<.001

Step	Predictors	Outcome: Conduct problems			
		F(df)	*B*	*SE*	*p*
	Child age		-0.10*	0.04	.020
	Child gender		-0.42**	0.15	.006
	No. of children living at-home		-0.18*	0.09	.036
	Family income		0.03	0.04	.538
	Schooling status		0.01	0.08	.880
	Routines		-0.03†	0.02	.069
	Schooling status x routines		-0.06***	0.02	<.001

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

Routine was examined as a moderator of the relation between conduct problems and schooling status. We tested if the relation between schooling status and conduct problems was significant for three levels of the moderator. The estimated simple slopes models examining the relation between schooling status and conduct problems based on routines are presented in Table 3.14. In summary, simple slope analyses revealed that the relation between schooling status and conduct problems was significant at low and high levels of routine, but not at average levels. Specifically, at low levels of routine, mandated HBL was associated with higher conduct problems relative to in-person learning. Further, at high levels of routine, mandated HBL was associated with lower conduct problems relative to in-person learning. Relations between schooling status and conduct problems plotted at the three different levels of the moderator (i.e., routines) are presented in Figure 3.3.

Table 3.14

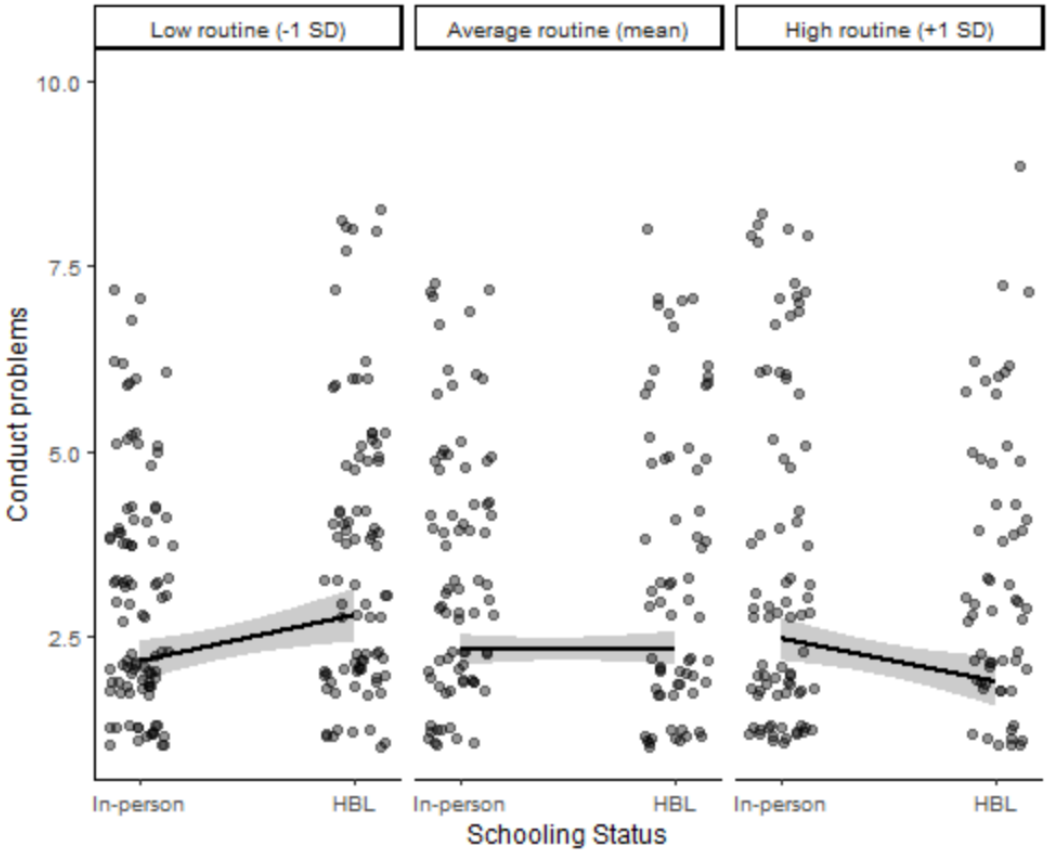
Simple Slopes Models for Conduct Problems

	b	*SE*	*t*	*p*
Low general routine (-1 SD)	0.31	0.12	2.70	.01*
Average routine (Mean)	0.01	0.08	0.15	.88
High general routine (+1 SD)	-0.29	0.11	-2.56	.01*

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

Figure 3.2

Scatterplot of Schooling Status and Routines Predicting Conduct Problems



Hyperactivity problems

The covariates added in Step 1 did not significantly predict hyperactivity problems (see Table 3.15). However, the addition of the IVs in Step 2 (i.e., child's schooling status and routines) explained a significant amount of variance in hyperactivity problems, $F(2, 710) = 7.35$, $p < .001$. There was a main effect of routines on hyperactivity problems,

such that more routine was associated with fewer hyperactivity problems. There was no main effect of schooling status on hyperactivity problems. A similar outcome was found when the interaction was added in Step 3, $F(1, 709) = 1.40$, $p = .238$.

