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Mathematics homework and the potential compounding of educational disadvantage

Lisa O’Keeffe^a , Carolyn Clarke^b , Sarah McDonald^a  and Barbara Comber^a 

^aEducation Futures, University of South Australia, Adelaide, Australia; ^bSchool of Education, St. Francis Xavier University, Nova Scotia, Canada

ABSTRACT

Parental involvement in schooling has been shown to have a positive impact on children’s educational outcomes. With changing mathematics curricula and pedagogical approaches as a context, we explore how mathematical dispositions emerge through gendered and classed experiences with mathematics homework. We share the experiences of mothers from eight Canadian families as they negotiate mathematics homework with their children. We consider the impact of their differing access to resources and highlight the way mathematics homework disrupts family time, creates tension, and contributes to a sense of inadequacy for some mothers. This results in mothers and children having negative experiences with mathematics homework, which can lead to the compounding of intergenerational negative mathematical dispositions and identities.

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Introduction

Public discourse on school-based mathematics includes narratives concerned with an apparent decline in achievement. A key driver of such narratives are the results, and ensuing media reporting, of international standardised mathematics assessments such as PISA (Programme for International Student Assessment, which is taken by 15-year-olds around the world every 3 years). As an example, Canada was once ranked in the top 10 countries worldwide for mathematics achievement but has experienced a steady decline over the past fifteen years, with students dropping from an average PISA score of 534 in 2003 to an average of 518 in 2018. While this decline is not statistically significant (Rodney, Rouleau, and Sinclair 2016), the OECD (2019, 3) reports that Canadian PISA results highlight a widening achievement gap where ‘more rapid declines were observed amongst the lowest-achieving students than amongst the highest-achieving students.’ Canada is not an outlier in this regard; in fact, socio-economic status is the strongest predictor of achievement in mathematics (across all PISA participating countries). In Australia, Thomson, de Bortoli, and Buckley (2013) report that one in three 9–10-year-old students are not meeting Australian

CONTACT Lisa O’Keeffe  lisa.okeeffe@unisa.edu.au

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curriculum standards and that 70% of all variances in mathematics achievement can be attributed to socio-economic status (SES). Similarly, evidence of a widening gap between the highest and lowest mathematics achievement scores of children in Britain correlates with SES (Hodgen, Foster, and Brown 2022; see also Askew et al. 2010), despite considerable initiatives and interventions in place across the UK, many of which are embedded in policy.

While studies have explored many of the factors contributing to variance of mathematical achievement on standardised assessment, (e.g. Hodgen, Foster, and Brown 2022; Thomson, de Bortoli, and Buckley 2013), this is not the specific focus of our research; rather, we have foregrounded PISA findings in order to contextualise this study in terms of the increased stress on mathematics homework as reported by parents/caregivers. We seek to better understand the wider mathematical development of young children, that is, their out-of-school experiences. We acknowledge that out-of-school and family experiences with mathematics are not limited to homework; however, the circumstances of mathematics homework provide a common context from which we can connect familial stories and experiences with mathematics.

Homework has become a contested practice in recent decades, with debates fuelled by contradictory claims about goals, effectiveness, and the importance of different stakeholders including teachers, students, and parents/caregivers (Farrell and Danby 2015; Grinshtain and Harpaz 2021). Teachers assign homework for many purposes, such as the reinforcement of skills taught in school and/or completion of unfinished work. Homework is sometimes seen as an opportunity for connection between home and school (Clarke 2012), and is often promoted as a means of propelling children to take responsibility for their learning (Warton 2001; Xu and Corno 1998). It remains widely accepted that the predominant goal of homework is to improve learning and hence academic success (Coutts 2004). However, research has demonstrated how homework can encroach on family time and negatively impact the emotional climate of the family (Bodovski, Munoz, and Apostolescu 2022; Coutts 2004; Kohn 2006), and yet the untroubled assumption that homework contributes to academic success prompts caregivers to accept the disruption to home life.

