

Research Article

Modifying Parental Learning Beliefs and Self-Reported Behaviors by a Short-Term Training

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Abstract: Background: It is widely acknowledged that parents have a strong influence on students' learning. However, some parents may not always support their children's learning in constructive ways due to structural constraints or lack of knowledge. Aims: This study implemented a short-term parent training focused on supporting children's learning at home and examined its effects seven months later. The training targeted both parent beliefs and behaviors. The study also investigated differential responsiveness of parent subgroups. Sample: Participants were 662 parents (intervention group: $N = 157$; control group: $N = 505$) of fifth and sixth Grade primary school students. Methods: Thirteen classes were randomly assigned to receive a 1.5-hour parent training, while 27 classes served as controls. In total, 157 parents (62.3% of those invited) actively participated in an onsite training. During the training, parents reflected on their beliefs and behaviors related to their child's learning, shared experiences with peers and were provided with practical strategies for support. All participants completed questionnaires before and seven months after the training, assessing their learning-related beliefs and behaviors. Results: Training participants differed significantly from the control group in the change of their growth mindset and controlling behavior. No main effects were found for failure mindset and autonomy support. However, significant interaction effects emerged: Fathers and parents with lower educational levels showed notable gains in failure mindset, while parents with medium educational levels increased their autonomy support more than those with lower educational levels. While the main effect on controlling behavior appears robust, the evidence for an effect on growth mindset is less robust and therefore requires further investigations. Conclusions: The study highlights the potential of parent trainings to effectively change relevant learning-related beliefs and behaviors and help parents to adopt supportive styles for their children's learning.

Keywords: parent involvement, parent training, beliefs, behavior, randomized controlled trial

1. Introduction

Parents have a considerable influence on their children's learning and school performance (OECD, 2023). Besides structural factors such as educational level and language proficiency, parents mainly shape their children's learning through their beliefs—reflected in verbal cues—and their behaviors during learning support (Eccles & Harold, 1996; Thomas et al., 2021). However, parents sometimes feel unsure and experience pressure when helping their child in learning which hinders them in being more constructively involved (Grolnick, 2003). Addressing this uncertainty

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and raising awareness about constructive learning support is crucial—especially to promote meaningful collaboration between teachers and parents, aligning their approaches to support children’s learning.

This study takes a first step in this direction by designing and implementing a short training for parents of fifth and sixth graders. The central research question is whether a short-term training can lead to sustainable and positive changes in learning-related beliefs and self-reported behaviors. Additionally, we investigate whether certain parent subgroups respond more strongly to the training. The training effects were evaluated over a seven-month period using a randomized control group design. Since empirical research on on-site parent trainings addressing learning support is limited, this study provides valuable insights into the potential of parent trainings to reduce disparities arising from unfavorable parental beliefs and behaviors.

1.1 Parent learning-related beliefs

Parent beliefs about learning are central to the ways in which parents interpret their children’s academic experiences and decide how to respond (Pomerantz et al., 2007). Beliefs can be understood as subjective understandings that individuals perceive as true; they shape the interpretation of learning situations and guide behavior in educational contexts (Op’t Eynde et al., 2002). In recent years, beliefs about the malleability of abilities, such as growth and fixed mindsets, and beliefs related to dealing with failure (failure mindset) have gained particular attention in educational research. A growth mindset reflects the belief that abilities can be developed through practice (Dweck, 2000), whereas failure mindsets capture whether individuals view failure as enhancing or debilitating for learning and development (Haimovitz & Dweck, 2016). Growth and failure mindsets are moderately correlated, indicating that a more malleable view of ability often goes hand in hand with more constructive interpretations of failure (Haimovitz & Dweck, 2016). Parents who view failure as a learning opportunity are more likely to encourage effort and process-focused learning, which children perceive as supportive.

Correlational research shows that parents’ growth mindset is positively associated with their children’s academic outcomes (Kim et al., 2026; Matthes & Stoeger, 2018), particularly under challenging conditions (Matthes & Stoeger, 2023). These findings suggest that parental encouragement of effort can foster children’s belief that effort leads to success and thereby enhance learning and achievement (Barger et al., 2022; Santana et al., 2019), even when academic ability is relatively low (Sheffler & Cheung, 2022). Some studies suggest associations between growth mindset and educational (Pomerantz & Dong, 2006) or social background (Song et al., 2022), whereas the relationship between parental gender and mindset beliefs has been less investigated. This suggests that learning-related beliefs, which are often unreflective and shaped by structural constraints, may reflect broader social and educational experiences.

1.2 Parent learning-support behaviors

Home-based parent learning support—such as homework supervision or help with studying—is relatively frequent, regardless of parents’ socioeconomic status, or educational attainment (Hartas, 2011). The quality of parents’ daily behaviors during learning support has a direct impact on children’s motivation and achievement and is more relevant than frequency of involvement (Pomerantz et al., 2007).