Table 3.15

Hierarchical Regression Analysis of Routines as a Predictor of Hyperactivity Problems Controlling for Child Age, Child Gender, Number of Children Living in the Home and Family Income

Step	Predictors	Outcome: Hyperactivity problems			
		F(df)	*B*	*SE*	*p*
1.	**Marginal R^2 / Conditional R^2 = .007 /.002**	1.29(4, 712)			.272
	(Intercept)		5.45***	0.55	<.001
	Child age		-0.05	0.05	.326
	Child gender		-0.31†	0.17	.073
	No. of children living at-home		-0.09	0.10	.354
	Family income		0.01	0.05	.769
2.	**Marginal R^2 / Conditional R^2 = .027 / .019**	3.33(6, 710)			.003
	(Intercept)		5.53***	0.55	<.001
	Child age		-0.06	0.05	.217
	Child gender		-0.36*	0.17	.040
	No. of children living at-home		-0.08	0.10	.429
	Family income		0.03	0.05	.583
	Schooling status		0.05	0.09	.548
	Routines		-0.06***	0.02	<.001
3.	**Marginal R^2 / Conditional R^2 = .029 / .020**	3.05(7, 709)			.004
	(Intercept)		5.53***	0.55	<.001
	Child age		-0.06	0.05	.215
	Child gender		-0.35*	0.17	.042
	No. of children living at-home		-0.08	0.10	.413
	Family income		0.03	0.05	.551

Step	Predictors	Outcome: Hyperactivity problems			
		F(df)	*B*	*SE*	*p*
	Schooling status		0.06	0.09	.529
	Routines		-0.07***	0.02	<.001
	Schooling status x routines		-0.02	0.02	.238

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

3.5 The Role of Household Chaos in Child Mental Health During COVID-19

Internalizing problems

The covariates added in Step 1 significantly predicted internalizing problems in children, with male gender and more children at-home predicting fewer internalizing problems in the target child (see Table 3.16). The addition of the IVs in Step 2 (i.e., child's schooling status and household chaos **[H4a]**) **(H5a)** accounted for a significant increase in explained variance in internalizing problems, $F(2, 710) = 98.30$, $p < .001$. Consistent with **H4a**, higher household chaos was significantly associated with higher levels of internalizing problems. The main effect of schooling status on internalizing problems was not significant. The addition of the interaction in Step 3 failed to explain a significant increase in variance in internalizing problems, $F(1, 709) = 0.26$, $p = .613$ **(H5a)**. We then examined the role of household chaos in predicting internalizing problems at the subscale level (i.e., emotional and peer problems).

Table 3.16

Hierarchical Regression Analysis of Household Chaos as a Predictor of Internalizing Problems Controlling for Child Age, Child Gender, Number of Children Living in the Home and Family Income

Step	Predictors	Outcome: Internalizing problems			
		F(df)	*B*	*SE*	*p*
1.	**Marginal R^2 / Conditional R^2 = .019 /.013**	3.45(4, 712)			.008
	(Intercept)		7.96***	0.96	<.001
	Child age		-0.04	0.09	.608
	Child gender		-0.79**	0.30	.009
	No. of children living at-home		-0.42*	0.17	.015
	Family income		-0.06	0.08	.468
2.	**Marginal R^2 / Conditional R^2 = .023 / .023**	35.69(6, 710)			<.001
	(Intercept)		7.03***	0.86	<.001
	Child age		0.05	0.08	.493
	Child gender		-0.54*	0.27	.044
	No. of children living at-home		-0.64***	0.15	<.001
	Family income		-0.01	0.07	.841
	Schooling status		-0.03	0.14	.836
	Household chaos		0.30***	0.02	<.001
3.	**Marginal R^2 / Conditional R^2 = .023 / .023**	30.60(7, 709)			<.001
	(Intercept)		7.02***	0.86	<.001
	Child age		0.05	0.08	.498
	Child gender		-0.53*	0.27	.047
	No. of children living at-home		-0.64***	0.15	<.001
	Family income		-0.01	0.07	.870
	Schooling status		-0.03	0.14	.839
	Household chaos		0.30***	0.02	<.001
	Schooling status x household chaos		-0.01	0.02	.613

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

Emotional problems

The covariates added in Step 1 significantly predicted emotional problems (Table 3.17) with fewer emotional problems in the males. The addition of the IVs in Step 2 (i.e., child's schooling status and household chaos) accounted for a significant increase in explained variance in emotional problems, $F(2, 710) = 87.15$, $p < .001$. Household chaos

had a significant main effect on emotional problems, such that higher household chaos predicted more emotional problems. The main effect of schooling status on emotional problems was not significant. The addition of the interaction in Step 3 did not account for a significant increase in explained variance in emotional problems, $F(1, 709) = 1.73$, $p = .189$.

Table 3.17

Hierarchical Regression Analysis of Household Chaos as a Predictor of Emotional Problems Controlling for Child Age, Child Gender, Number of Children Living in the Home and Family Income

Step	Predictors	Outcome: Emotional problems			
		F(df)	*B*	*SE*	*p*
1.	**Marginal R^2 / Conditional R^2 = .012 /.006**	2.09(4, 712)			.080
	(Intercept)		4.18***	0.62	<.001
	Child age		-0.07	0.06	.189
	Child gender		-0.42*	0.20	.034
	No. of children living at-home		-0.16	0.11	.154
	Family income		0.01	0.05	.911
2.	**Marginal R^2 / Conditional R^2 = .021 / .020**	30.78(6, 710)			<.001
	(Intercept)		3.61***	0.56	<.001
	Child age		-0.01	0.05	.818
	Child gender		-0.27	0.18	.128
	No. of children living at-home		-0.30**	0.10	.003
	Family income		0.03	0.05	.475
	Schooling status		-0.12	0.09	.185
	Household chaos		0.18***	0.01	<.001
3.	**Marginal R^2 / Conditional R^2 = .021 / .020**	26.66(7, 709)			<.001
	(Intercept)		3.59***	0.56	<.001
	Child age		-0.01	0.05	.804