Mathematics homework is the specific focus of this paper. As an extension of the classroom, mathematics homework is shaped by the practices and relationships relevant to the teaching context (Kemmis and Grootenboer 2008). Yet, how children's home lives, social experiences, and pre-existing skills interact with broader education practices cannot be ignored. A key aspect of the interaction between family life and school is the parent-child (or caregiver-child) relationship. The parent-child/caregiver-child relationship is one of particular significance for how children perceive and respond to different experiences (Bourdieu 1993), including their encounters with mathematics homework (Goodall and Johnston-Wilder 2015). In a recent meta-analysis of mathematics interventions in the home, Nelson et al. (2023, 6) emphasise the academic benefits of caregiver engagement with mathematics learning, where home learning activities were found to be 'consistently and significantly related to children's higher math achievement'. However, Nelson et al. (2023) did not discuss caregiver/parent mathematical confidence. Landers (2013) argues that the dispositions, experiences, and expectations of both caregivers and children (and their teachers), especially in relation to prior mathematics learning, impacts interactions with mathematics homework. In terms of caregiver interactions with homework, we note that it is primarily mothers, immaterial of social class, who take on the responsibility of managing children's homework (Braun, Vincent, and Ball 2011; Reay 1998; Vincent 2017). Adding to the

complexity of familial experiences with mathematics homework (Williams and Williams 2021), narratives of declining mathematics achievement and a neoliberal discourse of individual responsibility has increasingly led to mothers viewing their children's achievements as a personal moral responsibility (Doherty and Dooley 2018).

This study draws on the experiences of eight families, who participated in a larger Canadian ethnographic study of homework as a social practice, to examine how different families interact with mathematics homework. Ethnography enables research to be rooted in people's experiences and daily lives. Starting from the lived experiences of the families means the 'social relations and organisation that are present, but not fully visible' to an outsider can be brought to the fore (Griffith and Smith 2005, 3). More recently, discussions about how home life and schoolwork converge, particularly in relation to the impact on mothers, have been foregrounded as responses to the Covid-19 pandemic led schools across the world to engage with home learning. Such moves have given rise to global discussions around 'digital poverty' and social inequalities (Ramirez 2021), with availability and access to learning resources further adding to educational inequity (Beattie, Wilson, and Hendry 2022). This paper does not discuss the benefits or limitations of home learning in this context, but instead examines the everyday realities of one aspect of home-learning, mathematics homework, and family life.

This paper is organised into three parts. First, in order to foreground a common barrier which may be experienced by mothers supporting their children with mathematics homework, we consider how mathematical dispositions and experiences underpin children's identity formation as capable (or not) 'doers' of mathematics. We draw on the work of Bourdieusian scholars (e.g. Boaler 2002; DeWitt, Archer, and Mau 2016; Lareau 2011; Reay 2004; Vincent 2017) to understand interactions with mathematics homework as an aspect of family habitus and consider how the intersection of gender and social class may further impact mathematical identity formation. Families' lived experiences with mathematics homework are shared, and through their narratives, mother's mathematical dispositions and identities come to the fore.

Identity formation and learning mathematics

A widely accepted concern in the mathematics education community is student disengagement from mathematics (Boaler 2015). Looking at schooling more broadly, Haywood et al. (2009) and Lloyd-Jones et al. (2010) identified three key reasons why students choose to disengage with school: (1) attitudes and personal skills, (2) school experiences including achievement, and (3) home and community experiences. An Ofsted (2008) report in the UK, focussing on secondary schools, suggested that many students are quietly disengaging (as in not overtly through negative behaviour) from mathematics due to boredom, isolation stemming from a pedagogical focus on independent work, and concerns about elitism emanating from the stereotype that mathematics is only for 'smart' students. This final finding is echoed by Boaler et al. (2018), who describe key myths prevailing across general perceptions of mathematics, including that mathematics is only for those with a 'maths-brain', that mathematics is about procedures and memorisation and that high-mathematics achievement relies on being a 'fast-thinker'. Boaler et al. (2018) note that these myths impact student self-beliefs about their capabilities in mathematics, particularly if this type of mathematical outcome/behaviour is rewarded or identified as 'success' in their classroom.

Research has highlighted how students with negative dispositions toward mathematics often do not understand the concepts and report a reliance on memorising procedures (Brown et al. 2010; Boaler and Greeno 2000). These students are more likely to form identities as ‘not a mathematics person’.

Brown et al. (2010) describe the interrelatedness of student attainment in mathematics and their attitude towards mathematics. They noted that even successful students of mathematics perceive themselves as failing in some capacity in comparison to those they perceive as the ‘clever’ students, and that these negative perceptions are generally linked to ability stereotyping. That is, girls are more likely to form negative attitudes about mathematics achievement than boys. This sense of failure about one’s capability in mathematics results in increasing negative dispositions which in turn creates more perceptions of failure, combining to construct negative identities around mathematics.