Self-Determination Theory (Deci & Ryan, 2002) offers a widely used framework for capturing the quality of parental behavior. Autonomy-supportive behaviors—such as offering meaningful choices, acknowledging the child’s perspective, or helping children to help themselves—nurture basic psychological needs and foster intrinsic motivation. In contrast, controlling behaviors—such as using pressure, rigid rules, or excessive monitoring—undermine autonomy and can hinder motivation (Cheung et al., 2016; Grolnick & Pomerantz, 2022; Lerner et al., 2022). Meta-analyses and longitudinal studies support these distinctions and show that autonomy-supportive parenting is positively associated with student motivation and achievement, whereas controlling practices are negatively associated (Dumont et al., 2012; Özyildirim, 2024; Wandeler et al., 2013).

Evidence on the association between Socio-Economic Status (SES) and parental learning-support behavior is mixed. Cooper et al. (2000) found that parents from socioeconomically disadvantaged families reported more controlling and less autonomy-supportive behavior. In contrast, other studies reported no systematic effects of SES or parental education on these dimensions (Dumont et al., 2014; Villiger et al., 2010). Further parental characteristics, such as gender and cultural background, have been investigated less frequently. Villiger et al. (2010) found that German-

speaking (native) parents reported significantly higher levels of autonomy support than parents with another first language, suggesting that first language may reflect broader cultural influences on parenting styles.

Against this background, the question arises whether parents can be enabled to actively develop learning-supportive beliefs and behaviors. Exploring the effectiveness of parent training in this regard is highly relevant with a focus on creating optimal support conditions and equal opportunities for all students.

1.3 Parent trainings with a focus on learning support

Parent trainings focusing on learning support aim to empower parents with knowledge, strategies, and confidence to effectively support their children. However, intervention research in this area remains limited, largely due to the time-intensive and methodologically complex nature of such studies. Nevertheless, several programs have shown promising results.

These trainings typically address parental beliefs and/or behaviors. In terms of behavior, significant positive changes have been reported by parents, including reduced punitive reactions and conflict (Sielemann et al., 2021; seven training sessions of 1.5 hours over seven weeks), increased autonomy support and reduced counterproductive behavior (Wild & Gerber, 2009; eight training sessions of 1.5 hours over three months), less interference and control (Villiger et al., 2010; two sessions of 1.5 hours each over two weeks), as well as decreased controlling reported by parents and children and increased autonomy support reported by children only (Grolnick et al., 2021; two sessions of 1.5 hours each over 1-2 weeks). Villiger et al. (2010) did not find any changes in parents' self-reported autonomy support either.

When it comes to training in learning-related beliefs, interventions on growth mindset have become widespread in the recent past. Growth mindset trainings which seek to foster beliefs in the malleable nature of abilities are usually designed for pupils and students of all ages. Despite the small effect sizes (Burnette et al., 2023; Macnamara & Burgoyne, 2023; Sisk et al., 2018), there is evidence that students from socially disadvantaged backgrounds or academically at-risk benefit from such trainings in particular (Sisk et al., 2018). Some trainings aimed specifically at parents led to increased growth mindset and reduced focus on performance, controlling behavior, and negative affect (Haimovitz & Dweck, 2016, study 4; Moorman & Pomerantz, 2010), while others improved children's reading skills months later (Andersen & Nielsen, 2016). More recently, studies have targeted parents' math-related beliefs to enhance children's math motivation. Lee et al. (2022) found effects on gender stereotypes and expectations about their child's math success, but not on parents' growth mindset. A replication study (Lee et al., 2025) confirmed these findings and revealed delayed effects on children's math anxiety—specifically in families with strong parent-child relationships. MacDonald et al. (2024) examined parents' growth mindset and parenting practices over 15-18 months and reported sustained increases in beliefs about math ability and failure. However, no effects were found on parenting behavior (e.g., autonomy support, controlling) or student achievement.

Delivery formats vary. Some belief trainings occurred in laboratory settings manipulating mindsets through exposure to specific content (Moorman & Pomerantz, 2010) or remotely through videos and booklets (Andersen & Nielsen, 2016; Haimovitz & Dweck, 2016; duration not specified). Lee et al. (2022; 2025) used weekly mailed letters. Due to uncertainty about parent engagement in a remote setting, MacDonald et al. (2024) used a structured laboratory format with a brochure and two booster sessions over six months. Notably, this is the only study to target both beliefs and behaviors—yet only belief changes were observed.

Overall, the findings are promising—at least in terms of changing self-reported parental beliefs and behaviors. In particular, the reduction of unfavorable behavior has been achieved more frequently than promoting supportive ones (Grolnick et al., 2021; Sielemann et al., 2021; Villiger et al., 2010; Wild & Gerber, 2009). Importantly, short training duration of 1.5 hours does not necessarily reduce effectiveness (Grolnick et al., 2021; Villiger et al., 2010). However, evidence for robust increases in autonomy-supportive practices is less consistent, and no existing intervention has convincingly demonstrated sustained change in both beliefs and behaviors simultaneously. Addressing this gap is a central aim of the present short-term training, which explicitly targets both parental beliefs and self-reported behaviors related to children's learning. As remote trainings proved to be less successful, one objective is to design an on-site training that is effective yet not overly time-consuming.

