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# Child well-being before and after the 2020 COVID-19 lockdowns in three Australian states

Jacqueline B. H. Allen  | Ross J. Homel | Tara R. McGee  |  
Kate J. Freiberg

Griffith Criminology Institute, Griffith University, Mount Gravatt, Queensland, Australia

**Correspondence**

Jacqueline B. H. Allen, Griffith Criminology Institute, Griffith University, Mount Gravatt, QLD, Australia.  
Email: [jacqueline.allen@griffith.edu.au](mailto:jacqueline.allen@griffith.edu.au)

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**Abstract**

This paper reports on changes in the social-emotional well-being of 6- to 12-year-old children tested before the COVID-19 pandemic and during 2020 and 2021. Well-being was assessed using a video game that empowers children to report their own well-being, including school attachment, social and emotional well-being, behavioural conformity and family support. We compared well-being over time for two groups of children in government schools in Queensland, Western Australia and Tasmania. The *treatment group* of 580 children were tested in 2019 (Time 1) and a second time in mid-late 2020 and early 2021 (Time 2). The *comparison group* of 841 children were tested twice before the pandemic. Results showed that children in the treatment group reported significantly lower family support at Time 2 than those in the comparison group. This reduction in perceived family support was stronger for girls. In addition, children in the treatment group who reported lower levels of family support at Time 1 reported a steeper decline in family support by Time 2. Finally, boys in the treatment group reported significantly better behavioural conformity and emotional well-being relative to girls over time. Results highlight the varied impacts of the pandemic lockdowns and the need to provide continued support to vulnerable families.

**KEYWORDS**

children, COVID-19 lockdowns, family support, gender, social-emotional well-being

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# 1 | INTRODUCTION

The COVID-19 pandemic has been hugely disruptive to the lives of children and their families. In 2023, 3 years into the pandemic, it is generally agreed that mental health problems have worsened among children and young people in response to these multiple stressors and disruptions (for reviews, see Meherali et al., 2021; Racine et al., 2021; Rajmil et al., 2021; Samji et al., 2022). However, much remains to be learned about the impact of these events on the broader social-emotional functioning of children, such as attachment to school or relationships with peers (Figure 1).

This paper draws on data from a game-based measure of children's well-being to ask whether the social-emotional well-being of primary school children (aged 6 to 12 years) changed in the early period of the pandemic. Children's well-being was assessed using the game-based measure once before the pandemic and once after the end of the initial period of lockdowns, which occurred in March and April 2020 (timeline in Table A1). The timing of assessments varied, but all first (prepandemic) assessments occurred between late 2019 and February 2020, and all second (postlockdown) assessments occurred between July 2020 and early 2021 (Figure 2). Our assessment of well-being is multidimensional, incorporating emotional well-being, social well-being (such as relationships with peers), school attachment, conformity to rules and supportive relationships with family. Early setbacks in these aspects of social-emotional functioning may have lasting implications. It is important therefore to consider not only how well-being may have changed from before the pandemic started till after the end of the initial lockdowns but also whether students were at greater risk of poorer outcomes based on their gender and age as well as their preexisting levels of family support and well-being.

## 1.1 | A developmental perspective on child well-being and the pandemic

Important developmental needs of primary-school-aged children include the capacity for emotional and behavioural self-regulation, social skills with peers, positive relationships with teachers, and maintaining good behaviour in the school setting (Kumpfer et al., 2015). These skills and assets are the foundation of social-emotional well-being and adaptive functioning and provide a solid basis for the transition to adolescence.

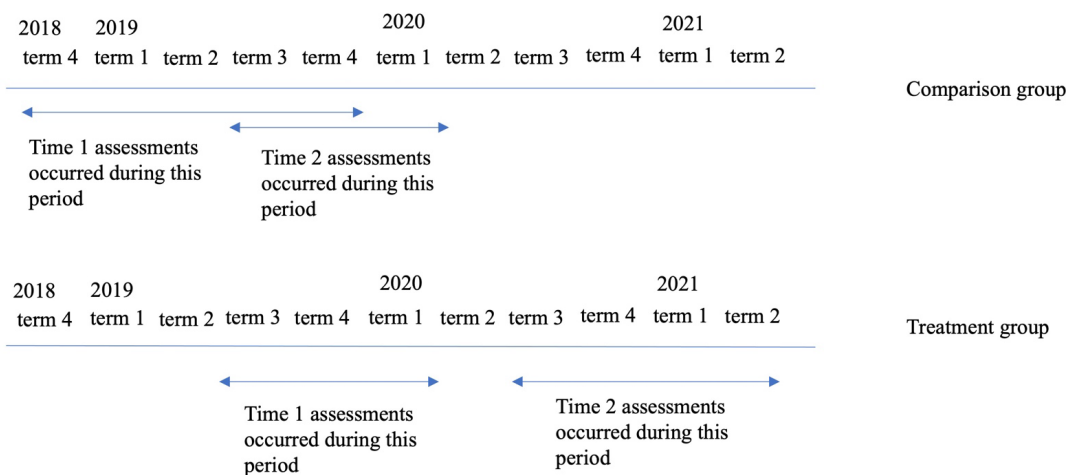


FIGURE 1 Study design.

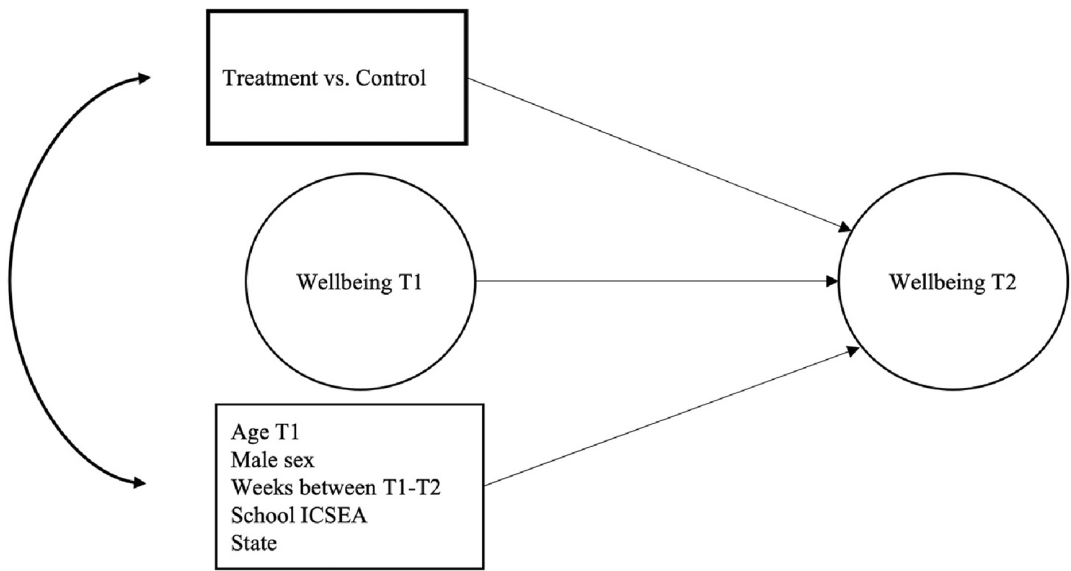


FIGURE 2 Model tested.

Bioecological models of development, epitomised by the work of Bronfenbrenner (1986), place children at the centre of a developmental system involving parents and immediate family members, peers, schools and the neighbourhood, as well as 22 contexts external to the child but which influence the child indirectly, such as parents' workplaces and social support networks. Children's development responds to these multiple contexts, as well as to the relations among different parts of the system. In this developmental system, the primary context that supports the development of social-emotional well-being in middle childhood is the child's family. A large body of literature shows that skills such as prosocial behaviour, self-regulation and conflict resolution are formed in responsive interactions with parents and other close family members over time (Masten & Shaffer, 2006).

The COVID-19 lockdowns in 2020 brought disruption to almost every element of children's developmental systems. It resulted in all activities (e.g. schooling, work and family life) being conducted within the family home. Developmental theory suggests that these disruptions, for primary-school-aged children, would primarily affect social-emotional well-being because of their effects on parents and parenting. For instance, the family stress model describes how financial and other strains can lead parents to experience stress and emotional distress, with flow-on effects to poor parenting and conflict with children, contributing to difficulties with internalising and externalising behaviours (Conger et al., 1994). Despite government financial support to many families, family stress is likely to be a key mechanism by which the 2020 COVID-19 lockdowns may have compromised children's social-emotional well-being.

However, schools and peers are also proximal to the child. After their homes, children spend more time in school than in any other context. The emotion and behaviour regulation skills that are learned in the family are practised and extended in the school context. Positive relationships with teachers support a wide range of academic and social outcomes (Liew et al., 2010; Merritt et al., 2012), while interactions with peers (many of which occur in school) provide multiple opportunities for fundamental socialisation experiences (Bukowski et al., 2011). The sudden and substantial changes to children and families' interactions in these key developmental settings might also be expected to have negative consequences for aspects of well-being, such as engagement with school and relationships with peers.