Education researchers have highlighted the value of exploring mathematics learner identities as a means of understanding why learners disengage from mathematics (Grootenboer and Zevenbergen 2008), with mathematics identity recognised as a greater predictor of continued participation in mathematics than achievement/success (Sfard and Prusak 2005). Similarly, Svoboda et al. (2016) suggest that ‘low SES-students’ (determined by their parent’s level of education), are less likely to choose higher levels of mathematics in secondary school. They also noted that parental expectation, as well as the child’s own expectations for success, shape a child’s mathematical identity. Specifically, Svoboda et al. (2016) found that mother’s aspirations and children’s own expectations were predictive of a child’s STEM (science, technology, engineering, and mathematics) identity.

In taking a Bourdieusian approach to identity, we understand ‘identity as part of habitus... a layering of dispositions, produced through socialisation which guide a person’s sense of what is ‘normal, possible, and desirable for people like me’ (DeWitt, Archer, and Mau 2016, 2432). DeWitt, Archer, and Mau (2016) highlight how, as capital and habitus interact, family dispositions influence and reproduce children’s values and beliefs, and in turn their attitudes and behaviours with respect to academic achievement. Boaler (2002) draws on Bourdieu to suggest that because schooling is primarily responsive to, and aligned with, the cultural and linguistic norms of middle-class children, working-class children may find themselves without the unspoken ‘rules of the game’—or norms and expectations of school—and face greater challenges in forming positive mathematical identities. Of particular interest is how identity formation impacts student persistence and has more influence on student learning than personal interest or achievement (Carlone and Johnson 2007). As such, considering identity through a Bourdieusian approach offers a powerful lens for understanding engagement in mathematics.

The intersection of mother’s work, social class, and mathematics homework

Examining the complexities of how caregivers and children experience mathematics in the context of homework builds an understanding of how mathematical identities, as an aspect of habitus, are formed within the home. Research has highlighted how parents/caregivers in middle-class families invest strongly in their children’s education to maintain class status while children from working-class homes are less likely to accrue the middle-class capital most valued by the education system (Lareau 2011). Connell (2003, 241) suggests these differences may be due, in part, to caregivers’ ‘lack of familiarity’ with more

recent curriculum and pedagogies, as well as the classed, but invisible, expectations of parental involvement with children's education. Yet, for some caregivers, anxieties surrounding their involvement in their children's education may stem from their own negative experiences with school (Connell 2003; Reay 2004).

Much of the literature on family involvement in education tends to focus on 'parents/caregivers' when in fact, the work of motivating children towards academic success disproportionately falls on mothers, irrespective of social class (Reay 1998, 2004). Mothers shoulder this additional work even when they do not conform with traditional understandings of gendered roles. O'Brien (2008, 145) suggests that this is a result of "deeply internalised traditional gender ideologies of care and of intensive mothering" as well as cultural expectations that mothers should engage in this type of additional work. Researchers (e.g. Clarke and Comber 2020; Griffith and Smith 2005; Lightfoot 2004; Reay 1998), point to the increasing reliance of educational systems on families, particularly mothers, for educational support where 'the availability of women's unpaid work ... sustain[s] and supplement[s] the educational work of schools' (Griffith and Smith 2005, 3). In this construct, parents – especially mothers – are positioned as co-educators along with their children's teachers (Reay 1998). Yet, how mothers engage in their children's education is closely tied to social class.

Previous studies have indicated that mothers from working-class families are less likely to attend school functions or to volunteer at school than the mothers of middle-class families who are generally active participants in the education system (Griffith and Smith 2005; Lareau 2000; Lightfoot 2004; Reay 1998, 2000). Additionally, the supplemental work-contribution of middle-class mothers increases the resources that some schools have at their disposal. This produces what Griffith and Smith (2005, 17) refer to as 'an engine of inequality' which gives 'credentialed, predominantly white, middle-class privileged access to positions on ruling institutions'.

In terms of homework, the engine of inequality is a factor in the widening gap between working- and middle-class families in terms of what they can contribute to their children's education. Research by Clarke and Comber (2020) and Clarke (2022) highlight the pressures felt by working-class mothers to meet the academic demands and monetary costs (in terms of materials needed for tasks) of their children's homework, where despite 'the greatest effort from mothers to carry out specifically what the school asked, homework played out differently in different homes and shaped family life uniquely depending on the accessibility of cultural capital' (Clarke 2022, 798). Normative beliefs about mothering ignore how middle-class mothers have access to the resources needed to bolster their children's educational outcomes (Cooper 2017; Reay 1998; Walkerdine, Lucey, and Melody 2001). We note that working-class mothers impart working-class values and the building of aspirations (McDonald 2021). Yet, within this type of system, many children are disadvantaged before they even enter the school doors.