Step	Predictors	Outcome: Emotional problems			
		F(df)	*B*	*SE*	*p*
	Child gender		-0.26	0.18	.140
	No. of children living at-home		-0.30**	0.10	.003
	Family income		0.04	0.05	.418
	Schooling status		-0.12	0.09	.188
	Household chaos		0.18***	0.01	<.001
	Schooling status x household chaos		-0.02	0.01	.189

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

Peer problems

The covariates added in Step 1 significantly predicted peer problems (Table 3.18) with fewer peer problems in males and in those with more children in the home. The addition of the IVs in Step 2 (i.e., child's schooling status and household chaos) accounted for a significant increase in explained variance in peer problems, $F(2, 710) = 61.60$, $p < .001$. Household chaos had a significant main effect on emotional problems, such that higher household chaos was associated with more peer problems. The main effect of schooling status on peer problems was not significant. The addition of the interaction in Step 3 did not account for a significant increase in explained variance in peer problems, $F(1, 709) = 0.53$, $p = .468$.

Table 3.18

Hierarchical Regression Analysis of Household Chaos as a Predictor of Peer Problems Controlling for Child Age, Child Gender, Number of Children Living in the Home and Family Income

Step	Predictors	Outcome: Peer problems			
		F(df)	*B*	*SE*	*p*
1.	**Marginal R^2 / Conditional R^2 = .028 /.023**	5.20(4, 712)			<.001

Step	Predictors	Outcome: Peer problems			
		F(df)	*B*	*SE*	*p*
	(Intercept)		3.77***	0.45	<.001
	Child age		0.03	0.04	.473
	Child gender		-0.38**	0.14	.008
	No. of children living at-home		-0.26**	0.08	.001
	Family income		-0.07	0.04	.089
2.	**Marginal R^2 / Conditional R^2 = .017 / .017** 24.59(6, 710)				<.001
	(Intercept)		3.42***	0.42	<.001
	Child age		0.06†	0.04	.089
	Child gender		-0.27*	0.13	.039
	No. of children living at-home		-0.34***	0.07	<.001
	Family income		-0.05	0.04	.172
	Schooling status		0.09	0.07	.177
	Household chaos		0.11***	0.01	.001
3.	**Marginal R^2 / Conditional R^2 = .017 / .017** 21.14(7, 709)				<.001
	(Intercept)		3.43***	0.42	<.001
	Child age		0.07†	0.04	.087
	Child gender		-0.27 *	0.13	.037
	No. of children living at-home		-0.34***	0.07	<.001
	Family income		-0.05	0.04	.157
	Schooling status		0.09	0.07	.178
	Household chaos		0.11***	0.01	<.001
	Schooling status x household chaos		0.01	0.01	.467

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

Externalizing problems

The covariates added in Step 1 significantly predicted externalizing problems in children (see Table 3.19), with fewer externalizing problems in males. The addition of the IVs in Step 2 (i.e., child's schooling status and household chaos **[H4b]**) **(H5b)** accounted for a significant increase in explained variance in externalizing problems, $F(2, 710) =$

147.08, $p < .001$. Consistent with **H4b**, household chaos had a significant main effect on externalizing problems, such that higher household chaos predicted more externalizing problems. The main effect of schooling status on externalizing problems was not significant. The addition of the interaction in Step 3 failed to explain a significant increase in variance in externalizing problems, $F(1, 709) = .670$, $p = .414$ **(H5a)**. Next, we examined the role of household chaos in predicting externalizing problems at the subscale level (i.e., conduct and hyperactivity problems).

Table 3.19

Hierarchical Regression Analysis of Household Chaos as a Predictor of Externalizing Problems Controlling for Child Age, Child Gender, Number of Children Living in the Home and Family Income

Step	Predictors	*Outcome: Externalizing problems*			
		F(df)	*B*	*SE*	*p*
1.	**Marginal R^2 / Conditional R^2 = .018 /.012**	3.21(4, 712)			.013
	(Intercept)		9.44***	0.91	<.001
	Child age		-0.15†	0.08	.070
	Child gender		-0.74*	0.29	.010
	No. of children living at-home		-0.27†	0.16	.097
	Family income		0.03	0.08	.687
2.	**Marginal R^2 / Conditional R^2 = .028 / .020**	52.05(6, 710)			<.001
	(Intercept)		8.43***	0.77	<.001
	Child age		-0.04	0.07	.563
	Child gender		-0.46†	0.24	.056
	No. of children living at-home		-0.52***	0.14	<.001
	Family income		0.08	0.07	.216
	Schooling status		-0.09	0.12	.453
	Household chaos		0.33***	0.02	<.001

Step	Predictors	*Outcome: Externalizing problems*			
		F(df)	*B*	*SE*	*p*
3.	**Marginal R^2 / Conditional R^2 = .038 / .028**	44.68(7, 709)			<.001
	(Intercept)		8.44***	0.77	<.001
	Child age		-0.04	0.07	.571
	Child gender		-0.47†	0.24	.053
	No. of children living at-home		-0.51***	0.14	<.001
	Family income		0.08	0.07	.241
	Schooling status		-0.09	0.12	.450
	Household chaos		0.33***	0.02	<.001
	Schooling status x household chaos		0.02	0.02	.415

Note. †p < .10, *p < .05, **p < .01, ***p < .001.