## 1.2 | Evidence for changes in children's mental health and well-being associated with the pandemic

Most of the research on the developmental impacts of the pandemic on children and young people has examined mental health, most often internalising symptoms. These studies, from around the world, show that the mental health of young people has deteriorated during the pandemic but that the deterioration is probably more pronounced among adolescents (older than 12 years) than for children (Meherali et al., 2021; Racine et al., 2021; Samji et al., 2022). However, mental health changes in relation to the pandemic have been studied relatively more often with adolescent samples, and age differences are sometimes poorly described in studies with wide age ranges (Racine et al., 2021). Thus, trends for primary-school-aged children are less clear than trends for adolescents.

Several studies do suggest a worsening of symptoms in primary-school-aged children during 2020 compared with earlier assessments or previous cohorts (Bignardi et al., 2020; Ravens-Sieberer et al., 2021; Spencer et al., 2021). For example, Hussong et al. (2021) drew from an existing cohort-sequential longitudinal study in the United States to show a significant worsening of mental health symptomatology in 12 to 13 year olds during the pandemic, compared with same-age children prior to the pandemic. Similarly, using a longitudinal design Feinberg et al. (2022) reported a substantial deterioration in both internalising and externalising problems in 8 to 10-year-old children in the United States. However, a German study comparing 6- and 7-year-olds pre and during pandemic found that parent-reported emotional and behavioural problems were poorer during the pandemic, but for girls only (Kurz et al., 2022).

Other studies show limited change, or a mixed pattern of results. An Italian study that followed a clinical sample of young adolescents longitudinally showed improvements in parent-reported internalising and externalising symptoms during the pandemic (Di Giunta et al., 2021), while other North American longitudinal studies with children and young adolescents showed no change in symptoms compared with the prepandemic period (Dabravolskaj et al., 2021; Walters et al., 2021).

The initial 2020 lockdowns around the world included school closures and greatly reduced interactions with peers or people outside the immediate family. As noted earlier, this could be expected to have caused disruptions to school engagement, peer relationships and social skills. However, little is known so far about the effect of the pandemic on these normative aspects of social-emotional well-being for the many children not necessarily exhibiting poor mental health symptomatology (Hamilton et al., 2021; Vaillancourt, McDougall, et al., 2021). Vaillancourt, Brittain, et al. (2021) examined students' reports of peer bullying and victimisation in large samples of students both before and during the pandemic. They found significant reductions in all forms of bullying and peer victimisation, including online. However, there was some evidence that the reduction was smaller for elementary school students compared with high school students. Walters et al. (2021) similarly found no changes in bullying or peer victimisation in young adolescents assessed both before and during the pandemic.

## 1.3 | Risk and protective factors

Children's developmental contexts can be sources of both risk and resilience. Depending on the nature of family, peer and school relationships, as well as individual vulnerability, children's well-being may have been affected to a greater or lesser degree by the pandemic lockdowns. Therefore, it is important to consider the risk and protective factors that may account for differences in children's social and emotional well-being, including parental mental health, stress and family relationships, as well as child mental health, school attachment and online schooling. We discuss these in more detail below.

An Australian study (Westrupp et al., 2021) showed that compared with prepandemic reports, parents surveyed in 2020 reported more depression, anxiety and stress, more parenting irritability, more couple conflict, less positive expressiveness in the family and more alcohol use. Several studies carried out during the pandemic show that parent stress and depression were concurrently related to children's negative mood and behaviour problems (Feinberg et al., 2022; Roos et al., 2021; Sun et al., 2022). While family stress can have a corrosive impact, supportive family relationships are a key protective factor for children (Masten, 2007). A series of cross-sectional and longitudinal studies carried out around the time of the pandemic confirm that children's and adolescents' outcomes were relatively better in the context of more positive and supportive relationships with parents (Essler et al., 2021; Luthar et al., 2021; Samji et al., 2022).

In addition to family relationships, studies of young people's mental health during the pandemic have shown that relatively more vulnerable children, such as those with preexisting mental health conditions, experienced poorer outcomes (Cost et al., 2022; Jones et al., 2021; Viner et al., 2021). However, how broader social-emotional vulnerabilities might put children at-risk of poorer outcomes is not clear. It has been suggested, for example that some children with low school attachment before the pandemic might have experienced further declines in attachment with a shift to online learning (Clinton, 2020). There are also concerns that vulnerable children may have struggled to re-engage with school (Brown et al., 2020). For example, a survey of adolescents in Western Australia carried out in 2020 found that those who reported poor school connectedness and poorer quality friendships were more likely to have mental health problems (Thomas et al., 2022). On the contrary, some children who experienced difficulties in the classroom prior to the pandemic might have found online learning a better fit for their needs or have benefited from a break from peer groups (Dabravolskaj et al., 2021; Vaillancourt, McDougall, et al., 2021).

Changes in child well-being before and after the initial period of COVID-19 lockdowns in 2020 may differ according to age and gender. Girls tend to report more emotional problems and fewer behavioural problems than boys (Chaplin & Aldao, 2013), although the differences in emotional problems are more pronounced as children transition into adolescence. Girls also report stronger school attachment than boys, and older primary school children report lower school attachment than younger primary school children (Homel & Edwards, 2018). However, these differences in average levels do not necessarily mean that girls or boys would be differentially affected by the initial COVID-19 lockdowns. Some reviews of the literature on COVID-19 and mental health suggest that depressive symptoms were more pronounced for girls (Samji et al., 2022), but this may be mostly the case for adolescent girls (Thomas et al., 2022). Only a few of the studies reviewed earlier that focussed on social-emotional well-being in primary school-aged children examined gender differences and where they were examined few differences were found (Bignardi et al., 2020; Hussong et al., 2021; Kurz et al., 2022; Ravens-Sieberer et al., 2021).

## 1.4 | The present study

In this study, we assessed children's social-emotional well-being using a recently developed computer game-based measure called *Rumble's Quest* (Day et al., 2019; Homel et al., 2021). A computerised video story, *Rumble's Quest* affords children with a natural context within which to answer questions about their lives and feelings. All questions are voiced to reduce literacy demands, and children answer by selecting labelled icons from a 5-point response scale. Questions are posed not in the abstract but as part of a conversation in a way that makes immediate sense and therefore promotes response reliability. Psychometric analyses reveal a factor structure with five dimensions, based on a subset of items. The instrument exhibits sound convergent and concurrent validity, test-retest reliability and internal consistency (Freiberg et al., in prepration). Since 2018, about 15,000 primary school children have played *Rumble's Quest* in Queensland, New South Wales, Victoria, Western Australia and Tasmania.



As noted earlier, children's well-being was assessed in the present study using Rumble's Quest once prior to the pandemic and once after the end of the initial period of lockdowns. However, one difficulty with examining change in well-being outcomes in a sample of students pre and post the initial period of COVID-19 restrictions is that there is no control group to which any changes could be compared. Change in student well-being may reflect common contextual changes, such as a new teacher or classroom; they could reflect exposure or practice effects arising from completing the measure itself; changes could occur because of developmental change with ageing; or they could reflect the effects of pastoral support offered by schools. Therefore, it is important to consider what normative change in well-being looks like in a sample of children not exposed to the pandemic. Some researchers may be able to use established measures in representative longitudinal datasets as a baseline for examining pre-post COVID changes (e.g. Westrupp et al., 2021), but this is not feasible for a newly developed measure like Rumble's Quest.

In the present study, we addressed this problem using a comparison group of children who were assessed before 2020 and were therefore not exposed to the pandemic and a treatment group of children who were exposed to the pandemic. Change between two measurement points that were at least one school term apart was examined in both groups. The comparison group comprised children who completed Rumble's Quest twice prior to the pandemic. The treatment group comprised children who completed Rumble's Quest once before the 2020 lockdowns and then a second time afterwards (up to mid-2021). Using this design, we compared the extent to which T2 measures of well-being differ between the treatment and comparison groups, after controlling for T1 measures of well-being, age, gender and school-level covariates.

Our research questions were as follows:

1. Are the T2 measures of social-emotional well-being significantly different in the treatment sample compared with the comparison sample?
2. Are any differences between the comparison and treatment groups at T2 moderated by age and gender?
3. Are any differences between the comparison and treatment groups at T2 moderated by T1 well-being; specifically, is any effect of the lockdowns amplified for students who were more vulnerable at T1?
4. Does T1 perceived family support protect against any deleterious effect of the 2020 lockdowns for other well-being outcomes such as emotional well-being?

On the basis of literature confirming that families were stressed during the 2020 COVID-19 lockdowns and that family stress affects children's behaviour via compromised parenting, we expect some changes for the worse in children's emotional well-being (related to internalising symptoms) and rule conformity (reflecting externalising symptoms; RQ1). However, the local situations of the study sites of Queensland, Tasmania and Western Australia in 2020 must be considered. Lockdowns requiring families to stay at home began toward the end of March and were over in QLD and WA by late April and in TAS by mid-May (Table A1). For the remainder of the period in the present study (until mid-2021), there were no further extended lockdowns in these states. Therefore, we expect small negative effects for emotional well-being and rule conformity. The literature on other aspects of social-emotional well-being with regard to the pandemic is sparse and inconsistent, and we do not advance any expectations about change.