Methodological approach

The data presented in this article were drawn from a larger ethnographic study which investigated how homework functioned as a social practice within families in Newfoundland on the eastern coast of Canada (Clarke 2012; Clarke and Comber 2020; Clarke 2022). Data were gathered throughout one school year, with family interviews held early in the school year, mid-way through, and again at the end of the year. In this article, we examine how

eight families, who were both working and middle class (defined in terms of skills, education, and income), experienced mathematics homework. The eight families (introduced in Table 1) represent all families from the larger study who made reference to mathematics homework specifically. Each of these eight families had traditional family configurations of a mother and a father, one or both of whom participated in the original study. All participating families had a child in Grade 3 (typically aged 8-9)- the year in which students take their first standardised test in Newfoundland, Canada. While the study focussed on the experiences of homework for Grade 3 children and their families, all children in each family were invited to participate. Each family participated in three interviews which included discussion about, and sharing of, homework artefacts. Across the interviews with each family, all mothers and one father attended all interviews, another father attended the first family interview, and another joined for the first 10 minutes of his family's second interview.

The eight family interviews were coded to identify references to mathematics or aspects of mathematics across the interviews. Following this, the mathematics-related interview segments were thematically coded to identify key themes across the data. The key themes we identified are children's negative perceptions of mathematics, the perception of mathematics homework as time consuming, and parents' frustrations when they felt they were unable to help their child with their mathematics homework. We then drew on Bourdieu's theory of social reproduction, while considering intersections of social class and gender, to understand how parental engagement and involvement in mathematics homework creates opportunities for consolidation of learning for children.

Lived experiences of mathematics homework

During the interviews with the families, the children were asked if there were specific types of homework that they did or did not like doing. The majority of children commented on not liking mathematics homework, using words like 'hate' and 'really hard' to describe their feelings. Only one child indicated they really liked mathematics homework, while another revealed, 'it makes me curious 'cause I don't know if I'm goin' to have pluses or take aways' (Emma Taylor). While this child used a positive adjective to describe her feelings about mathematics homework, her curiosity was also tied to an uncertainty about the focus of the content (addition or subtraction) rather than learning something new or interesting. The predominantly negative perspective shared by the children is of concern, particularly given we know that negative discourses about mathematics can have a damaging impact on student perceptions of themselves as 'doers' of mathematics (Larkin and Jorgensen 2016). These perceptions can have long term implications for future success and choices in mathematics. For example, Landers (2013) highlights how children's mathematical identity formation may be impacted by their experiences of mathematics homework. Positive experiences with mathematics homework can support the development of capable mathematical learner identities, while negative experiences, in terms of either the content or familial interactions, can lead young people to develop a negative view of themselves as learners, or identify as a 'non-homework-doer' (Landers 2013, 387).

Familial conversations about mathematics homework tended to centre around worksheets and assignments, with some rare inclusion of projects and family-based activities. The Simmons family spoke of a project where the father had worked with his daughter (Jenna) to create representations of 'half'. However, larger 'themed' projects were more likely

Table 1. Introduction to the eight participating families.

Family name	Members in family: male (M) female (F) grade (G)	Participants in the interviews	Mother's work	Father's work	Usually helped with homework
Best	Mother – Tonya Father – Jeremy Brianna (F) G 3 Brandi (F) G 7	Mother and Brianna	Receptionist – full-time	Labourer – full-time	Mother
Bungay	Mother – Dianne Father – Dave Kyra (F) G 3 Nora (F) G 8 Jordan (M) G 9 Sara (F) completed secondary school	Mother and Kyra	Cashier at local grocery store at beginning of study, receptionist for an optometrist at end of study – full-time *Stay at home mom	Carpenter – full-time	Mother
Heath	Mother – Brenda Father – Colin Jared (M) G 3 Penny (F) age 3 Julie (F) age 2	Mother and Jared	*Stay at home mom	Labourer/Truck Driver – full-time	Mother
Noseworthy	Mother – Raylene Father – Gerard Thomas (M) G 3 Byron (M) G 7	Mother and Thomas	Stay at home mom for most of the time, worked as a substitute student assistant (call in basis)	Pipefitter - full-time	Mother
Blunden	Mother – Tracy Father – George Carson (M) G 1 Jason (M) G 3	Mother, Father*, Carson, and Jason	Office Administrator – full time	Manager Flight Training School – full-time	Mother
Simmons	Mother – Carly Father – Mike Evan (M) G 1 Jenna (F) G 3 Craig (M) G 4 Shawn (M) age 2	Mother, Father* and Jenna	Social Worker – part time	Air Traffic Controller – full-time	Mother
Taylor	Mother – Tara Father – Greg Emma (F) G 1 Morgan (M) G 3	Mother, Emma, and Morgan	Teacher – full time	Accountant -full-time	Mother
Winter	Mother – Haley Father – Pearce Anna (F) Kindy Jayna (F) G 3	Mother, Father, Anna, and Jayna	Bank Teller – full time	Oil Truck Driver – full-time	Father