To date, little is known about whether the impact of parent trainings on learning support is consistent across participants, or whether specific parent subgroups, e.g., those with lower education or from culturally diverse backgrounds, benefit more than others. Exploratory analyses by Grolnick et al. (2021) provided some evidence that

parents with lower education responded more strongly to such training. Identifying who benefits most remains a key question for future investigation.

1.4 Parental participation in trainings

A challenge of parent trainings is to reach the majority of parents, regardless of social, linguistic and cultural background, given that parents from a socially disadvantaged background usually participate at a lower rate due to diverse constraints such as time, cultural and/or linguistic barriers (e.g., Heinrichs et al., 2005). Moreover, fathers are typically underrepresented in parenting interventions and trainings (Lundahl et al., 2008; Panter-Brick et al., 2014), making them a particularly difficult target group to reach. The reasons why parents choose to participate or not participate in trainings are multifaceted. The strongest predictors of parent training attendance are perceived program benefits, program barriers, and past parenting resource use (Fischer & Gorges, 2023; Spoth & Redmond, 1995), which are factors that are in line with expectancy-value theory (Eccles & Wigfield, 2002; Eccles & Wigfield, 2020). Perceived benefits can be understood as the value parents attribute to the training, whereas program barriers represent the perceived costs that hinder parents' participation. Consequently, the content of the training should appear useful to the parents and address their needs. In addition, the time and duration should be suitable for most parents and therefore not represent any barrier.

For this reason, the program in the present study was designed as a short-term training. Furthermore, it aimed to enhance parents' support for their child's learning—an objective intended to spark parental interest and respond to their need for training (perceived benefits). The goals of the parent training were: (1) to engage parents in self-reflection and social exchange regarding their learning-related beliefs and behaviors when supporting their child's learning, and (2) to provide strategies for learning support that foster autonomy and self-regulated learning instead of controlling.

1.5 Research questions

This study examined whether parental beliefs (growth mindset, failure mindset) and self-reported behaviors (control, autonomy support) can be modified through a short-term parent training. Furthermore, it investigated whether certain parent characteristics influenced responsiveness to the training.

Research questions:

1) Do participating parents significantly differ from non-participants with respect to specific characteristics, namely gender, educational level, or first language?

2) Changes in parental beliefs (growth mindset, failure mindset): Does training participation lead to more learning-supportive beliefs (main effects)? Do some parents with specific characteristics report significantly greater change in beliefs (interaction effects)?

3) Changes in parental behaviors (controlling, autonomy support): Does training participation lead to more learning-supportive behaviors (main effects)? Do some parents with specific characteristics report significantly greater change in behaviors (interaction effects)?

Hypotheses:

H1: Drawing on the cited literature, we expect participation to be influenced by (a) gender and (b) educational background (as a socio-economic factor). Due to the lack of evidence, we do not hypothesize differences with respect to first language.

H2: Training participation leads to significant changes in parental beliefs relative to a control group: (a) a more pronounced growth mindset, and (b) a more positive failure mindset, after controlling for parents' gender, education level and first language. Furthermore, we examine interaction effects between training participation and background variables. (c) Given that parents with low educational levels are likely to benefit more from such training (Grolnick et al., 2021), it is expected that they will shift significantly more toward a growth mindset compared to parents with high educational levels. (d) Because of the relatedness of the growth mindset and failure mindset constructs, the same is expected for failure mindset. (e) No interaction effect is expected for training participation and gender when predicting changes in growth mindset and (f) equally when predicting failure mindset. However, no hypothesis is formulated regarding the background variable first language due to a lack of evidence.

H3: Training participation leads to significant changes in parental learning-supportive behaviors relative to a

control group: (a) less control, and (b) greater autonomy support, after controlling for parents' gender, education level and first language (main effects). Furthermore, we examine interaction effects between training participation and background variables. Since parents with low educational levels are likely to respond more strongly to such training (Grolnick et al., 2021), we hypothesized that they would exhibit significantly more change, i.e., (c) less control and (d) more autonomy support, after the training. Finally, no interaction effects are hypothesized for gender or first language.

2. Methods

2.1 *The parent training*

Designing trainings to improve parental learning support can be grounded in conceptual change theory (Limón & Mason, 2002) and social-cognitive learning theory (Bandura, 1986). Conceptual change theory helps identify and challenge misconceptions—such as the belief that abilities are fixed—by creating cognitive conflict and encouraging reflection. This enables parents to adopt evidence-based, favorable beliefs and behaviors (e.g., Harackiewicz et al., 2012, who changed parental beliefs regarding the benefits of Science, Technology, Engineering, and Mathematics (STEM)). Social-cognitive learning theory emphasizes learning through observation, modeling, and reinforcement (Bandura, 1986).

The parental training in the present study incorporated video-based role modeling, featuring a mother who demonstrated both unsupportive and supportive behaviors with her child. Group discussions explored the impact of these behaviors on the child and the underlying parental beliefs. This helped parents better understand how the modeled behaviors in the video might be perceived from the child's perspective. In the plenary session, specific behaviors reflecting a growth mindset were identified and discussed (Muenks et al., 2024). The video model acted as scaffolding, supporting parents in translating favorable beliefs into practice—for example, through process-oriented feedback based on growth and failure mindsets (Andersen & Nielsen, 2016; Barger et al., 2022). Overall, the training combined short instructional segments emphasizing the value of effort and failure in learning (Tao et al., 2022), video analyses of various learning support scenarios, and discussions in small groups and plenary formats. Parents also received a handout summarizing key concepts and strategies.