With respect to age and gender (RQ2), we anticipate that any changes in emotional well-being and school attachment may be more pronounced for older children, but the literature reviewed earlier does not support any strong expectation for gender differences. We do expect that children who had low levels of well-being prior to the pandemic will report larger declines in well-being over time than those who were not vulnerable (RQ3). However, the literature suggests that this will be most apparent for emotional problems (e.g. Cost et al., 2022). Finally, developmental theory suggests that supportive parenting should protect against some negative effects of COVID-19 lockdowns (RQ4).

## 2 | METHOD

### 2.1 | Participants

Participants were 1421 students at 13 government primary schools who completed Rumble's Quest twice over a period of at least one school term. Schools were located in Queensland, Tasmania and Western Australia. Although school term dates vary slightly between states and school sectors, terms are about 10 weeks long. Typically, Term 1 runs from late January to late March, Term 2 from mid-April to late June, Term 3 from mid-July to mid-September and Term 4 from October to December (Table A1).

Figure 2 depicts the study design. Students were divided into two groups. The *comparison group* ( $n = 841$ , 59.2 per cent) completed Rumble's Quest twice prior to pandemic restrictions. In the comparison group, Time 1 assessments (T1) occurred in Term 4 (2018) at the earliest, and in Term 4 (2019) at the latest. Time 2 (T2) assessments occurred in Term 3 (2019) at the earliest and in Term 1 (2020) at the latest. In the *treatment group* ( $n = 580$ , 40.8 per cent), T1 assessments took place in Term 3 (2019) at the earliest and Term 1 (2020) at the latest, and T2 assessments took place in Term 3 (2020) and Term 2 (2021). A timeline of selected government directives affecting movement, gathering and schools up to June 2020 is provided in the Table A1.

Table 1 shows information about the students and their schools. There were no significant differences between the treatment and comparison groups in age or gender, but the treatment group had significantly more students in Queensland. Moreover, the interval between the measurement occasions was longer on average in the treatment group. The average percentile of school socioeconomic position (ICSEA, see the section Measures) was close to the median in the comparison group, but significantly lower in the treatment group. The average number of students who completed the assessment in a school was 132.0 (SD = 116.7, range = 1–448).

### 2.2 | Procedures

Some of the 13 schools elected to use Rumble's Quest through their participation in the *Creating Pathways to Child Wellbeing in Disadvantaged Communities* ARC Linkage Project (Homel et al., 2015), while others independently sought out the instrument through the Griffith University-based RealWell platform to aid in their understanding of and responses to student well-being issues. The Terms and Conditions of Use required schools to obtain the informed written consent of parents using their usual procedures. Children were briefed about the game by a supervising school staff member and participated during timetabled sessions in normal school hours. When the game was opened, children entered their code that linked them to their school's Rumble's Quest account and then selected their avatar through whom they entered the game world. When each child finished the game, the system posted their data to a secure Australian web server. The Terms and Conditions permit the research team to access deidentified data generated by the game for the purposes of population norming and related research studies. Schools downloaded detailed data reports that focussed on their school-level results. Schools could also choose to interpret derived scores on the well-being factors for each of the participating children, but apart from child responses to a small number of items related to safety at home or at school, could not access individual children's item scores. The purpose of this restriction is to protect each child's privacy, an important assurance offered in the preliminary section of the game designed to encourage honest answers and engender children's trust in the integrity of the data collection process.

TABLE 1 Characteristics of students and schools.

	Comparison group ( <i>n</i> = 841)		Treatment group ( <i>n</i> = 580)		Total		Comparison
	<i>n</i> or mean	% or SD	<i>n</i> or mean	% or SD	<i>n</i> or mean	% or SD	
<i>Student characteristics</i>							
Male ( <i>n</i> , %)	432	51.4	323	55.7	755	53.1	$\chi^2(1) = 2.57, p = .109$
Age in years at T1, range 6–11 (mean)	8.0	1.5	7.9	1.3	8.0	1.4	$F(1, 1419) = 5.85, p = .016$
Terms between T1 and T2 (mean) <sup>b</sup>	3.1	0.7	3.9	0.6	3.4	0.8	$F(1, 12) = 7.09, p = .021$
One term	54	6.4	0		54	3.8	
Two terms	6	0.7	24	4.1	30	2.1	
Three terms	583	69.3	88	15.2	671	47.2	
Four terms	198	23.5	41	7.1	239	16.4	
Five terms	0	0	50	8.6	50	3.5	
<i>School characteristics<sup>a</sup></i>							
Schools ( <i>n</i> )	10		7		13		
School ICSEA percentile (mean) <sup>b</sup>	54.4	24.4	31.9	16.7	45.2	24.2	$F(1, 12) = 5.35, p = .039$
ICSEA quartiles ( <i>n</i> )							
First	4		4		6		
Second	1		1		2		
Third	4		2		4		
Fourth	1		0		1		
State							
Queensland ( <i>n</i> )	4		3		6		
Western Australia ( <i>n</i> )	1		1		1		
Tasmania ( <i>n</i> )	5		3		6		

Abbreviations: SD, standard deviation; T1, Time 1; T2, Time 2.

<sup>a</sup>Four schools had students in both samples.

<sup>b</sup>Comparisons adjusted for school clustering.

## 2.3 | Measures

### 2.3.1 | Rumble's Quest —Measuring well-being

Each of the 57 items had five labelled response options, with three variants. For example, “Do you like your school?” (*No; A bit; Sometimes; Mostly; Yes*); “How do your teachers make you feel?” (*Unhappy; OK; A bit happy; Mostly happy; Happy*); “Do you get to do things you enjoy in your spare time?” (*Never; A bit; Sometimes; Often; A lot*). For all items, higher scores corresponded to more positive responses. The five well-being factors derived from a subset of 32 items were school attachment, social well-being, emotional well-being, behavioural conformity and family support (Table 2).

*School attachment* comprised eight items, all of which related to the child's feelings about their school. *Social well-being* comprised six items reflecting mainly positive affect, positive self-esteem, or getting along with peers. *Emotional well-being* (seven items) referenced mostly negative emotions and experiences and may therefore reflect a facility to stay calm and positive in the face of challenge. *Behavioural conformity* (five items) related to rule breaking and attitudes to rules. Finally, *family support* (six items) referenced supportive adults and a positive home environment.



**TABLE 2** Rumble's Quest items for each well-being dimension.

	Composite reliability (95% CI)	Cronbach reliability
<i>School attachment</i>	0.82 (0.80–0.84)	0.82
4. Do you think school is a nice place to be?		
1. Do you like your school?		
21. How does going to school make you feel?		
2. Do you feel good when you are in class?		
5. When you wake up in the morning do you look forward to school?		
43. Do you feel safe at your school?		
20. How do you teachers make you feel?		
9. Do you get to do interesting things at your school?		
<i>Social well-being</i>	0.64 (0.60–0.68)	0.67
16. Do good things happen to you?		
13. Are you good at quite a lot of things?		
30. Do you behave yourself?		
*50. Do you ever play at your friends' house?		
36. Do people like you just as you are?		
34. Do people trust you?		
<i>Emotional well-being</i>	0.74 (0.72–0.76)	0.74
25. Do you get sad?		
57. How often is someone mean to you?		
12. Do you feel like you have problems?		
15. Do you ever feel worried?		
33. Do you get mad and lose your temper?		
56. Do bad things happen to you?		
*51. How often do you see someone fighting?		
<i>Behavioural conformity</i>	0.62 (0.56–0.69)	0.69
48. How often do you get detention or sent to the principal's office for being in trouble?		
52. How often are you mean to someone?		
10. Do you get in trouble in class?		
29. Do you think following rules is stupid?		
*27. If your friends take chocolate from the shop without paying, would you take some too?		
<i>Family support</i>	0.69 (0.66–0.71)	0.71
*18. How do you parents make you feel?		
42. Do you feel safe at home?		
**54. Do your parents think school is important?		
49. Do you do fun things with your parents?		
38. Do you have a grown-up who always listens and helps when you need them or feel upset?		
45. Do you have dinner together with your family?		

Note: \* indicates item intercept freely estimated at T2. \*\* indicates item loading and intercept freely estimated at T2.

Table 2 shows items and reliability coefficients. The composite reliability coefficient is based on a measurement model with the full sample. The composite coefficient represents the proportion of the total variance of each latent factor that is true-score variance (Kline, 2016). Therefore, higher values indicate better reliability. The reliabilities for social well-being and behavioural

conformity are somewhat lower than is ideal, a feature that will be improved in future iterations of the instrument.

### 2.3.2 | Covariates

Covariates included the student's gender (male = 1), age in years, gap between T1 and T2 assessments in weeks and the 2019 percentile for the student's school on the Index of Community Socio-educational Advantage (ICSEA). ICSEA is calculated from the education and occupation of parents of school students, the school's geographical remoteness and the proportion of students who are Indigenous (ACARA, 2020).

## 2.4 | Data analysis

We used a series of structural equation models to address the research questions, using Mplus 8.4 (Muthén & Muthén, 1998–2017). Each dimension of well-being was examined in a separate model. In each model, the well-being dimension was modelled as a latent variable with indicators being the items assigned to each dimension in Table 2. Items were modelled as continuous variables. All models used robust maximum likelihood estimation with standard errors adjusted for clustering in schools.