Conduct problems

The covariates added in Step 1 significantly predicted conduct problems (Table 3.20) (higher in younger children, male children, and those with fewer children living in their home). The addition of the IVs in Step 2 (i.e., child's schooling status and household chaos) accounted for a significant increase in explained variance in conduct problems, $F(2, 710) = 109.41$, $p < .001$. Household chaos had a significant main effect on conduct problems, such that higher household chaos was associated with more conduct problems. The main effect of schooling status on conduct problems was not significant. The addition of the interaction in Step 3 did not account for a significant increase in explained variance in conduct problems, $F(1, 709) = 0.02$, $p = .878$.

Table 3.20

Hierarchical Regression Analysis of Household Chaos as a Predictor of Conduct Problems Controlling for Child Age, Child Gender, Number of Children Living in the Home and Family Income

Step	Predictors	Outcome: Conduct problems			
		F(df)	*B*	*SE*	*p*
1.	**Marginal R^2 / Conditional R^2 = .023 /.018**	4.24(4, 712)			.002
	(Intercept)		4.00***	0.49	<.001
	Child age		-0.10*	0.04	.025
	Child gender		-0.42**	0.15	.006
	No. of children living at-home		-0.18*	0.09	.042
	Family income		0.02	0.04	.677
2.	**Marginal R^2 / Conditional R^2 = .025 / .025**	40.16(6, 710)			<.001
	(Intercept)		3.50***	0.43	<.001
	Child age		-0.05	0.04	.228
	Child gender		-0.29*	0.14	.031
	No. of children living at-home		-0.30***	0.08	<.001
	Family income		0.04	0.04	.258
	Schooling status		-0.06	0.07	.394
	Household chaos		0.16***	0.01	<.001
3.	**Marginal R^2 / Conditional R^2 = .025 / .025**	34.38(7, 709)			<.001
	(Intercept)		3.51***	0.43	<.001
	Child age		-0.05	0.04	.229
	Child gender		-0.29*	0.14	.031
	No. of children living at-home		-0.30***	0.08	<.001
	Family income		0.04	0.04	.264
	Schooling status		-0.06	0.07	.393
	Household chaos		0.16***	0.01	<.001
	Schooling status x household chaos		0.00	0.01	.878

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

Hyperactivity problems

The covariates added in Step 1 did not significantly predict hyperactivity problems (Table 3.21). The addition of the IVs in Step 2 (i.e., child's schooling status and household chaos) accounted for a significant increase in explained variance in hyperactivity problems, $F(2, 710) = 95.81$, $p < .001$. Household chaos had a significant

main effect on hyperactivity problems, such that higher household chaos was associated with more hyperactivity problems. The main effect of schooling status on hyperactivity problems was not significant. The addition of the interaction in Step 3 did not account for a significant increase in explained variance in hyperactivity problems, $F(1, 709) = 1.31$, $p = .254$.

Table 3.21

Hierarchical Regression Analysis of Household Chaos as a Predictor of Hyperactivity Problems Controlling for Child Age, Child Gender, Number of Children Living in the Home and Family Income

Step	Predictors	Outcome: Hyperactivity problems			
		F(df)	*B*	*SE*	*p*
1.	**Marginal R^2 / Conditional R^2 = .007 /.002**	1.29(4,712)			.272
	(Intercept)		5.45***	0.55	<.001
	Child age		-0.05	0.05	.326
	Child gender		-0.31†	0.17	.073
	No. of children living at-home		-0.09	0.10	.354
	Family income		0.01	0.05	.769
2.	**Marginal R^2 / Conditional R^2 = .022 / .021**	33.03(6,710)			<.001
	(Intercept)		4.92***	0.49	<.001
	Child age		0.01	0.04	.879
	Child gender		-0.17	0.15	.273
	No. of children living at-home		-0.22*	0.09	.014
	Family income		0.04	0.04	.347
	Schooling status		-0.03	0.08	.671
	Household chaos		0.17***	0.01	<.001
3.	**Marginal R^2 / Conditional R^2 = .022 / .021**	28.51(7,709)			<.001
	(Intercept)		4.93***	0.49	<.001
	Child age		0.01	0.04	.866

Step	Predictors	Outcome: Hyperactivity problems			
		F(df)	*B*	*SE*	*p*
	Child gender		-0.18	0.15	.256
	No. of children living at-home		-0.22*	0.09	.014
	Family income		0.04	0.04	.392
	Schooling status		-0.03	0.08	.666
	Household chaos		0.17***	0.01	<.001
	Schooling status x household chaos		0.01	0.01	.254

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

CHAPTER 4 DISCUSSION

4.1 Summary

In the current study, we examined the impact of mandated HBL on measures of child mental health as well as the role of routines and household chaos on this relation during the COVID-19 pandemic. We found that parent-reported levels of internalizing and externalizing problems (i.e., higher order scales) did not differ between mandated home-based and in-person learners. With regards to routines, more routine was associated with parent reports of fewer externalizing problems but not internalizing problems in children. Further, routines had a protective effect on the adverse impact of mandated HBL on externalizing problems, but not on internalizing problems. Turning to household chaos, higher household chaos was associated with both more internalizing and externalizing problems in children, regardless of schooling status, but, unexpectedly, was not a risk factor for increased internalizing and externalizing problems during mandated HBL (versus in-person learning).