The training session took place in the evening and lasted approximately 1.5 hours. Participation was voluntary but strongly encouraged. Parents received an invitation letter outlining the purpose and content of the session, signed by both the research team and the classroom teacher. The signature of the teacher may have created perceived pressure for parents to participate. However, since the invitation to the parent training was independent from the students' participation in the school-based intervention, this effect can be minimized. Two research team members conducted the sessions using a predetermined script. The classroom teacher was present but had no active role beyond opening and closing the session. The training was implemented in 11 different schools; in four cases (across two schools), classroom teachers opted to conduct the session jointly with a colleague. At the end of each session, parents completed an anonymous paper-and-pencil questionnaire assessing their understanding of the core messages, serving as a manipulation check (e.g., "Abilities can be further developed by practicing"; response options: right/wrong/I don't know). The vast majority of the parents answered the questions correctly.

2.2 *Context and procedure*

The hypotheses were tested with data from parents of primary school students whose class participated in an intervention study to foster Self-Regulated Learning (SRL) at school (Niederbacher & Villiger, 2025). The parent training served as additional component addressing learning support at home; however, its content was independent of the classroom-based intervention. Potential spill-over effects of the school-based intervention, and thus confounding effects, appear unlikely for several reasons. First, the school intervention focused on task-specific SRL strategies within a classroom-based reading activity, whereas the parent training addressed more general support and feedback strategies for learning at home, such as organizing study time, preparing for exams, and responding to grades. The two interventions therefore targeted different contexts and levels of self-regulation. Second, the school-based intervention did not produce significant effects on students' self-regulated learning (Schuler et al., 2024), making indirect effects on

parents' beliefs and support behavior unlikely.

The study included three conditions: A, B, and C (see below). To determine the required sample size for the study, we applied benchmark values suggested by Arend and Schäfer (2019). Assuming a power of ≥ 0.80 , the expected effects ($d = 0.68$) can be detected with about 30 classes, making 10–12 per condition (~ 720 students).

The study finally included 757 primary school students (40 classes, 5th grade: 66.3% and 6th grade: 33.7%) from two Swiss cantons (Canton Bern, Canton Fribourg). Teachers voluntarily signed up to participate with their class. Parents provided written consent for both their own and that of their children's participation (95.9% of the originally approached $N = 809$). Participation was voluntary, with participants having the right to withdraw from the study at any time without negative consequences.

Participants were randomly assigned to one of three groups: (A) students received school-based training in self-regulated learning, and their parents were invited to participate in parent training (13 classes, $N = 252$ student-parent dyads); (B) students received only the school-based training, while their parents received no parent training during the study period (14 classes, $N = 249$); or (C) neither students nor parents received a training during the study period (13 classes, $N = 256$). Students, parents and teachers completed questionnaires at two time points: at baseline (T1) in September 2021 and at posttest (T2) in May/June 2022.

2.3 Sample

Of the 252 parents invited to the parent training in Group A, 157 participated (62.3%) and 95 did not (37.7%). Due to COVID-19 restrictions, only one parent per child was invited to take part. The 95 non-participants from Group A were excluded from further analyses, as they had received written information about the training. Thus, the intervention group consisted of the 157 participating parents from Group A. Groups B and C did not receive parent training during the study period ($N = 505$). In the following, they are referred to as the control group with respect to the parent training (for sensitivity analyses comparing Group A with Group B only, see Section 3.5). Consequently, the final analytical sample comprised 662 parents, whose demographic characteristics are presented below.

The parents had a mean age of 43.32 (Standard Deviation (SD) = 5.6; $N = 599$, 9.5% missing). 73.7% identified as female, 18.3% male, with 8.0% missing. German or Swiss German was the first language for 70.0%, while 23.7% reported another first language (6.3% missing). Most parents were born in Switzerland (70.4%), with 23.1% born abroad (6.5% missing).

Educational levels were as follows: 0.9% had no formal qualification, 7.5% completed compulsory schooling, 33.7% vocational training or trade school, 2.9% a vocational baccalaureate and another 2.9% an academic baccalaureate. Higher professional education (e.g., federal certificate) was reported by 17.8% of parents, and 26.9% held a university or university of applied sciences degree. The proportion of highly educated participants in our sample is representative of the Swiss population. Education data were missing for 7.4% of parents.

2.4 Measurements

The parent questionnaire used a 4-point Likert scale (1 = “does not apply at all” to 4 = “applies exactly”). It measured parental beliefs and behaviors as follows (descriptive information for observed variables, see Table 1).