Invariance of the well-being latent factors over T1–T2 was assessed, including metric invariance (factor loadings constrained to be equal over time) and scalar invariance (item intercepts constrained to be equal over time). All models were compared using the difference between chi-square, the comparative fit index (CFI) and the root mean square error of approximation (RMSEA), with nonsignificant chi-square values and differences of <0.01 for CFI and RMSEA considered invariant (Little, 2013). Scalar invariance across time was established for school attachment. Partial scalar invariance was confirmed for other well-being dimensions by freeing a small number of item intercepts across time. These items are indicated in Table 2. Tests of invariance are presented in the Appendix.

In preliminary analyses, we first examined the change between T1 and T2 in the comparison and treatment groups separately. In a second set of preliminary analyses, we tested differences between the comparison and treatment groups on T1 well-being dimensions. In these models, treatment group differences were examined by regressing the T1 well-being dimension on a dummy variable where 1 = treatment group. We also examined models adjusted for the child's age at T1, gender, school ICSEA percentile and state.

Figure 2 illustrates the model used to test the research questions. To examine whether T2 measures of well-being were significantly different between the treatment and comparison groups, we regressed the T2 well-being latent variable on the dummy treatment group variable and the T1 latent variable. We also examined models adjusted for T1 age, gender, the gap between assessments, gender, school ICSEA percentile and state. Therefore, the regression coefficient for the treatment dummy represents the extent to which levels of well-being at T2 in the treatment group were different to levels of well-being at T2 in the comparison group, after controlling for T1 levels of well-being and other covariates in adjusted models. A treatment regression coefficient can be interpreted as an effect size, but to make it more easily interpretable, we calculated a standardised mean difference by taking into account the standard deviation of the dependent variable and the  $n$  of the treatment and comparison groups (Lipsey & Wilson, 2001). We report this standardised mean difference for models in which the treatment group coefficient was statistically significant. The size of the standardised mean difference can be interpreted using Cohen's (1988) guidelines where 0.2 is a small effect, 0.5 is a medium effect and 0.8 is a large effect.

For research questions 2–4, four two-way interactions were tested for each well-being dimension: (1) a two-way interaction between treatment group and age, testing whether any T2

differences between samples differed by age; (2) a two-way interaction between treatment group and gender; (3) a two-way interaction between treatment group and the T1 well-being dimension, testing whether students better or more poorly off initially responded differently to the lockdowns; and (4) a two-way interaction between treatment group and T1 family support, testing whether strong perceived family support could protect against decreases in well-being. For age, a significant interaction term would indicate that the regression slope for age was different in the treatment and comparison groups, potentially highlighting differential effects of the pandemic for older or younger students. Significant gender and T1 well-being interaction terms would be interpreted in the same way.

As chi-square is known to be sensitive to sample size and small deviations from multivariate normality (Marsh et al., 2005), fit was also assessed with the RMSEA (values < 0.08 indicate acceptable fit, and values < 0.06 good fit); the CFI (values > 0.90 indicate adequate fit, but values higher than 0.95 are better); and the SRMR (values < 0.08 indicate adequate model fit: Hu & Bentler, 1999). Given the number of models, we report the range of model fit for each set of analyses (from poorest fitting to best fitting) and the fit for each model in the [Appendix](#).

### 3 | RESULTS

#### 3.1 | Preliminary analyses

##### 3.1.1 | Change between Time 1 and Time 2

Table 3 shows the T2 means for each well-being variable in both groups. Means for the comparison group suggest that under prepandemic conditions, a second Rumble's Quest assessment that took place on average three terms after the first showed no changes in school attachment, emotional well-being and family support, but a drop in social well-being and an increase in

**TABLE 3** Estimates of T2 well-being means compared with T1 well-being means in the comparison and treatment groups.

Well-being dimension	Comparison group T2 mean (SE)	Treatment group T2 mean (SE)
School attachment	−0.07 (0.06)	0.15 (0.06)**
Social well-being	−0.17 (0.07)*	−0.07 (0.05)
Emotional well-being	−0.01 (0.03)	0.12 (0.04)**
Behavioural conformity	0.10 (0.04)**	0.24 (0.05)***
Family support	−0.003 (0.03)	−0.16 (0.01)**
Model fit		
Poorest model fit: Family support (comparison group) behavioural conformity (treatment group)	$\chi^2(56) = 218.76^{***}$ CFI = 0.880 RMSEA (90% CI) = 0.059 (0.051–0.067) SRMR = 0.047	$\chi^2(36) = 128.63^{***}$ ; CFI = 0.906 RMSEA (90% CI) = 0.067 (0.054–0.079) SRMR = 0.052
Best model fit: School attachment (the comparison and treatment groups)	$\chi^2(109) = 214.1^{***}$ CFI = 0.970 RMSEA (90% CI) = 0.034 (0.027–0.041); SRMR = 0.034	$\chi^2(109) = 206.4^{***}$ CFI = 0.961; RMSEA (90% CI) = 0.039 (0.031–0.047); SRMR = 0.037

Abbreviations: CFI, Comparative Fit Index; CI, confidence interval; RMSEA, root mean square error of approximation; SE, standard error; SRMR, standardised root mean square residual; T2, Time 2.

\* $p < .05$ ;

\*\* $p < .01$ ;

\*\*\* $p < .001$ .

behavioural conformity. The treatment group reported lower levels of social well-being and family support at T2, but higher levels of T2 school attachment, emotional well-being and behavioural conformity.

### 3.1.2 | Sample differences at Time 1

Table 4 summarises models examining T1 well-being dimensions. For each well-being-dependent variable, an unadjusted model was estimated with just treatment group as a predictor, and an

TABLE 4 Estimates from models examining T1 well-being.

Well-being dimension	Model	Treatment group	T1 age	Male gender	School ICSEA percentile	State (ref = WA)	
		Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)	QLD	TAS
School attachment	Unadj.	-0.09 (0.08)	—	—	—	—	—
	Adj.	-0.02 (0.07)	-0.01 (0.02)	-0.28 (0.06)***	0.01 (0.002)***	0.21 (0.07)**	0.25 (0.09)**
Social well-being	Unadj.	-0.20 (0.11)	—	—	—	—	—
	Adj.	-0.10 (0.11)	-0.10 (0.04)*	0.04 (0.06)	0.01 (0.002)**	0.03 (0.07)	0.03 (0.10)
Emotional well-being	Unadj.	-0.16 (0.10)	—	—	—	—	—
	Adj.	0.04 (0.08)	0.04 (0.03)	-0.05 (0.06)	0.01 (0.002)***	-0.09 (0.06)	-0.08 (0.08)
Behavioural conformity	Unadj.	-0.22 (0.08)**	—	—	—	—	—
	Adj.	-0.13 (0.08)	0.12 (0.04)**	-0.49 (0.07)***	0.01 (0.002)***	0.32 (0.09)***	0.06 (0.11)
Family support	Unadj.	-0.05 (0.10)	—	—	—	—	—
	Adj.	-0.05 (0.11)	0.05 (0.05)	0.02 (0.05)	0.005 (0.002)**	0.23 (0.05)***	0.05 (0.08)
Model fit							
				Unadjusted	Adjusted		
Poorest model fit: Social well-being		$\chi^2(14) = 105.50$ ***			$\chi^2(39) = 238.04$ ***		
		CFI = 0.947			CFI = 0.894		
		RMSEA (90% CI) = 0.068 (0.056–0.080)			RMSEA (90% CI) = 0.060 (0.053–0.067)		
		SRMR = 0.036			SRMR = 0.036		
Best model fit: School attachment		$\chi^2(27) = 50.37$ **			$\chi^2(62) = 209.10$ **		
		CFI = 0.987			CFI = 0.946		
		RMSEA (90% CI) = 0.025 (0.014–0.035)			RMSEA (90% CI) = 0.041 (0.035–0.047)		
		SRMR = 0.020			SRMR = 0.029		

Abbreviations: CFI, Comparative Fit Index; CI, confidence interval; Est., coefficient estimate; QLD, Queensland; RMSEA, root mean square error of approximation; SE, standard error; SRMR, standardised root mean square residual; T1, Time 1; TAS, Tasmania; WA, Western Australia.

\* $p < .05$ ;

\*\* $p < .01$ ;

\*\*\* $p < .001$ .

adjusted model was estimated in which all covariates were added. The upper part of the table shows unstandardised regression coefficients for the regression of T1 well-being on treatment group and the covariates.

There were no significant differences between the groups on most T1 dimensions in both unadjusted and adjusted models. The treatment group reported lower behavioural conformity at T1, but this was not significant after adjusting for covariates. Older students reported significantly poorer social well-being, but better adjustment with regard to behavioural conformity. Males reported poorer adjustment with regard to school attachment and behavioural conformity. Higher ICSEA percentiles were consistently associated with better adjustment on all well-being dimensions.

### 3.2 | Sample differences at Time 2: Comparison group compared with treatment group

Table 5 summarises models examining group differences on T2 well-being dimensions. For each well-being-dependent variable, an unadjusted model was estimated, with just treatment group and T1 well-being as predictors, and an adjusted model was estimated in which all other covariates were added. The upper part of the table shows unstandardised regression coefficients for the regression of T2 well-being on treatment group, T1 well-being and the covariates.