*Indicates that a participant only participated in one interview

Note: Mothers in this study described themselves as 'stay at home moms' if they did not work outside the household. Also, the Best and Noseworthy families often function as single parent families due to the father's work commitments

to take place in subjects like social studies, heritage fair projects and science fair projects. All other elaborations on mathematics homework were centred on worksheets and assignments.

Many of the parents, and some of the children, commented on mathematics homework being work that was not completed in class. For example, Jenna Simmons suggested mathematics homework was given if they 'don't get it done in school'. Parents also complained that too many worksheets and assignments were being set as homework, the amount of which seemed to increase in the lead up to the Criterion Referenced Tests (CRT¹). An argument could be made here that this focus on sending home CRTs from previous school years for homework practice could be indicative of Reay and Wiliam's (1999, 353) concern that standardised testing can narrow the learning experiences of children. They indicate that such narrowing, 'together with an emphasis on achieving the highest scores possible, produces a situation in which unjustifiable educational practices are not only possible, but encouraged'. This is pertinent given Graham and Neu (2004, 296) claim that CRTs are widely used in Canadian provinces to assess 'students' mastery of the curriculum as well as to evaluate teacher and school effectiveness. Berliner (2011) suggests that the pressures created around performance expectations in standardised assessments, such as CRTs, results in teachers feeling pressure to carry out vast amounts of test preparation with students. This pressure resulted in two distinct changes to homework, as noted by the families in this study. The first was an increase in the amount of homework, and the second was a change in the type of homework. Some mothers reported that for a period before the CRTs, mathematics replaced all spelling and reading homework. This was also noted by the children who enjoyed reading and were clearly disappointed about the increased focus on mathematics.

Understanding family experiences of mathematics homework can also reveal educational inequalities. Clarke (2012), drawing on Bourdieu (1993), highlights how intergenerational reproduction of educational inequities is manifested by approaches such as setting unfinished schoolwork for homework. There were numerous examples of this approach across the data. Brenda Heath discussed the challenges for her family when the mathematics concepts her son, Jared, did not understand in school were assigned for homework. Brenda did not feel confident in her ability to help Jared with this homework, claiming, 'I am not very smart at this', while Jared was inattentive to the homework tasks assigned and kept asking, 'Can I go now?', 'Can I go in my room?', and 'I want to watch my show now'. Along with Brenda's lack of confidence and Jared's reluctance, there were two younger children in the home. While Brenda was working with Jared, the toddler was climbing into her arms and trying to snatch the pencil and papers from Jared. Brenda said this was a typical homework scene when her husband was not home to care for the younger children. She described spending at least an hour each day working through Jared's mathematics homework, describing the whole experience as 'frustrating'; meanwhile, Jared, who was already struggling with aspects of his schoolwork, appeared at risk of falling further behind.

Tonya Best also described the phenomenon of unfinished mathematics schoolwork set as homework as setting 'families up for an evening of frustration when both the mother and child are often tired'. Although Tonya referred to the difficulties for the family, the implication was that mathematics homework was particularly difficult for her and her son. Similarly, Carly Simmons noted how her daughter was not assigned homework unless she failed to finish work during class time, suggesting that only those who were struggling with

their schoolwork were required to do 'extra' at home. The reality for some children was that those who found mathematics schoolwork difficult were required, despite their tiredness from a full day of school, to continue or complete this work at home.

It seems unsurprising, then, that Diane Bungay described this experience as her and her daughter's 'struggle time'. Struggling to understand and/or complete mathematics homework when already feeling tired can have hugely negative implications for children's perceptions and enjoyment of mathematics. Our concern is, if children are struggling in the classroom where they are aided by a trained professional, it is unclear how continuing with difficult schoolwork at home will improve outcomes. These difficulties are compounded when the person trying to help at home finds the mathematical work challenging and has limited educational or social resources to draw from.