Parents rated their *growth mindset* with 6 items (e.g., “My child can improve their abilities”, Matthes & Stoeger, 2018; $\alpha_{T1/T2} = 0.63/0.61$). Parents' *failure mindset* was measured using 6 items (e.g., “Experiencing failure facilitates my child's learning and growth”, Stern & Hertel, 2020, based on Haimovitz & Dweck, 2016, $\alpha_{T1/T2} = 0.83/0.80$). To measure *controlling behavior* parents were asked to rate 4 items (e.g., “I check if my child is well-prepared for exams”, Helmke et al., 2004; $\alpha_{T1/T2} = 0.77/0.79$). *Autonomy support* was assessed with 4 items (e.g., “If my child has problems learning, I don't tell them what to do straight away, but help them to find a way”, Wild et al., 2009; $\alpha_{T1/T2} = 0.68/0.65$).

For further analysis, the belief and behavior variables were modelled as latent constructs. Measurement models were estimated separately for each construct at each measurement occasion. For the constructs *growth mindset* and *failure mindset*, residuals of revers-worded items were permitted to correlate. Overall, the measurement models showed acceptable to good fit (Hu & Bentler, 1999, section 2.5). The *growth mindset* models showed somewhat weaker fit in terms of Tucker-Lewis Index (TLI) at both measurement occasions. In addition, the Root Mean Square Error of Approximation (RMSEA) values for *growth mindset* and *failure mindset* at Time 2 were slightly above the criterion

for good fit, whereas the remaining fit indices were satisfactory (*growth mindset* T1: $N = 617$, $\chi^2(8) = 25.28$, Scaling Correction Factor (SCF) = 1.04, Comparative Fit Index (CFI) = 0.95, TLI = 0.91, RMSEA = 0.06, Root Mean Square Residual (SRMR) = 0.03; *growth mindset* T2: $N = 585$, $\chi^2(8) = 28.53$, SCF = 0.91, CFI = 0.95, TLI = 0.90, RMSEA = 0.07, SRMR = 0.03; *failure mindset* T1: $N = 611$, $\chi^2(6) = 12.96$, SCF = 1.27, CFI = 0.99, TLI = 0.98, RMSEA = 0.04, SRMR = 0.02; *failure mindset* T2: $N = 583$, $\chi^2(6) = 24.16$, SCF = 1.16, CFI = 0.98, TLI = 0.95, RMSEA = 0.07, SRMR = 0.03; *controlling behavior* T1: $N = 621$, $\chi^2(2) = 4.77$, SCF = 1.13, CFI = 1.00, TLI = 0.99, RMSEA = 0.05, SRMR = 0.01; *controlling behavior* T2: $N = 586$, $\chi^2(2) = 3.89$, SCF = 1.11, CFI = 1.00, TLI = 0.99, RMSEA = 0.04, SRMR = 0.01; *autonomy support* T1: $N = 622$, $\chi^2(2) = 0.79$, SCF = 1.37, CFI = 1.00, TLI = 1.00, RMSEA = 0.00, SRMR = 0.01; *autonomy support* T2: $N = 586$, $\chi^2(2) = 0.42$, SCF = 0.96, CFI = 1.00, TLI = 1.00, RMSEA = 0.00, SRMR = 0.01).

Table 1. Descriptive statistics for analyzed variables

	Analytical subsample ($N = 662$)			Intervention group ($n = 157$)			Control group ($n = 505$)		
	N	M	SD	n	M	SD	n	M	SD
Growth mindset T1	617	3.41	0.38	146	3.43	0.36	471	3.40	0.38
Growth mindset T2	585	3.39	0.40	143	3.45	0.40	442	3.37	0.39
Failure mindset T1	611	2.52	0.62	143	2.49	0.63	468	2.53	0.61
Failure mindset T2	583	2.59	0.61	143	2.67	0.62	440	2.56	0.61
Controlling behavior T1	621	2.90	0.68	147	2.95	0.68	474	2.88	0.67
Controlling behavior T2	586	2.72	0.69	143	2.72	0.70	443	2.72	0.69
Autonomy support T1	622	3.49	0.41	147	3.50	0.42	475	3.48	0.41
Autonomy support T2	586	3.52	0.39	143	3.50	0.41	443	3.53	0.39

Note: N = total number of participants, n = group-specific number of participants, M = Mean, SD = Standard Deviation

The control variables used in the analyses were measured as follows. Parents indicated their *gender* in the questionnaire, with female coded as 1 and male coded as 0. *First language* was assessed with the question “What is your mother tongue?” offering 11 predefined options plus an “other language” category. Responses were recoded into a binary variable: “German/Swiss German” (1) and other languages (0). The *educational level* was reported by selecting from seven predefined categories (according to the Swiss education system): (1) No formal education, (2) Compulsory education, (3) Vocational training or vocational education, (4) Vocational baccalaureate, (5) Baccalaureate, (6) Higher professional education (e.g., federal certificate) or (7) University or University of applied sciences. These responses were grouped into three categories: low (categories 1-3), medium (categories 4-6), and high educational level (category 7). Two dummy variables were created for the subsequent analyses (low and high educational levels, medium educational levels as the reference group). *Training participation* was coded as a binary variable (1 = intervention group, 0 = control group).