In the unadjusted model for school attachment (with just T1 school attachment as a covariate), membership of the treatment group was associated with higher school attachment at T2, but this was nonsignificant after adjustment for covariates. However, the T2 family support dimension was significantly lower in the treatment group in both unadjusted and adjusted models. In the adjusted model, the standardised mean difference of T2 family support between the treatment and comparison groups was  $-0.22$ , which is a small effect (Cohen, 1988). There were no significant group differences in T2 social well-being, emotional well-being or behavioural conformity.

### 3.3 | Moderation by age, gender, T1 well-being and T1 family support

None of the interactions between the treatment group and age were statistically significant (for details, refer to Table A6). The interaction between treatment group and gender was significant for emotional well-being, behavioural conformity and family support, indicating that the slope of gender in the prediction of the T2 dimension in these models was different between the two groups. Moreover, in the T2 family support model, the interaction between treatment group and T1 family support was statistically significant, indicating that the slope of T1 family support in predicting T2 family support differed between the two groups. However, none of the interactions between treatment group and T1 family support for the other well-being outcomes were statistically significant.

The best way of interpreting what this complex set of interactions means is through visual representation. The interactions are illustrated in Figures 3–6. In illustrating the interactions, the range of values on the Y-axis is approximately half a standard deviation above and below the mean of the T2 well-being dimension. Therefore, group differences (the gaps between the lines in Figures 3–6) can be interpreted as effect sizes since they represent various fractions of standard deviation units.

The gender  $\times$  treatment group interaction for emotional well-being is depicted in Figure 3. Predicted values of T2 emotional well-being are shown for males and females in the treatment and comparison groups, respectively. In the comparison group, males were significantly lower than females on T2 emotional well-being. This is evidenced by the simple slope for gender in the comparison group of  $-0.14$ . In the treatment group, the difference between males and females was substan-

TABLE 5 Estimates from models examining T2 well-being.

T2 well-being dimension	Model	Treatment group		T1 well-being		T1 age		Male gender		T1-T2 interval		School ICSEA percentile		QLD		TAS	
		Est. (SE)		Est. (SE)		Est. (SE)		Est. (SE)		Est. (SE)		Est. (SE)		Est. (SE)		Est. (SE)	
School attachment	Unadj.	0.17 (0.05)***		0.52 (0.03)***		-		-		-		-		-		-	
	Adj.	0.11 (0.07)		0.51 (0.03)***		-0.06 (0.03)*		-0.12 (0.08)		0.004 (0.004)		-0.001 (0.001)		-0.05 (0.04)		-0.08 (0.05)	
Social well-being	Unadj.	-0.07 (0.07)		0.53 (0.07)***		-		-		-		-		-		-	
	Adj.	0.003 (0.07)		0.51 (0.08)***		-0.05 (0.03)		-0.001 (0.07)		0.00 (0.002)		0.001 (0.001)		-0.17 (0.05)**		-0.15 (0.08)	
Emotional well-being	Unadj.	0.04 (0.05)		0.47 (0.03)***		-		-		-		-		-		-	
	Adj.	0.06 (0.05)		0.46 (0.03)***		0.01 (0.02)		-0.07 (0.06)		0.003 (0.003)		0.003 (0.001)		-0.002 (0.05)		-0.08 (0.03)**	
Behavioural conformity	Unadj.	-0.03 (0.09)		0.52 (0.07)***		-		-		-		-		-		-	
	Adj.	0.06 (0.05)		0.48 (0.06)***		-0.06 (0.02)***		-0.27 (0.05)***		-0.002 (0.002)		0.005 (0.001)***		0.09 (0.04)*		0.02 (0.06)	
Family support	Unadj.	-0.21 (0.07)**		0.41 (0.08)***		-		-		-		-		-		-	
	Adj.	-0.22 (0.09)*		0.40 (0.07)***		-0.04 (0.02)		0.12 (0.09)		0.001 (0.003)		0.002 (0.002)		0.02 (0.07)		-0.13 (0.09)	
Model fit																	
Unadjusted		Adjusted															



TABLE 5 (Continued)

T2 well-being dimension	Model	Treatment group		T1 well-being		T1 age		Male gender		T1-T2 interval		School ICSEA percentile		QLD		TAS	
		Est. (SE)		Est. (SE)		Est. (SE)		Est. (SE)		Est. (SE)		Est. (SE)		Est. (SE)		Est. (SE)	
Poorest model fit: Social well-being		$\chi^2(67) = 290.16^{***}$								$\chi^2(133) = 579.57^{***}$							
		CFI = 0.919								CFI = 0.874							
		RMSEA (90% CI) = 0.048 (0.043–0.054)								RMSEA (90% CI) = 0.049 (0.045–0.053)							
		SRMR = 0.041								SRMR = 0.046							
Best model fit: School attachment		$\chi^2(124) = 245.91^{***}$								$\chi^2(184) = 440.70^{***}$							
		CFI = 0.975								CFI = 0.953							
		RMSEA (90% CI) = 0.026 (0.021–0.031)								RMSEA (90% CI) = 0.031 (0.028–0.035)							
		SRMR = 0.029								SRMR = 0.037							

Abbreviations: CFI, Comparative Fit Index; CI, confidence interval; Est., coefficient estimate; QLD, Queensland; RMSEA, root mean square error of approximation; SE, standard error; SRMR, standardised root mean square residual; T1, Time 1; TAS, Tasmania; WA, Western Australia.

\* $p < .05$ ;

\*\* $p < .01$ ;

\*\*\* $p < .001$ .

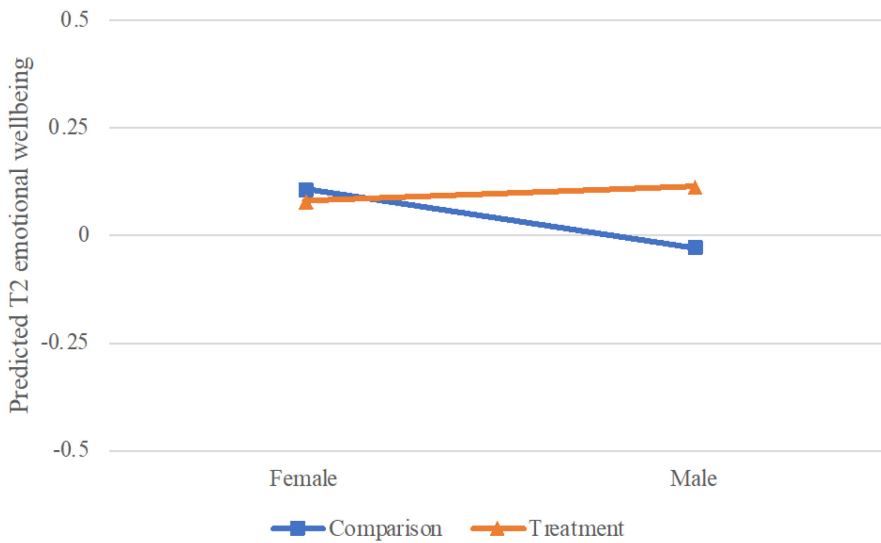


FIGURE 3 T2 emotional well-being: Interaction between gender and treatment group.

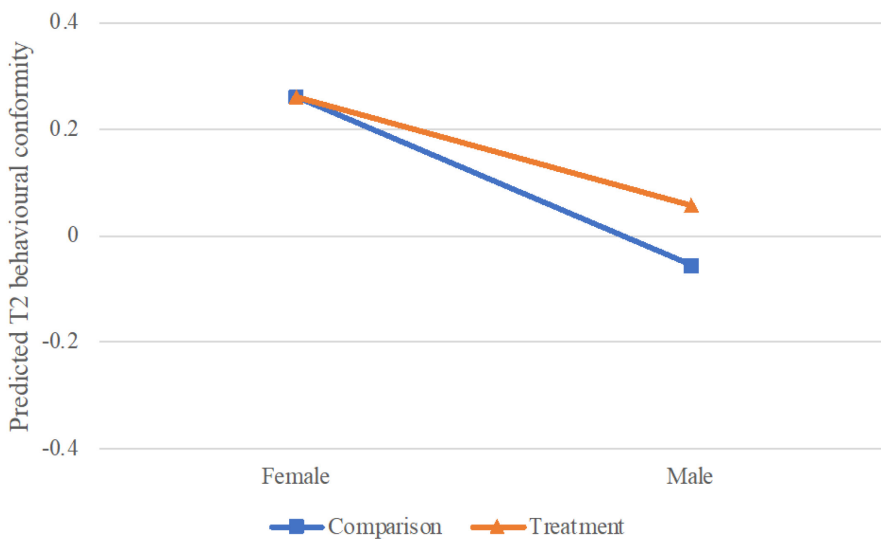


FIGURE 4 T2 behavioural conformity: Interaction between gender and treatment group.

tially smaller (simple slope for gender = 0.03). Thus, males in the treatment group maintained adaptive levels of emotional well-being between T1 (before the 2020 COVID-19 lockdowns) and T2 (after the end of the 2020 COVID-19 lockdowns) relative to females. This same gender difference over time did not exist in the comparison group, where boys reported poorer levels of emotional well-being at T2 than girls. However, the size of the effects was small. For instance, Figure 3 shows that the difference between males and females in the comparison group ( $-0.14$ ) was small, given that the Y-axis ranges between half a standard deviation below and above the mean. Therefore, the difference between males in the treatment and comparison groups at T2 was also small.