When the subscales were examined separately, we found that mandated HBL was associated with more peer problems than in-person learning. Further, more routine was associated with fewer peer and hyperactivity problems and had a protective effect on the adverse effect of mandated HBL on both peer and conduct problems. Lastly, household chaos was associated with worse mental health on all four subscales. Overall, our results were partially consistent with our hypotheses.

Child mental health in mandated home-based versus in-person leaners

Our first research question was whether there were differences in levels of mental health between mandated at-home and in-person learners. Inconsistent with our

hypotheses, there were no differences between the two groups of children on higher-order internalizing or externalizing problems. A similar pattern of results emerged when examining the two subscales of externalizing problems separately, whether this was conduct or hyperactivity problems. However, when looking at the internalizing subscales separately, children engaging in mandated HBL exhibited more peer problems than those attending school in-person, but not more emotional problems. Specifically, mandated home-based learners compared to in-person learners were less likely to generally be liked by other children and more likely to get along better with adults (than with other children).

Children engaging in mandated HBL did not show more externalizing problems, including conduct or hyperactivity problems, than their peers attending school in-person. This effect could be the result of the increased at-home supervision associated with COVID-19 school closures and workplace restrictions. Compared to before the pandemic, parents might have more opportunity to monitor their children's behavior, as they are now much more likely to be working from home (Mehdi & Morissette, 2021). Accordingly, the supervisor to child ratio is lower for mandated home-based learners (parent to number of children in the home) than in-person learners (teacher to number of children in a classroom). Direct supervision (McKee et al., 2008) and parental monitoring (Burlaka, 2016) have been linked to decreased externalizing problems in children, which suggests that there may be some unintended benefits to children of mandated HBL on conduct and hyperactivity problems.

With regards to internalizing problems, children engaging in mandated HBL demonstrated more peer, but not emotional problems. One proposed explanation for the

lack of significant differences on emotional problems between children engaging in HBL and their peers attending school in-person is that HBL might grant children more opportunities to spend quality time with their parents. As a result, this may have prevented mandated home-based learners from developing emotional problems (Roeters & van Houdt, 2019). In contrast to emotional problems, interestingly, our study found that mandated home-based learners experienced more peer problems than in-person learners, likely due to children's' minimal and significantly decreased opportunity for face-to-face interaction with their peers. An inevitable consequence of mandated HBL is that children are no longer in the physical presence of their classroom peers when learning, reducing their opportunity to interact face-to-face with other children and build friendships. The association between mandated HBL and increased peer problems falls in line with research suggesting that face-to-face interactions, compared to online, are better for children's social wellbeing (e.g., Achterhof et al., 2021). For instance, a study revealed that in girls aged 8 to 12, face-to-face interaction was associated with positive social wellbeing, while interaction via video was associated with negative social wellbeing indicators (Pea et al., 2012). Further, a drawback of online learning is that some online platforms (e.g., Skype) do not offer environments conducive to children engaging in private conversations with each other during online classes. Although certain platforms offer private spaces (e.g., private chats or break out rooms), whether these tools are utilized depends on various circumstances (e.g., the teacher, school budgets, children's capacity to navigate technology unsupervised) and are probably not as frequently used with younger children who are just learning to navigate the online world. As a result of all these factors, mandated HBL might have reduced the quality of

children's interactions with their peers, causing parents to express concern over their children's social skills.

In terms of gender differences on child mental health measures, males showed worse child mental health on all indices, including higher order internalizing and externalizing problems, relative to other genders. This is partially consistent with pre-pandemic research showing that male children exhibit more externalizing problems and female children exhibit more internalizing problems (e.g., Merikangas et al., 2010; Rescorla et al., 2007). Our findings suggest that males might be at-risk of increased internalizing problems during the COVID-19 pandemic.

Routines and child mental health during COVID-19

Our second research question was whether and how are routines associated with better child mental health during the COVID-19 pandemic. Consistent with our hypothesis, routines were associated with fewer higher-order externalizing problems. When looking at the externalizing subscales independently, routines were associated with fewer hyperactivity problems but were not related to conduct problems. Further, inconsistent with our prediction, routines were not associated with lower levels of higher-order internalizing problems. When considering the internalizing subscales separately, more routine was not associated with fewer emotional problems, but it was, interestingly, associated with fewer peer problems in all children. Partially consistent with our hypotheses, we also found routines to have a protective effect on the adverse impact of mandated HBL on externalizing problems, but not on internalizing problems. Specifically, at low levels of routine, mandated home-based learners showed more externalizing problems than in-person learners, an effect that was eliminated at moderate

and high levels of routine. Within the specific subscales, routines had a protective effect on the adverse effect of mandated HBL on peer and conduct problems. Schooling status had opposing effects on conduct problems depending on whether the child was following low or high levels of routine.

In line with past research (e.g., Bater & Jordan, 2017; Larsen & Jordan, 2020), children who followed more routines, regardless of their schooling status, showed fewer higher-order externalizing problems (specifically fewer hyperactivity problems but not fewer conduct problems). The finding that routines were associated with reduced externalizing problems might be explained by routines providing children with predictable expectations and consequences, and in turn the chance to establish coping strategies (Lanza & Drabick, 2011). The current study builds on existing research by demonstrating that previous findings of a positive association between routines and externalizing problems (e.g., Bater & Jordan, 2017; Larsen & Jordan, 2020) extend to the context of COVID-19 pandemic. Further, our finding that routines were associated with fewer hyperactivity problems in particular falls in line with research demonstrating that routines are associated with a reduction in ADHD symptom severity (e.g., Landry, 2010). However, routines were not associated with reduced conducted problems in our study. This finding could be due to sampling variation. Specifically, our sample consisted of mostly upper-middle-class social economic status (SES) families (see Table 3.1), which means that although we controlled for family income, our sample did not have much diversity in terms of family SES. Research shows that routines are especially important for the mental health of children from low SES families (Budescu & Taylor, 2013;

Ferretti, 2014) and thus a sample composed of more diverse socioeconomic backgrounds might show stronger effects of high levels of routine on conduct problems.