Mathematics homework and time

Mothers were also concerned about the time-consuming nature of mathematics homework. Time was a reoccurring theme, with families making comments such as 'it takes a long time' and 'it takes so long to do "em" [mathematics assignments] ...especially when he's not getting it'. These problems echo Dudley-Marling (2003) argument that setting unfinished schoolwork as homework is particularly disruptive for families because of an implicit assumption that someone in the home will have the ability and time to 'teach' mathematical concepts – concepts that the child has struggled to learn during class time. Brenda Heath voiced her frustration about this experience:

Well, with math...I don't see any benefits....cause they had a math teacher to teach them math...so like....and a lot of homework they bring home to their parents....their parents don't know how to do....so if the parents don't know how to do it....how are the parents supposed to teach the child how to do that, right?....

It is important to problematise the assumptions made about the help available to children at home. Implicit in classed assumptions about the help available in the home are two parent families who are in a financial position for one parent to be at home to oversee homework. Yet, many of the mothers in this study worked either part-time or full time and they spoke of the challenge of finding the time and energy for themselves and their children to engage meaningfully with mathematics homework. Raylene Noseworthy discussed how mathematics homework was a major concern in her family, especially for her son, Byron, and she lacked the confidence to help him. She sometimes called their father at work for support, and, at one point the mathematics became so difficult that Raylene arranged for Byron to be tutored after school two afternoons each week. Raylene felt she would never be able to work on a full-time basis, manage the boys, and supervise the homework, indicating that homework was the 'main reason why [she didn't] work full time'. Raylene's experience illustrates how mother's 'unpaid labour' (Griffith and Smith 2005) is not only a feature of middle-class families but also applies to working-class families.

Despite research highlighting how middle-class mothers commit to extensive labour to generate their children's academic success, we see here how working-class mothers also engage in a concerted effort on the part of their children, as Raylene actively made the decision to forgo full-time work for time spent on her children's homework. Her experience aligns with Vincent's (2017) claim that working-class women assume great

parenting responsibilities and points to the intense pressure on mothers to be involved in their children's homework. It is often taken for granted that families have the time, and/or the economic and cultural capital, to accomplish the goals of the school (and as Blackmore and Hutchison (2010) argue, school systems), thus creating an inequality between middle-class and working-class families with regard to education (Griffith and Smith 2005).

Mathematics homework and mother's confidence

Many of the mothers made reference to not feeling confident or capable enough to support their children, and this was particularly noticeable for the working-class mothers such as Tonya Best:

It's hard 'cause a lot of it she brings home I don't have a clue how to do it...a lot of the math. The rest of it is pretty well...you can manage to help her with it, so it is not so bad. But the math is...I don't even know...I don't even know why she brings it home cause I don't know how to do it.

Diane Bungay discussed her realisation that she was unable to help her child with mathematics homework, stating: 'It's almost that far out there, you'd never think that I wouldn't be able to help my child in Grade 3 (typically aged 8–9) with math.' Similarly, Brenda Heath expressed despair at sending her child to school with completed homework that she knew was wrong because she did not know how to help him. Despite their best efforts, these mothers were clearly concerned about their children's mathematics achievement. While Blackmore and Hutchison (2010) suggest that working class parents are often absent from involvement in school activities, this was not the case for these families. However, Blackmore and Hutchison (2010) also suggest that when working class families are more involved in their child's schooling activities, they may need considerable support. In the context of this article, support might include access to resources to develop their own mathematical content knowledge and/or information about particular approaches/strategies their children are learning.

Additionally, families may further benefit from targeted support due to their own negative educational experiences (Blackmore and Hutchison (2010)). Arguing from a Bourdieusian perspective, this is where we see the potential for the family habitus to impact the identity construction of capable and confident 'doers' of mathematics. When the reality of what one sees as 'normal, possible, and desirable for 'people like me'' (DeWitt, Archer, and Mau 2016, 2432) (e.g. one's family members), is influenced by negative experiences and expectations with mathematics, children can struggle to imagine themselves as having successful mathematical experiences. Thus, reinforcing self-narratives of 'I'm not any good'. This is reflected in Bleeker and Jacobs (2004) findings that mother's beliefs influence their child's perception of their own capabilities, which can also influence future potential in mathematics. Considering how the working-class mothers in this study may already have identities developed around negative school experiences, it seems that the struggle, or inability, to draw on resources of success in terms of their children's mathematics homework may be reproducing negative mathematical identities.