Figure 4 shows the gender  $\times$  treatment group interaction for T2 behavioural conformity. The interpretation for males and females was similar to that for emotional well-being. In the comparison group, males were significantly lower than females on the T2 behavioural conformity dimension (simple slope =  $-0.32$ ), while in the treatment group, the gender difference was

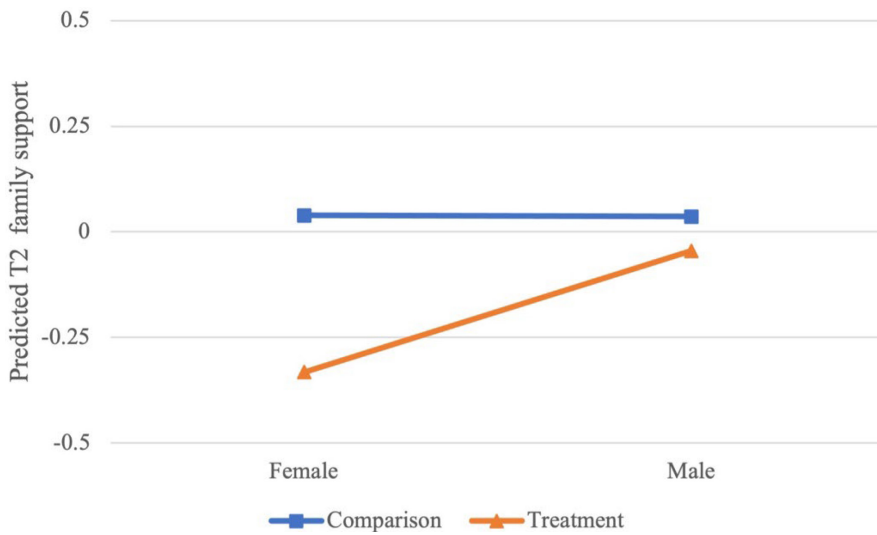


FIGURE 5 T2 family support: Interaction between gender and treatment group.

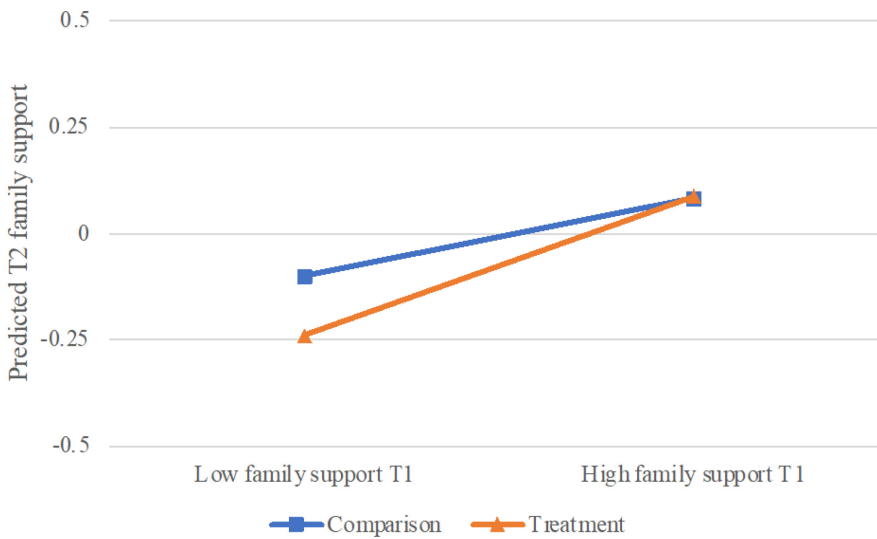


FIGURE 6 T2 family support: Interaction between T1 family support and treatment group.

significantly smaller (simple slope =  $-0.20$ ). Thus, males in the treatment group maintained more adaptive levels of behavioural conformity between T1 (before the 2020 COVID-19 lockdowns) and T2 (after the end of the 2020 COVID-19 lockdowns), than boys in the comparison group did over time prior to the pandemic. However, Figure 4 shows that while females were consistently higher on behavioural conformity than males, the difference between males in the treatment and comparison groups in T2 behavioural conformity was small.

Figure 5 shows the gender by treatment group interaction for T2 family support. In the comparison group, the simple slope for gender was extremely small (simple slope =  $-0.01$ ), indicating few differences between males and females at T2. However, in the treatment group females reported significantly lower levels of family support (simple slope =  $0.29$ ), indicating that females in the treatment group reported less adaptive levels of family support after the end of the 2020 COVID-19 lockdowns, after accounting for T1 level of family support and other covariates.

Figure 5 shows that the difference between males and females in the treatment group, while not large, was around a quarter of a standard deviation. This can be compared with essentially no difference between males and females in the comparison group.

Finally, Figure 6 shows the two-way interaction between treatment group and T1 family support in the prediction of T2 family support. The figure suggests that students who initially reported lower (less adaptive) family support tended to also report less family support at T2 but even more so in the treatment sample: the simple slope for T1 family support in the comparison group was 0.32 and in the treatment group was 0.55.

## 4 | DISCUSSION

This paper contributes to the literature by examining longitudinal changes in school attachment, social well-being, emotional well-being, behavioural conformity and family support self-reported by 6- to 12-year-old children prior to the pandemic (with children assessed from 2019 to early 2020) and after the initial period of lockdowns (from mid-2020 to mid-2021). A unique contribution of this paper is our use of a comparison sample of children, also assessed over two time points prior to the pandemic. This has allowed us to consider effects of the lockdowns over and above normative change under prepandemic conditions.

### 4.1 | Changes in children's well-being before and after the 2020 COVID-19 lockdowns

Results showed that on most of the well-being dimensions, the treatment group was not significantly different at the second assessment (during 2020) than the comparison group was at their second assessment prior to the pandemic. However, children in the treatment group did report significantly lower family support than those in the comparison group at the second assessment. This is consistent with several studies, showing that increased stress on families during the pandemic has been associated with less supportive parenting (Essler et al., 2021; Walters et al., 2021; Westrupp et al., 2021). Overall, the results suggest only modest changes between 2019 and late 2020 in social-emotional well-being, as measured by Rumble's Quest. There are several ways to interpret this pattern of findings.

First, the sample was entirely located within Queensland, Tasmania and Western Australia, and these states were relatively lightly touched by lockdowns during 2020. The period of stay-at-home orders and school closures was restricted to March and April, with most children returning to school by May. It is possible that different results would be seen from children who experienced the lengthy, later lockdowns in Victoria and New South Wales.

Second, many primary-school-aged children may have been supported by resilient families. Emerging pandemic research highlights the resilience of many families, even those experiencing significant disadvantage (Marshall et al., 2022; Witte & Kindler, 2022). Other longitudinal comparisons of children before and during the pandemic have shown a limited change in well-being (Dabravolskaj et al., 2021; Walters et al., 2021). In addition, financial supports implemented by the Australian government in March 2020 were estimated to have reduced levels of household financial stress to below pre-COVID levels, with this effect more pronounced in the lowest income households (Phillips et al., 2020). Therefore, for some families, a key driver of poor outcomes in the family stress model—financial strain—may have been mitigated.

Third, all the schools in the present study had chosen pre-COVID to use Rumble's Quest to assess well-being in the student cohort. They might, therefore, have been particularly attuned to or concerned about student well-being and have worked harder than other schools to support students during school closures.

Finally, it is possible that the results are biased due to differences between the treatment and comparison groups. Although we controlled for school and student characteristics, there

were important differences between the two groups. For instance, the treatment group schools were lower in SES and treatment group students had a longer interval between assessments than comparison group students. We discuss further limits to interpretation in the Limitations section below.

## 4.2 | Risk and protective factors

We did not find that the well-being of older children suffered more than that of younger children. However, changes in emotional well-being, behavioural conformity and family support between T1 and T2 were different for boys and girls, and these differences generally favoured more adaptive outcomes for boys. As expected, girls overall reported more adaptive (higher) levels of both emotional well-being and behavioural conformity. However, boys showed improvements over time in these dimensions of well-being while girls showed no change or less change. That is, boys' levels of well-being at Time 2 were somewhat closer to girls' levels of well-being. This suggests that some boys may have experienced an emotional or behavioural “boost” in the period after the easing of restrictions in 2020. One reason for this may be time away from peers and the school environment (Vaillancourt, Brittain, et al., 2021), especially since the behavioural conformity dimension largely reflects opportunities to “get in trouble” at school. These gender differences were small, however, and it is possible that they will be short-lived.

The interaction between treatment group and gender for family support showed that girls who were in the treatment group (i.e. who experienced the early part of the pandemic response) reported a drop in family support at T2, but that boys in the treatment group did not. Many studies show that girls and women have greater concerns about interpersonal relationships than men and that interpersonal relationships can be a greater source of stress for women (Rudolph & Conley, 2005; Rudolph & Hammen, 1999). This is hypothesised to result from socialisation processes, in which girls are socialised to be more responsive to the needs of others and to put greater effort into the maintenance of harmonious relationships. Therefore, it is possible that the decrease in perceived family support reported by the girls in the treatment group reflects girls' greater tendency to both notice family stress resulting from the COVID-19 pandemic and to be more concerned about it.