2.5 Statistical analyses

Descriptive statistics, chi-square tests (χ^2), and correlations were conducted using SPSS (Version 29). Latent mean group differences (z-tests with the control group as reference group), and regression analysis were carried out using Mplus 8 (Muthén & Muthén, 2017). Hypotheses with a directional assumption were tested using one-tailed significance levels. All other hypotheses were tested using two-tailed significance levels. Effect sizes for the main regression effects were calculated using Cohen’s f^2 , indicating each predictor’s incremental contribution to the explained variance in the dependent variable. Values of 0.02, 0.15, and 0.35 were interpreted as small, medium, and large effects, respectively

(Cohen, 1988; Selya et al., 2012).

The parental belief and behavior variables were modelled as latent constructs. The evaluation of confirmatory factor analyses was based on chi-square values (χ^2) and degrees of freedom (df), as well as the following fit indices: CFI values ≥ 0.95 , TLI values ≥ 0.95 , RMSEA values < 0.06 , SRMR values < 0.08 (Hu & Bentler, 1999). Measurement invariance of the latent constructs across time points and groups was tested using the Satorra-Bentler scaled chi-square difference test (Satorra & Bentler, 2010). To account for the hierarchical data structure, the “type = complex” option was employed. Missing data (ranging from 0% to 14.95% per variable) were addressed using Full Information Maximum Likelihood (FIML) (Graham, 2009), and the Maximum Likelihood with Robust standard errors (MLR) estimator was used, which is robust to violations of the normality assumption (Muthén & Satorra, 1995) (see Supplementary materials, section 1.1).

3. Results

3.1 Group comparisons regarding participation

First, within Group A, we compared parents who participated in the training ($n = 157$) with those who did not participate ($n = 95$) in terms of gender, educational level, and first language using chi-square tests. A significant gender difference was found ($\chi^2(1, n = 252) = 7.23, p < 0.01$), indicating that fathers were underrepresented (H1a supported). No significant differences were observed for educational levels (high educational level [dummy-coded]: ($\chi^2(1, n = 252) = 0.21, p > 0.05$; low educational level [dummy-coded]: ($\chi^2(1, n = 252) = 0.16, p > 0.05$) or first language ($\chi^2(1, n = 252) = 0.39, p > 0.05$), not supporting H1b. These findings suggest that parents with lower educational attainment and non-German first languages did not respond less frequently to the training invitation than their counterparts.

3.2 Correlations

Table 2. Intercorrelation matrix of the analyzed variables

		1	2	3	4	5	6	7	8	9	10	11	12
1	Growth mindset T1	1											
2	Failure mindset T1	0.26***	1										
3	Controlling behavior T1	-0.13**	0.00	1									
4	Autonomy support T1	0.19***	0.12**	0.30***	1								
5	Growth mindset T2	0.48***	0.10*	-0.10*	0.14***	1							
6	Failure mindset T2	0.13**	0.54***	0.06	0.04	0.32***	1						
7	Controlling behavior T2	-0.13**	0.02	0.69***	0.20***	-0.16***	0.04	1					
8	Autonomy support T2	0.16***	0.06	0.20***	0.40***	0.24***	0.11**	0.25***	1				
9	Gender ^a	0.00	-0.03	-0.05	0.02	0.01	-0.08	-0.06	0.00	1			
10	Low educational level ^b	-0.17***	0.08	0.22***	0.06	-0.17***	0.05	0.18***	0.01	0.11**	1		
11	High educational level ^c	0.21***	-0.11**	-0.22***	-0.01	0.19***	-0.03	-0.20***	0.03	-0.14***	-0.58***	1	
12	First language ^d	-0.01	-0.23***	-0.14***	-0.10*	0.05	-0.21***	-0.16***	-0.02	0.14**	-0.05	0.00	1
13	Training participation ^e	0.03	-0.03	0.05	0.02	0.09*	0.07	0.00	-0.04	-0.04	0.01	-0.01	-0.02

Note: $547 \leq n \leq 662$. a: 1 = female and 0 = male. b: 1 = low educational level and 0 = medium educational level. c: 1 = high educational level and 0 = medium educational level. d: 1 = German and 0 = other language. e: 1 = intervention group and 0 = control group. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ (two-tailed)

Table 2 displays the intercorrelations of the observed variables used in the analyses. Gender was not correlated with any of the belief and behavior variables at either T1 or T2. Lower education level was associated with a weaker growth mindset and higher controlling behavior but showed no significant correlation with failure mindset or autonomy support at both measurement points.

At T1, a high education level was linked to a stronger growth mindset, a more negative failure mindset, and lower controlling behavior, with no correlation to autonomy support. This pattern remained at T2, except the correlation between high education level and failure mindset was no longer significant.

At T1, having German as first language was associated with a more negative failure mindset, lower controlling behavior, and lower autonomy support, but not with growth mindset. This pattern persisted at T2, except the correlation with autonomy support was no longer significant. Training participation was positively correlated with a stronger growth mindset at T2.

3.3 Measurement invariance across time and groups, and comparisons between intervention and control group

The model fit was good for all latent variables (see Supplementary materials, section 1.2). Measurement invariance across time (T1 to T2) was supported for all constructs. Full scalar invariance was established for *growth mindset*. Partial scalar invariance was achieved for *failure mindset*, *controlling behavior*, and *autonomy support*, by freeing one item intercept per construct.