When parents/caregivers have negative mathematical identities and/or deeply rooted negative feelings about mathematics, their involvement in their child's mathematics homework, despite being well-intentioned, may be counterproductive (Beattie, Wilson, and

Hendry 2022). In this study many of the mothers were aware of their negative mathematical identities. For example:

Diane Bungay: Math wasn't my thing.

Kyra (her daughter) adds: Ain't my thing either.

Diane and Kyra's shared responsibility around mathematics homework was clearly evident, with Diane referring to it as 'our' struggling time and Kyra agreeing that 'I gets frustrated quick'. Both were powerful statements, which demonstrated both the impact of educational demands on their family life and the intergenerational negativity around mathematics capabilities.

Middle-class parents struggled with mathematics homework at times as well. Yet, a sense of despair was less evident in their descriptions of working with their children. The middle-class mothers appeared to have more access to resources to draw on to learn new concepts themselves. One parent, Tara Taylor, who despite working as a Grade 4 (children aged 10–11) teacher and vice principal, initially found it difficult to adjust to new mathematical strategies and approaches during curriculum changes in her son's earlier years of schooling. Although she now felt more confident in helping her second child with these mathematical strategies and approaches, Tara noted that:

sometimes I don't know if you're not doing more damage with some of it ...for those parents who don't know 'cause I mean it's not all the time simple and straight forward.

We note here that Tara recognised her relative privilege in being aware that the new curriculum introduced new strategies. Ultimately, it did not appear that Tara's experience of mathematics homework was one of low confidence but rather about drawing on her educational capital to take on a new approach to mathematics school and homework.

New strategies and approaches compounded the challenges presented by mathematics homework for many of the working-class mothers, e.g. the Heath, Best and Noseworthy families. The mothers in these families were already diffident in their mathematical abilities and the new curriculum meant having to decode new approaches and mathematical terminology as they attempted to make connections to their existing mathematical understandings. Diane articulated this struggle when she expressed the following:

Diane: Well, when it's really, really difficult, I can't help her like if it's something ... well, I know ... actually, I'm just starting to realize now some of the things they've just changed the names ...

Interviewer: Yes

Diane: Right? Like, for us it was ... we were borrowing ... now it's not called borrowing ...

Kyra: Trading.

The work of decoding or translating was identified by numerous mothers across the interviews. Hayley Winter noted how it was 'hard but we've come around and I find the teachers really good.... if you ask them questions.... they'll help you with learning how to do it yourself', while others such as Carly Simmons felt the new approaches were chaotic, however she did think they were better overall. Although finding the differences frustrating at times, mothers such as Tracy and Tara were able to draw on their middle-class capital to seek the support and guidance directly from their children's schools. Tracy, whose son was

confident in his mathematics, made a number of comments about the need for parents to know the way they are supposed to 'teach' at home.

Discussion

The mothers in this study assumed great responsibility for their children's homework, even if many did not often feel confident helping with the mathematical challenge. The internal conflict that this created for them was evidenced in their language throughout the interview conversations, through tones of despair and frustration. Some required their children to stay up late, past their bedtime, working on mathematics homework as they didn't want their child(ren) to fall behind.

The mothers did this despite recognising the negative impact on themselves, their child(ren), and their family time. Others drew on social capital. Lareau (2000) suggests that some families may compensate for a lack of institutional capital by hiring a tutor. However, these options are typically dependent on the family's economic capital and is not a viable option for many families. Raylene Noseworthy is one example of where a mother arranged for her son to be tutored in mathematics by a family friend. The Noseworthy family would be considered a working-class family, yet Raylene accessed social capital to negotiate a reduced rate in order to shore up success for her son. Some mothers looked to their child's teacher for support. Raylene had also done this extensively with her children, often staying late after school so the teacher could help them with mathematics homework or prepare for upcoming assessments. Other families (e.g. Blunden, Heath, and Winter) also spoke of asking the teachers for additional help, through telephone calls and emails.

In all situations, the mothers interviewed were doing their best to try to bolster their children's educational experiences both in school and at home. It is important to note that while configurations of family expectations and caring work have been going through a transition from previous traditional configurations, it is still disproportionately mothers who take on the bulk of caring work in the home, regardless of social class (O'Brien 2008; Rodriguez Castro, Brady, and Cook 2022). O'Brien (2008, 145) states that mothers hold 'deeply internalised traditional gender ideologies of care and of intensive mothering; a gendered knowledge that they must care, as proper mothers,' which becomes problematic when mothers find themselves out of their depth or unable to help in particular situations, such as with mathematics homework. There is a sense here, then, that an inability to support their children in particular ways is not only about the frustration of not understanding but is also about how see themselves as 'good' or successful mothers who can confidently support their children.