The developmental literature also suggests that girls' greater vulnerability to family stress is one factor underlying the higher female prevalence of depressive symptoms that emerges in early adolescence (Leadbeater et al., 1995; Lewis et al., 2015). Although girls in the treatment group in the present study did not report significantly poorer emotional well-being at T2, they did not report *better* emotional well-being, as boys did. It was beyond the scope of the present study to test whether changes in family stress were associated with changes in emotional well-being for girls. However, the finding of a perceived drop in family support by girls does suggest that examining gendered vulnerabilities to pandemic stress should be a focus of future research.

We expected that children who had lower levels of well-being, especially poor emotional well-being, prior to the pandemic would be more likely to report poorer well-being after the 2020 lockdowns. However, this was only apparent for family support. Children in the treatment group who reported lower initial levels of family support experienced a bigger decrease in family support by T2, compared with children who had higher initial levels of family support. This suggests that families who were more stressed prior to the pandemic may have had fewer emotional or other resources to draw on during the initial period of COVID-19 lockdowns, with a subsequent worsening in family relationships. This is consistent with research carried out during the pandemic highlighting the increased risk to already vulnerable families (Spencer et al., 2021) and the protective role of supportive family relationships (Wong et al., 2022). However, contrary to expectations, the T1 level of family support was not related to T2 levels of any other well-being dimension. The role of decreases in perceived family support for children's emotional or behavioural well-being requires further investigation.

### 4.3 | Limitations

First, the number of schools in the sample was unfortunately not large enough to model school-level effects using multilevel modelling. Although we adjusted standard errors for school clustering, it is possible that important differences between schools, both observed and unobserved, were not sufficiently accounted for. Additionally, fit for some models was less than ideal, particularly for social well-being and behavioural conformity. Reliability was also lower for these well-being dimensions. Future work will address these issues.

Second, the comparison and treatment groups were convenience samples. The research team had no control over when students were tested, and detailed reports are not available describing what schools did to improve well-being between T1 and T2. Moreover, no information is collected about children's families other than the child-reported family support dimension, limiting the capacity to explore contexts of children's development.

Third, at present how higher or lower scores on the well-being dimensions assessed by Rumble's Quest relate to concrete outcomes such as mental health symptoms or teacher-reported classroom behaviour is not clear. However, initial validity analyses suggest that the dimensions are highly correlated with other measures of childhood well-being (Freiberg et al., under review), suggesting that the dimensions do differentiate children with poor and good adaptive functioning.

Finally, the present study does not report on children's well-being *during* the period of 2020 COVID-19 lockdowns, but only in 2020 and the first half of 2021 after lockdowns had ended. Thus, some of the results may reflect a boost in well-being after the easing of restrictions and a return to school. To address both these limitations, longer-term follow-ups will be important.

## 5 | CONCLUSIONS

The present study demonstrated some small changes in self-reported social-emotional well-being for primary-school-aged children in the early period of the pandemic during 2020. Changes were both positive and negative. Boys may have experienced a short-term boost in emotional and behavioural aspects of well-being, but longer-term follow-ups are required. In contrast, there was an overall decrease in family support reported mostly by girls in the treatment group. This perception by girls is intriguing and has important practical implications if the result can be replicated.

Given that love and care from families offered within a safe and predictable environment is a key protective factor for children's mental health and well-being during times of stress, there is a particular need for schools and helping agencies to provide support to the most vulnerable families and children as early as is practicable after the need becomes known. While this has of course been well understood for many years (Homel et al., 2015), the pandemic and lockdowns, even in the relatively mild form experienced in 2020 in the three states included in this study, have thrown into sharp relief the consequences for children of family stress and disruption and the consequent need to understand and ameliorate these effects. We need to redouble our efforts on behalf of those most at-risk.

### AUTHOR CONTRIBUTIONS

**Jacqueline B. H. Allen:** Conceptualization; formal analysis; methodology; writing – original draft; writing – review and editing. **Ross J. Homel:** Conceptualization; funding acquisition; project administration; writing – review and editing. **Tara R. McGee:** Conceptualization; writing – review and editing. **Kate J. Freiberg:** Data curation; project administration; software; writing – review and editing.



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## CONFLICT OF INTEREST STATEMENT

RealWell (<https://www.realwell.org.au>), the platform which licensed Rumble's Quest for use by schools and agencies while the research reported in this paper was being conducted, was a social enterprise developed wholly within Griffith University. In July 2022 RealWell Pty Ltd was established as a for-purpose business with a continuing research relationship with Griffith University. The authors declare that they derive no financial benefit from RealWell Pty Ltd nor do they have any personal relationships that could have appeared to influence the work reported in this paper. The funding agencies had no role in the study design; data collection, analysis, interpretation; writing of the paper; or decision to submit the paper for publication. The corresponding author had full access to all data in the study and had final responsibility for the decision to submit for publication. The authors declare their independence from the funders and from anybody substantially funded by one of these organisations.

## ORCID

Jacqueline B. H. Allen  <https://orcid.org/0000-0002-5162-4118>

Tara R. McGee  <https://orcid.org/0000-0003-1385-1931>

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## AUTHOR BIOGRAPHIES

**Jacqueline B. H. Allen** is a researcher who focusses on individual, family, peer and neighbourhood determinants of successful development during childhood, adolescence and young adulthood. Of particular interest are early-in-life prevention of criminal offending, the neighbourhood and developmental contexts of substance use in adolescence and young adulthood, and statistical modelling of complex longitudinal processes. Jacqueline is a lecturer in the School of Criminology and Criminal Justice.

**Ross J. Homel**, AO, is a Foundation Professor of Criminology and Criminal Justice at Griffith. He is passionate about the prevention of crime, violence and injuries and has published approximately 200 books, articles and high-impact government reports. He has, with colleagues, won many awards for his research on the prevention of crime and the promotion of positive development and well-being for children and young people in socially disadvantaged communities through family support and family-school-community partnerships.

**Tara R. McGee** is an Associate Professor in Criminology at Griffith University. She has worked predominantly with the Mater University Study of Pregnancy, the CREATE project on which paper is based, and the Cambridge Study in Delinquent Development, to examine the development of antisocial behaviour and offending across the life course. Dr McGee is the founding co-editor of the *Journal of Developmental Life-Course Criminology* and the current President of the Australian and New Zealand Society of Criminology.

**Kate J. Freiberg** is a Principal Research Fellow at the Griffith Criminology Institute. Her work draws together developmental psychology and prevention science. She maintains a strong focus on the development of accessible resources and methodologies to support front-line professionals, child-serving organisations and policymakers who strive to achieve better outcomes for children and families living in challenging environments.

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# APPENDIX FOR “CHANGES IN CHILD WELL-BEING DURING THE COVID-19 PANDEMIC”

**TABLE A1** Summary of selected commonwealth and QLD, TAS and WA directives that affected movement, gatherings and schools to June 2020.

	Commonwealth	Queensland	Tasmania	Western Australia
<i>March 2020</i>				
18 March	Nonessential indoor gatherings of more than 100 people not permitted  Avoid nonessential travel  Do not travel overseas			
20 March	Borders closed to noncitizens and nonresidents			
22 March	–		Border restrictions—nonessential travellers to quarantine 14 days	Border restrictions—nonessential travellers to quarantine 14 days
23 March	Nonessential businesses directed to close (e.g. gyms, bars, place of worship)	Border restrictions—arrivals to QLD to quarantine for 14 days		Schools remain open, but parents could choose not to send children
25 March	Ban on Australians travelling overseas		Libraries and public premises close  Schools remain open, but parents could choose not to send children. Home learning opportunities provided	
26 March		Government schools to be student-free till end term 1; remain open for children of essential workers		Families encouraged to keep children home
29 March	Two persons only permitted at indoor and outdoor gatherings			
30 March	All Australians advised to stay home			
31 March		Closure of QLD border		Intrastate travel bans—nonexempt residents to not travel outside regional boundaries

(Continues)



TABLE A1 (Continued)

Commonwealth	Queensland	Tasmania	Western Australia
<i>April 2020</i>			
2 April	Restrictions on gatherings: no more than two people outside and no more than two visitors		
4 April	End of term 1		
9 April		End of term 1	End of term 1
26 April	Easing of stay-at-home restrictions—can leave home for recreation		Easing of restrictions on gatherings—up to 10 people allowed
28 April			Schools open to all families who choose to send children
<i>May</i>			
11 May	Younger and older school grades returned to in-person learning		
18 May			All students required to return to school Eased restriction on gatherings—up to 20 people may gather Cafés and restaurants increased patrons
25 May	All students return to in-person learning	Primary-school and senior high school grades return to in-person learning	
31 May	More patrons permitted in restaurants, pubs, cafes		
<i>June</i>			
1 June	Eased restriction on gatherings—up to 20 people may gather	Easing of restrictions on intrastate travel and businesses	
8 June			Parents and carers permitted in school grounds
17 June		Eased restriction on gatherings—up to 20 people may gather	

Sources: [https://www.aph.gov.au/About\\_Parliament/Parliamentary\\_Departments/Parliamentary\\_Library/pubs/rp/rp2021/Chronologies/COVID-19AustralianGovernmentAnnouncements](https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/rp2021/Chronologies/COVID-19AustralianGovernmentAnnouncements); [https://www.aph.gov.au/About\\_Parliament/Parliamentary\\_Departments/Parliamentary\\_Library/pubs/rp/rp2021/Chronologies/COVID-19StateTerritoryGovernmentAnnouncements](https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/rp2021/Chronologies/COVID-19StateTerritoryGovernmentAnnouncements); [https://www.premier.tas.gov.au/media\\_release\\_search](https://www.premier.tas.gov.au/media_release_search); <https://www.mediastatements.wa.gov.au/Pages/Default.aspx>; <https://www.health.qld.gov.au/system-governance/legislation/cho-public-health-directions-under-expanded-public-health-act-powers/revoked>.