Further, in our study, routines were not associated with fewer emotional problems in children, and consequently, were not related to higher order internalizing problems; however, more routine was associated with fewer peer problems. The absence of a link between routines and emotional problems could be because children might need more direct parental support in addressing their emotional problems. Further, though our finding was inconsistent with pre-pandemic research showing that routines were associated with fewer internalizing problems (Bridley & Jordan, 2012; Jordan, 2003), it was consistent with the research demonstrating that routines had effects on higher-order externalizing but not internalizing problems (McRae et al., 2018). Our findings fall in line with those of Koblinsky et al. (2006), who did not find a relation between routines and internalizing problems but found that routines were associated with fewer externalizing problems and better social skills. The association between more routines and fewer peer problems is consistent with past research linking routines to cooperation among children (Keltner, 1990) and to greater social competence (Brody et al., 1999). Further, our findings are also consistent with evidence showing that routines promote better self-regulation in children (Ren & Fan, 2018) and that self-regulation increases competence in social interactions (McKown, 2013). Another contributing factor could be that children who follow more daily routines are more likely to have designated time for peer interactions (i.e., play times).

We found that routines were associated with child mental health during the pandemic by having a protective effect on externalizing problems generally (and conduct

problems specifically) against the adverse impact of mandated HBL. The adverse effect of mandated HBL on externalizing (and conduct) problems was stronger at lower levels of routine and absent at greater levels of routine (average and high levels). Interestingly, when looking at conduct problems specifically, child schooling status and routines did not separately predict conduct problems; there was a cross-over interaction between the two, such that schooling status had opposing effects on conduct problems depending on the level of routine the child followed. It should be noted the finding that moderate and high levels of routine buffered against the negative impact of mandated HBL on externalizing (and conduct) problems points to routines following the protective model of a resilience factor (Strickland et al., 2019; Fergus & Zimmerman, 2005). Intuitively, the observed difference in externalizing problems generally (and conduct problems specifically) at low levels of routine may have emerged because, compared to mandated home-based leaners, in-person learners who lack routines at-home still have access to the routines and structure provided by spending their day physically at school. Mandated HBL usually coincides with other COVID-19 restrictions, such as restrictions on the number of people with whom families can have close physical contact, cancelled activities, business, and restaurant closures, etc., in response to a regional outbreak. It is possible that the adverse impact of mandated HBL may have been eliminated when home-based learners followed moderate or high levels of routine by routines diminishing the probability of aggressive and impulsive behaviors that can be triggered by boredom (Freund et al., 2021).

Further, as predicted by research on resiliency (Strickland et al., 2019; Fergus & Zimmerman, 2005), routines had a protective effect on the negative impact of mandated

HBL on peer problems through the compensatory model of a protective factor. Specifically, mandated HBL and more routines acted in opposite directions on peer problems, such that the former predicted more while the latter predicted fewer peer problems. In other words, routines counteracted the negative effect of mandated HBL on peer problems, such that routines represented a protective factor that compensated for the adverse effect of mandated HBL on peer problems. This is in line with past research showing routines as a protective factor against the development of internalizing problems, including peer problems (Bridley & Jordan, 2012).

Household chaos and child mental health during COVID-19

Our third and final research question was whether and how household chaos is associated with worse child mental health during the COVID-19 pandemic. Consistent with both our hypotheses and pre-pandemic research (e.g. Dumas et al., 2005; Larsen & Jordan, 2020; Pike et al., 2016; Crespo et al., 2019), higher levels of chaos in home were associated with lower levels of child mental health, as demonstrated on both higher-order scales as well as their four respective subscales. The current study extends the finding from previous research that household chaos is negatively associated with child mental health (e.g., Akram & Shamama-tus-Sabah, 2020; Larsen & Jordan, 2020) to the context of the COVID-19 pandemic. Further, compared to past research, our study found stronger effects of household chaos on child mental health (e.g., Akram & Shamama-tus-Sabah, 2020; Dumas et al., 2005). This supports the notion that restrictions due to COVID-19 may be exacerbating the adverse impact of household chaos on child mental health, perhaps by elevating household chaos to a threshold where it is more adversely impact child mental health. Another explanation is the removal of other protective factors.

Specifically, the COVID-19 pandemic and its associated containment measures have reduced children's opportunities for social interactions and have decreased both the amount of time they spend outdoors and doing exercise as well as adversely affecting parental mental health (Araújo et al., 2020; Moore et al., 2020), all of which are factors that could potentially buffer the negative effect of household chaos on child mental health.