The implications of negative discourses or experiences with mathematics homework reaches far beyond interactions with the homework itself. For example, Newton and Abreu (2012) discuss how a parent's mathematical identity influences how they choose to engage with their child about mathematics, as does their discourse about mathematics. They describe how negative mathematical identities often reinforce a commonly held, though incorrect (as noted earlier, myth number two), view that mathematics is for the 'gifted'. This results in many people, including parents, reinforcing a negative narrative around mathematics (Williams and Choudry 2016). DeWitt, Archer, and Mau (2016) highlight how as capital and habitus interact, parents/caregivers and siblings can influence a child's value and expectation with regard academic achievement which in turn influences their attitudes

and behaviours thus creating the potential for a 'perfect storm' – *I shouldn't be good at mathematics as my mother/parent/caregiver finds this hard, therefore I am not any good*. In this paper, we argue that it is either academic capital or mathematical capital, and in some cases both, that created barriers for these families.

Some families may resort to helping 'too much', possibly because they are frustrated, experiencing conflict, are anxious for their children to perform well or because children are too tired or do not understand the assigned work. If mathematics homework tasks are too difficult to complete, either independently by a child or with parents' help, then one would have to question why they are sent home. The experiences of the eight families in this study do not support the research claim that homework has potential non-academic benefits such as fostering independence, creating positive character traits, developing good organizational skills, or virtues such as self-discipline and responsibility (Kohn 2006; Kralovec and Buell 2000). The themes that emerged from these interviews were about the amount of time homework took away from families, the way in which confidence and self-esteem of mothers was further degraded by mathematics homework and a general sense of them not being able to help their children enough. These negative feelings and emotions were witnessed and felt by children in this study, and, in many cases, they too shared these negative feelings and self-beliefs around mathematics homework.

Conclusion

This article examined how eight families experienced mathematics homework. While this is a small sample, and the findings cannot be generalized we also acknowledge that throughout our years of experience our findings depict a common narrative. The mothers in this study contributed a tremendous amount of time and resources to their children's education. Some mothers saw their children as disadvantaged by these mathematical experiences. Many of the mothers were continually positioned as 'at-home teachers' whose engagement was required to meet the expectations of schools. This positioning was confronting for those mothers who lacked knowledge or confidence to help with their children's mathematics homework, and it impacted how they positioned themselves in terms of gendered performances of mothering, where there remains a 'moral imperative to perform care, including educational work' (O'Brien 2007, 171).

The study also revealed how having negative mathematical experiences or expressing negative mathematical dispositions is not class specific. Yet, the range of resources available to each family varied, and for some children, this contributes to compounding educational disadvantage. As a research team, we, the authors, all of whom could be described as middle class, discussed how we reflect a range of mathematical experiences and dispositions. Yet, in our current stages of mothering (or grandmothering) and/or teaching roles, we, unlike many of the mothers in this study, are each comfortable in challenging the doxa around homework and its importance. These differing experiences, and differing educational capitals, reflect Lareau's (2011) summation that different families have different abilities when it comes to customising their interactions with, and within, the education system.

Feelings of despair, a lack of confidence and a general sense of negativity and struggle created by the family interactions/experiences with mathematics homework can be reproduced in children. Thus, contributing to intergenerational negativity surrounding mathematics. Furthermore, the majority of mathematics homework interactions were undertaken

by the mothers, many of whom clearly articulated their struggles and lack of confidence with mathematics. Given the likelihood of influence across gender dyads (Casad, Hale, and Wachs 2015) and that mothers disproportionately take on the bulk of caring work in the home, including homework, we are interested in the potential additional hurdles that may be faced by girls in developing strong mathematical identities. Considering the global concern about the lack of female representation in mathematics disciplines, studies and careers, further research should consider whether girls are disproportionately impacted by the interactions and experiences of mathematics homework in the early stages of schooling.

Note

1. CRTs are standardised tests carried out provincially, beginning in the primary grades. The first formal assessments begin in Grades One and Two, Criterion Referenced Tests are administered in Grades Three, Six and Nine, including English language, arts, and mathematics.

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ORCID

Lisa O’Keeffe  <http://orcid.org/0000-0002-3728-2182>
 Carolyn Clarke  <http://orcid.org/0000-0002-1406-9311>
 Sarah McDonald  <http://orcid.org/0000-0002-0454-4983>
 Barbara Comber  <http://orcid.org/0000-0002-8364-1676>

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