TABLE A2 Tests of time invariance over T1–T2.

Well-being dimension	$\chi^2$	<i>df</i>	<i>p</i>	CFI	RMSEA	RMSEA 90% CI	$\Delta\chi^2$	$\Delta df$	<i>p</i>	$\Delta CFI$	$\Delta RMSEA$
<i>School attachment</i>											
Configural model	206.754	95	<.001	0.976	0.029	0.023–0.034					
Metric model	216.128	102	<.001	0.975	0.028	0.023–0.033	3.79	7	.803	–0.001	–0.001
Scalar model	227.512	109	<.001	0.974	0.028	0.023–0.033	11.444	7	.120	–0.001	0.000
<i>Social well-being</i>											
Configural model	243.412	69	<.001	0.954	0.042	0.036–0.048					
Metric model	249.023	75	<.001	0.954	0.04	0.035–0.046	10.50	5	.062	–0.003	–0.001
Scalar model	279.861	81	<.001	0.948	0.042	0.036–0.047	19.61	5	.002	–0.006	–0.001
Scalar model, intercept for item 50 free	257.311	80	<.001	0.953	0.039	0.034–0.045	9.15	4	.057	–0.001	–0.002
<i>Emotional well-being</i>											
Configural model	243.412	69	<.001	0.954	0.042	0.036–0.048					
Metric model	249.023	75	<.001	0.954	0.04	0.035–0.046	6.75	6	.345	0.000	–0.002
Scalar model	279.861	81	<.001	0.948	0.042	0.036–0.047	30.30	6	<.001	–0.006	0.002
Scalar model, intercept for item 51 free	257.311	80	<.001	0.953	0.039	0.034–0.045	8.19	5	.146	–0.001	–0.001
<i>Behavioural conformity</i>											
Configural model	76.385	29	<.001	0.968	0.034	0.025–0.043					
Metric model	81.802	33	<.001	0.968	0.032	0.024–0.041	5.24	4	.264	0.000	–0.002
Scalar model	92.418	37	<.001	0.963	0.032	0.024–0.041	10.51	4	.033	–0.005	0.000
Scalar model, intercept for item 27 free	89.098	36	<.001	0.965	0.032	0.024–0.041	7.33	3	.060	–0.003	0.000
<i>Family support</i>											
Configural model	135.823	47	<.001	0.954	0.036	0.029–0.044					
Metric model	165.449	52	<.001	0.941	0.039	0.033–0.046	27.72	5	<.001	–0.013	0.003
Metric model, loading for item 54 free	132.511	51	<.001	0.958	0.034	0.027–0.041	1.55	4	.828	0.004	–0.002

(Continues)

TABLE A2 (Continued)

Well-being dimension	$\chi^2$	df	p	CFI	RMSEA	RMSEA 90% CI	$\Delta\chi^2$	$\Delta df$	p	$\Delta CFI$	$\Delta RMSEA$
Scalar model	145.543	55	<.001	0.953	0.034	0.027–0.041	15.63	4	.003	0.012	–0.005
Scalar model, intercept for item 18 free	140.024	54	<.001	0.955	0.033	0.027–0.04	7.33	3	.06	–0.003	–0.001

TABLE A3 Model fit for models examining T2 well-being means compared with T1 in the control and treatment groups (manuscript Table 3).

Model	Control group (n = 841)				Treatment group (n = 580)			
	$\chi^2$ (df)	CFI	RMSEA (90% CI)	SRMR	$\chi^2$ (df)	CFI	RMSEA (90% CI)	SRMR
School attachment	214.10 (109)***	0.970	0.034 (0.027–0.041)	0.034	206.42 (109)***	0.961	0.039 (0.031–0.047)	0.037
Social well-being	218.76 (56)***	0.880	0.059 (0.051–0.067)	0.047	161.90 (56)***	0.914	0.057 (0.047–0.067)	0.040
Emotional well-being	199.43 (80)***	0.950	0.042 (0.035–0.050)	0.041	196.30 (80)***	0.929	0.050 (0.041–0.059)	0.042
Behavioural conformity	78.49 (36)***	0.959	0.037 (0.026–0.049)	0.039	128.63 (36)***	0.906	0.067 (0.054–0.079)	0.052
Family support	147.32 (54)***	0.924	0.045 (0.037–0.054)	0.049	136.56 (54)***	0.920	0.051 (0.041–0.062)	0.041

Abbreviations: CI, confidence interval; CFI, Bentler Comparative Fit Index; RMSEA, root mean square error of approximation; SRMR, standardised root mean square residual; T2, Time 2.

\*\*\* $p < .001$ .

TABLE A4 Model fit for models examining T1 well-being (manuscript Table 4).

Well-being dimension	Model	$\chi^2$ (df)	CFI	RMSEA (90% CI)	SRMR
School attachment	Unadj.	50.37 (27)**	0.987	0.025 (0.014–0.035)	0.020
	Adj.	209.01 (62)***	0.946	0.041 (0.035–0.047)	0.029
Social well-being	Unadj.	105.50 (14)***	0.947	0.068 (0.056–0.080)	0.036
	Adj.	238.04 (39)***	0.894	0.060 (0.053–0.067)	0.036
Emotional well-being	Unadj.	108.64 (20)***	0.952	0.056 (0.046–0.066)	0.038
	Adj.	244.62 (50)***	0.920	0.052 (0.046–0.059)	0.039
Behavioural conformity	Unadj.	45.75 (9)***	0.937	0.054 (0.039–0.069)	0.033
	Adj.	145.48 (29)***	0.872	0.053 (0.045–0.062)	0.039
Family support	Unadj.	65.35 (14)***	0.935	0.051 (0.039–0.064)	0.032
	Adj.	154.08 (39)***	0.898	0.046 (0.038–0.053)	0.032

Abbreviations: CFI, Bentler Comparative Fit Index; CI, confidence interval; RMSEA, root mean square error of approximation; SRMR, standardised root mean square residual; T1, Time 1.

\*\* $p < .01$ .

\*\*\* $p < .001$ .

**TABLE A5** Model fit for models examining T2 well-being (manuscript Table 5).

T2 well-being dimension	Model	$\chi^2$ (df)	CFI	RMSEA (90% CI)	SRMR
School attachment	Unadj.	245.91 (124)***	0.975	0.026 (0.021–0.031)	0.029
	Adj.	440.70 (184)***	0.953	0.031 (0.028–0.035)	0.037
Social well-being	Unadj.	290.16 (67)***	0.919	0.048 (0.043–0.054)	0.041
	Adj.	579.57 (133)***	0.874	0.049 (0.045–0.053)	0.046
Emotional well-being	Unadj.	295.06 (93)***	0.948	0.039 (0.034–0.044)	0.038
	Adj.	667.71 (171)***	0.906	0.045 (0.042–0.049)	0.043
Behavioural conformity	Unadj.	126.04 (45)***	0.951	0.036 (0.028–0.043)	0.040
	Adj.	422.59 (99)***	0.873	0.048 (0.043–0.053)	0.053
Family support	Unadj.	156.83 (65)***	0.957	0.032 (0.025–0.038)	0.036
	Adj.	336.43 (131)***	0.929	0.033 (0.029–0.038)	0.036

Abbreviations: CFI, Bentler Comparative Fit Index; CI, confidence interval; QLD, Queensland; RMSEA, root mean square error of approximation; SRMR, standardised root mean square residual; T2, Time 2; TAS, Tasmania; WA, Western Australia.

\*\*\* $p < .001$ .

**TABLE A6** Summary of coefficients from models with significant interactions and simple slopes.

	Dependent variable		
	T2 emotional well-being	T2 behavioural conformity	T2 family support
Treatment group	−0.03 (0.04)	0.001 (0.06)	−0.37 (0.12)**
Male gender	−0.14 (0.05)**	−0.32 (0.04)***	−0.003 (0.05)
T1 family support	—	—	0.40 (0.07)***
Gender × treatment group	0.17 (0.08)*	0.11 (0.05)*	0.29 (0.09)**
T1 family support × treatment group	—	—	0.23 (0.09)*
Simple slopes			
Simple slope for gender in:			
Treatment group	0.03 (0.05)	−0.20 (0.05)***	0.27 (0.08)**
Comparison group	−0.14 (0.05)**	−0.32 (0.04)***	−0.01 (0.05)
Simple slope for T1 family support in:			
Treatment group	—	—	0.55 (0.07)***
Comparison group	—	—	0.32 (0.07)***

\* $p < .05$ .

\*\* $p < .01$ .

\*\*\* $p < .001$ .