Finally, we looked at how chaos in the home is associated with child mental health during the COVID-19 pandemic by examining its role in child mental health outcomes during mandated HBL. Inconsistent with our prediction, the present study did not find that household chaos exacerbated the adverse impact of mandated HBL on child mental health measures. In the current sample, compared to parents of in-person learners, parents of mandated home-based learners reported that their child spent twice as much time learning at-home due to COVID-19 since the beginning of the academic year (see Table 3.1). Further, the children engaging in mandated HBL in this study had been mandated to learn at-home for over half of the academic year. Our results suggests that, despite spending more time in their homes, mandated home-based learners may have adapted to their new conditions and to spending more time at-home. This could potentially explain why high household chaos did not have a stronger effect on the mental health of these children. It is also worth noting that, surprisingly, there were no differences between the amount of household chaos reported by parents of mandated home-based and of in-person learners. It is possible that, although homes were initially chaotic due to the sudden onset of mandated HBL which might have had negative impacts on family members' mental health, parents and children may have adapted to these circumstances

given that COVID-19 and associated restrictions have been in place since March 2020, a year before this study was conducted.

4.2 Implications

Our results provide evidence that children who engaged in mandated HBL struggled with more peer problems, signaling the importance of ensuring that these children are getting adequate social interactions. Guidelines for parents of mandated home-based learners may want to highlight the importance of their child interacting with other children out of online schooling. As mentioned previously, mandated HBL usually coincides with government mandated lockdowns, including restrictions on the number of people with whom families can have close physical contact. Keeping this in mind, parents could be encouraged to arrange more online "play dates" with peers for their children and more private online interactions (e.g., video chats, online gaming). Further, parents may want to prioritize face-to-face interaction whenever possible (i.e., try to have other children as part of their COVID-19 limited social network; "COVID-19 bubble"). As for educators, they may want to prioritize online class delivery through teaching methods that promote direct, interactive, and private social interactions between classmates.

Our findings point to child routines as an effective tool for promoting aspects of children's mental health, regardless of their schooling status during the COVID-19 pandemic. We found that that mandated home-based learners who are following low levels of routine are indeed struggling with their mental health by showing more externalizing problems generally (and conduct problems specifically) relative to in-person learners. This highlights how crucial it is for parents to implement more daily

general (e.g., mealtimes, play times) and schooling (e.g., homework) routines at-home, particularly if they have children engaging in mandated HBL. Moreover, our findings that routines act as a protective factor against the adverse impact of mandated HBL on externalizing problems generally (and conduct and peer problems specifically) present potential useful strategies for parents and educators. While routines may be fostered in the homes of all children to promote fewer peer problems, regardless of schooling status, our findings suggest that for children engaging in mandated HBL in particular, routines have a critical role in protecting against conduct problems. Further, schools and educators may need to develop resources to support parents in their efforts to implement more routines in their child's day while learning at-home. A potential avenue for educators is that they should attempt to organize their weekly education plans to include more routine activities so that children have more structure incorporated into their day during mandated HBL. The aim of this strategy could be twofold: to increase routines which will both improve the child's productivity in schooling activities (Roche & Ghazarian, 2012) as well as promote the child's mental health and consequently, their parents (Elgar et al., 2005), who have also experienced challenges due to mandated HBL (Deacon et al., 2021). This might be especially important for children with pre-existing mental health difficulties or learning challenges, who are likely to be more vulnerable to the adverse impacts of mandated HBL (Lee, 2020).

The current study provides data showing that high levels of household chaos is associated with worse mental health in children during the COVID-19 pandemic, regardless of whether they are learning at-home or in-person. Parents could be advised to reduce chaos in the home as a means of improving their child's mental health during the

COVID-19 pandemic, regardless of whether or not the child is engaging in mandated HBL. For instance, parents could be encouraged to clear out clutter, delegate responsibility (i.e., give family members chores), set no-television hours, and cancel unnecessary activities (Epstein, 2021).

Further, the mental health repercussions of the COVID-19 pandemic are expected to be especially severe for adults with children at-home (Brooks et al., 2020). Given the link between household chaos and poor mental health in adults (e.g., Madigan et al., 2017; Thomas & Spieker, 2016), this study provides another reason for parents to be offered more mental health supports, as these could in turn reduce chaos in the home, and consequently, promote better child mental health. Further, parents undertaking mandated HBL due to COVID-19 have been found to report increased stress (APA, 2020). Given the recent evidence suggesting an association between maternal stress and household chaos during the pandemic (Kracht et al., 2021), our results highlight the need for parents to be provided with adequate educational supports during mandated HBL due to COVID-19.

4.3 Limitations and Future Directions

There are some limitations to the present study that should be considered. Our results relied on parental retrospective reports, which increased the likelihood of error. Retrospective reporting was necessary because January 15th- February 15th was the only time-period when both home-based and in-person learning were happening in Canada and the United States. However, this limits our ability to make inferences about the impacts of mandated HBL on child mental health during other time periods. Further, due to this study being part of a larger project and constraints on survey length due to time,

only Parent A completed the mental health measure. In the current study, Parent A was more likely to be female and to spend more time schooling their child at home than Parent B, which may have skewed our findings because parents' perceptions of child mental health might differ. However, given that research generally finds that mothers and fathers' ratings on the SDQ are moderately to strongly correlated (Davé et al., 2008; Li et al., 2017), future work that includes both parents' reports is unlikely to generate results that are largely inconsistent to those reported in the current study. In further support of our findings, parents who spend more time with a child (i.e., Parent A) are predicted to be more aware and sensitive to their child's potential mental health problems (Davé et al., 2008). In addition, our measures are limited by their subjective nature, nonetheless, research shows that subjective rather than objective measures are more predictive of mental health and wellbeing (e.g., Saw et al., 2015). This study also relied on parental reports of child mental health, which may have differed from children's self-reports. Research finds low to moderate agreement between parent and child reports on the SDQ (Cleridou et al., 2017; van der Meer, 2008) and that a multitude of factors (e.g., child age and gender, type and severity of problems) determine these differences (e.g., van der Meer, 2008). However, no conclusions on the pattern of these findings have been made (i.e., parent/children do not seem to consistently report greater or fewer problems than the other). Future work may want to collect and compare child self-reports to parent reports when examining our research questions.