Group invariance was tested separately for each time point. At T1, full metric and scalar invariance were established for all constructs. At T2, full metric invariance and partial or full scalar invariance were observed (see Supplementary materials, section 1.2).

Baseline comparisons of latent means (z-tests) revealed no significant differences between the intervention group ($n = 157$) and control group ($n = 505$) for any construct at T1. Additionally, chi-square tests showed no significant group differences in relevant background variables (see Supplementary materials, section 1.2).

3.4 Regression analyses: Effects of the parent training and interaction effects

Hierarchical multiple regression analyses were conducted for each dependent variable. Model 1 included baseline scores and control variables (gender, educational levels, first language); Model 2 added training participation; Model 3 included interaction terms. All regression models demonstrated satisfactory to good fit indices (Bentler & Bonett, 1980; Hu & Bentler, 1999) (see Tables 3 and 4).

Growth mindset (Table 3): T1 and T2 scores were significantly associated. No control variables had a significant effect (Model 1). Training participation had a significant positive effect (Model 2), supporting H2a. This indicates that the training effectively promoted a more positive growth mindset when controlling for baseline and sociodemographic variables. The effect size for training participation was small (Cohen's $f^2 = 0.02$). No significant interaction effects were found (Model 3); thus, H2c and H2d were not supported. First language showed no moderating effect (no hypothesis specified).

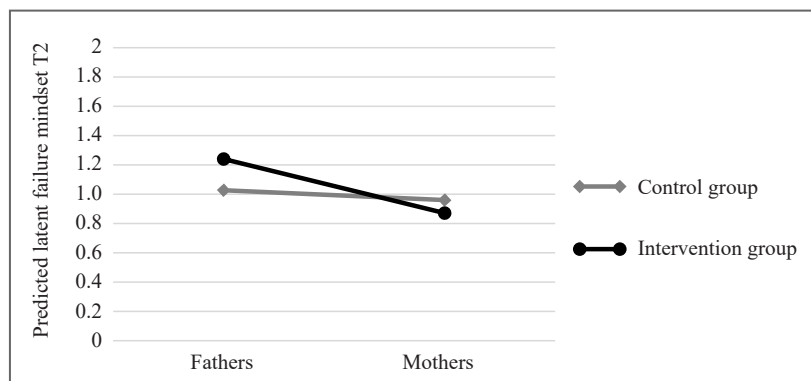
Failure mindset (Table 3): A strong association between T1 and T2 was again observed. In Model 1, gender, low education, and first language had significant effects. The training had no significant main effect (Model 2), thus not supporting H2b. However, Model 3 revealed significant interactions: Contrary to expectations, fathers reported a more positive failure mindset post-training than mothers did (H2f not supported; see Figure 1). In contrast, parents with lower educational level reported more favorable changes than those with medium education, supporting H2d (see Figure 2). No moderating effect was found for first language.

Controlling behavior (Table 4): A strong association between T1 and T2 scores was observed. None of the control variables were significant predictors (Model 1). Model 2 revealed a significant negative main effect of training participation, supporting H3a. This suggests that the training effectively reduced controlling behavior, even after accounting for parents' initial controlling behavior and sociodemographic factors. This effect was small (Cohen's $f^2 = 0.02$). In Model 3, no significant interaction effect with educational levels emerged, indicating that H3c was not supported. No interaction effects were found for gender or first language (no hypothesis had been formulated for these variables).

Table 3. Effects of parent training on parental beliefs and moderating effects

	Growth mindset T2			Failure mindset T2		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Growth mindset/ Failure mindset T1	0.61*** (0.06)	0.61*** (0.06)	0.61*** (0.06)	0.62*** (0.04)	0.62*** (0.04)	0.63*** (0.04)
Gender ^a	0.05 (0.05)	0.06 (0.05)	0.05 (0.06)	-0.10** (0.04)	-0.10** (0.04)	-0.05 (0.04)
Low educational level ^b	-0.06 (0.07)	-0.06 (0.06)	-0.04 (0.08)	0.10* (0.05)	0.10* (0.05)	0.06 (0.07)
High educational level ^c	0.07 (0.06)	0.07 (0.06)	0.07 (0.07)	0.07 (0.05)	0.07 (0.05)	0.05 (0.06)
First language ^d	-0.00 (0.05)	0.00 (0.05)	0.04 (0.06)	-0.10* (0.05)	-0.09* (0.05)	-0.09 (0.06)
Training participation ^e		0.09* (0.05)	0.18 (0.16)		0.04 (0.04)	0.15 (0.13)
Training participation ^e × Gender ^a			0.04 (0.10)			-0.20* (0.10)
Training participation ^e × Low educational level ^b			-0.04 (0.09)			0.10* (0.05)
Training participation ^e × High educational level ^c			0.02 (0.08)			0.02 (0.06)
Training participation ^e × First language ^d			-0.13 (0.12)			-0.02 (0.09)
<i>N</i>	600	600	600	599	599	599
<i>R</i> ²	38.0%	39.1%	39.6%	41.6%	41.9%	43.7%
χ^2 (<i>df</i>)	191.13 (97)	214.25 (108)	270.14 (152)	256.02 (98)	231.24 (87)	328.76 (142)
SCF	1.04	1.03	1.01	1.02	1.05	0.97
CFI	0.91	0.90	0.90	0.94	0.94	0.93
RMSEA	0.04	0.04	0.04	0.04	0.05	0.05
SRMR	0.07	0.07	0.07	0.07	0.07	0.07