There are some limitations to the generalizability of our results that highlight the importance for future work to consider these research questions amongst different populations. We did not have sufficient sample sizes to compare mandated home-based

(*n* = 41) and in-person learners (*n* = 47) with diagnosed learning disabilities, limiting our capacity to speak to the effects of mandated HBL on children with such disabilities. Accordingly, future work should explore this in more detail. Further, due to the small sample size of US citizens (*n* = 71) in this study, it did not look at differences in participants based on their country of residence. Future work may wish to look at whether mandated HBL has different effects on children living in Canada versus in the United States. Given our sample characteristics (i.e., most parents identifying as White, university-educated individuals with an upper-middle-class income), our results may also have limited generalizability. However, our sample's ethnic composition is relatively representative of that of Canada (Statistic Canada, 2017) and the United States (United States Census Bureau, 2019). Further, the median family income is consistent with that of parents living in Canada (Statistics Canada, 2019) and the United States (Semega et al., 2020). Nonetheless, given that the pandemic and its associated containment measures are expected to worsen social inequalities (Cénat et al. 2020), future works should investigate the distinct effects of mandated HBL, routines and household chaos on the mental health of children from ethnic minorities and lower SES backgrounds. Also, the children in this study were experiencing unique circumstances due to the COVID-19 pandemic (e.g., wearing a mask, social distancing, handwashing, restricted activities; Rudolph & Zacher, 2020) that previous (and potentially future) cohorts of children in grades 1 to 5 were not (or may not be) exposed to. Further, school aged children might have different experiences with COVID-19 than their older peers (e.g., need more parental support during HBL; Mahoney, 2020). These cohort effects may have played a role in our findings; thus, results may not be generalizable to this age group at other periods in time

or to other age cohorts. Future research should also compare the mental health of voluntary versus mandated home-based learners, including looking at the differential impact of routines and household chaos on their mental health. These groups share important differences, for example, parents engaging in voluntary HBL may be better equipped to school their children at-home (e.g., more likely not to be in the labor force (Howell & Sheran, 2008), have accommodations in place) during a global crisis. The current study did not have an adequate sample size of voluntary home-based learners to make such comparisons, and so future work should focus on specific recruitment of voluntary home-based learners to achieve required sample sizes.

There are some limitations to this study due to its methodology that should be considered. While we have established the statistical significance of these findings, we did not find any evidence to suggest that these were clinically significant (i.e., not equal to or greater than a score of 11 on internalizing problems or 12 on externalizing problems). Thus, caution should be taken when interpreting these results and future work should examine the long-term effects of mandated HBL on child mental health. Accordingly, our cross-sectional analyses also only allowed for the examination of associations, whereas longitudinal data would permit to temporally separate associations and allow for more confidence in the directionality of effects. Future studies should compare the mental health of children before and after more chronic experiences of HBL. In addition, the goal of this study was to look at the effects of HBL when it was mandated by the government due to COVID-19; thus, it was impossible to randomly assign participants to conditions. Despite this lack of random assignment, the two groups did not systematically differ on any variables (see Table 3.1 and 3.2). However, the groups likely

correlated with the number of COVID-19 restrictions in the area (e.g., business and restaurant closures, restrictions on the number of people with whom families can have close physical contact, cancelled activities), such that mandated home-based learners likely lived in areas with more restrictions than in-person learners. As a result, the mental health differences observed between children engaging in home-based and in-person learning might be due to other COVID-19 restrictions other than mandated HBL. Accordingly, the effects found in this study might be explained by these potential third variables. Another alternative explanation might be parental mental health and substance use, which have been adversely impacted by the pandemic (Rodriguez et al., 2020) and by mandated HBL in particular (Deacon et al., 2021). Poor parental mental health and increased substance use are associated with worse child mental health (Whitaker et al., 2006), fewer routines at home (Manczak et al., 2017) and more household chaos (Dube et al., 2001; Madigan et al., 2017). Future work should examine how other variables, like COVID-19 restrictions and parental mental health and substance use, might account for or influence the relation between mandated HBL and child mental health and impact the role of routines and household chaos in this relation.

4.4 Conclusion

In summary, the current study provides evidence that children in grades 1 to 5 engaging in mandated HBL due to COVID-19 restrictions are struggling with some, but not all, aspects of their mental health. Mandated home-based learners were more likely to show peer problems than children attending school in-person. They were also more likely to experience externalizing problems (particularly conduct problems) when following low levels of routine at-home. This study provides evidence of routines as a protective

factor against the negative impact of mandated HBL on peer problems (through the protective model) and on externalizing and conduct problems (through the compensatory model) in children. These findings highlight that mandated home-based learners are experiencing more peer problems than peers attending school in-person learners and that routines can play a particularly important role in both increasing (at low levels) and decreasing (at high levels) their vulnerability to certain mental health problems (i.e., externalizing problems generally and peer and conduct problems specifically). Further, this study extended the pre-pandemic finding that household chaos has a negative impact on child mental health to the context of a global pandemic like COVID-19. Collectively, the evidence presented in this study might aid in the development of necessary recommendations and supports for parents and educators that could help promote child mental health during the COVID-19 pandemic.

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