Note: Standardized β -coefficients; standard errors in parentheses. *N* = number of participants. *R*² = explained variance. χ^2 (*df*) = Chi-square value (Degrees of Freedom). SCF = Scaling Correction Factor. a: 1 = female and 0 = male. b: 1 = low educational level and 0 = medium educational level. c: 1 = high educational level and 0 = medium educational level. d: 1 = German and 0 = other language. e: 1 = intervention group and 0 = control group. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ (one-tailed)

**Figure 1.** Interaction effect between training participation and gender on failure mindset T2

Note: Intervention group = parents who participated in the training. The y-axis represents model-implied predicted values of the latent outcome at T2

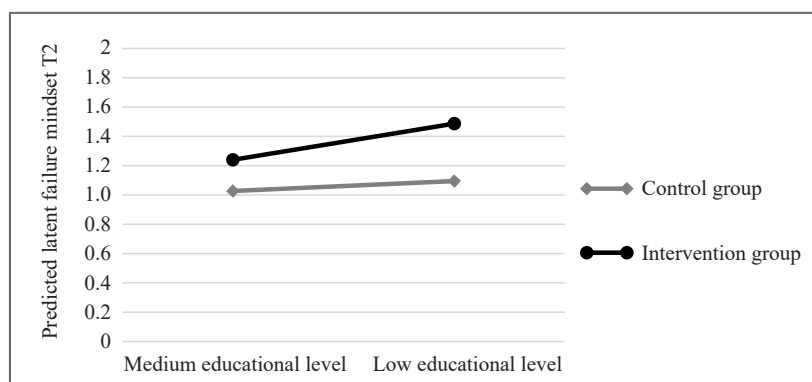


Figure 2. Interaction effect between training participation and educational level on failure mindset T2

Note: Intervention group = parents who participated in the training. The y-axis represents model-implied predicted values of the latent outcome at T2

Table 4. Effects of parent training on parental behavior and moderating effects

	Controlling behavior T2			Autonomy support T2		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Controlling behavior/ Autonomy support T1	0.75*** (0.04)	0.75*** (0.04)	0.75*** (0.04)	0.50*** (0.06)	0.50*** (0.06)	0.49*** (0.06)
Gender ^a	-0.03 (0.06)	-0.04 (0.06)	-0.03 (0.06)	0.01 (0.05)	0.01 (0.06)	-0.01 (0.06)
Low educational level ^b	-0.01 (0.05)	-0.01 (0.05)	-0.04 (0.06)	0.02 (0.06)	0.02 (0.06)	0.08 (0.07)
High educational level ^c	-0.06 (0.05)	-0.06 (0.05)	-0.09 (0.06)	0.05 (0.06)	0.05 (0.06)	0.05 (0.08)
First language ^d	-0.05 (0.04)	-0.05 (0.03)	-0.08* (0.04)	0.04 (0.07)	0.03 (0.03)	0.02 (0.07)
Training participation ^e		-0.07* (0.03)	-0.20 (0.19)		-0.04 (0.06)	-0.05 (0.20)
Training participation ^e × Gender ^a			-0.04 (0.15)			0.07 (0.12)
Training participation ^e × Low educational level ^b			0.08 (0.06)			-0.15* (0.08)
Training participation ^e × High educational level ^c			0.05 (0.05)			0.01 (0.07)
Training participation ^e × First language ^d			0.11 (0.06)			0.05 (0.12)
<i>N</i>	600	600	600	600	600	600
<i>R</i> ²	56.8%	57.5%	58.2%	25.0%	25.2%	26.0%
χ^2 (<i>df</i>)	132.19 (47)	140.38 (54)	160.55 (82)	39.42 (47)	58.29 (54)	96.21 (82)
SCF	1.09	1.07	1.06	1.11	1.07	1.04
CFI	0.94	0.95	0.95	1.00	0.99	0.98
RMSEA	0.06	0.05	0.04	0.00	0.01	0.02
SRMR	0.08	0.08	0.08	0.04	0.04	0.04

Note: Standardized β -coefficients; standard errors in parentheses. *N* = number of participants. *R*² = explained variance. χ^2 (*df*) = Chi-Square Value (Degrees of Freedom). SCF = Scaling Correction Factor. a: 1 = female and 0 = male. b: 1 = low educational level and 0 = medium educational level. c: 1 = high educational level and 0 = medium educational level. d: 1 = German and 0 = other language. e: 1 = intervention group and 0 = control group. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ (one-tailed)

Autonomy support (Table 4): T1 and T2 scores were significantly associated. None of the control variables had a significant effect (Model 1). The main effect of training was not significant in Model 2, providing no support for H3b. However, Model 3 revealed a significant negative interaction between training participation and low educational level, contradicting H3d. Parents with lower educational levels reported less autonomy support post-training compared to parents with medium educational levels (Figure 3). No significant interaction effects were found for gender or first language, for which no specific hypotheses had been specified.

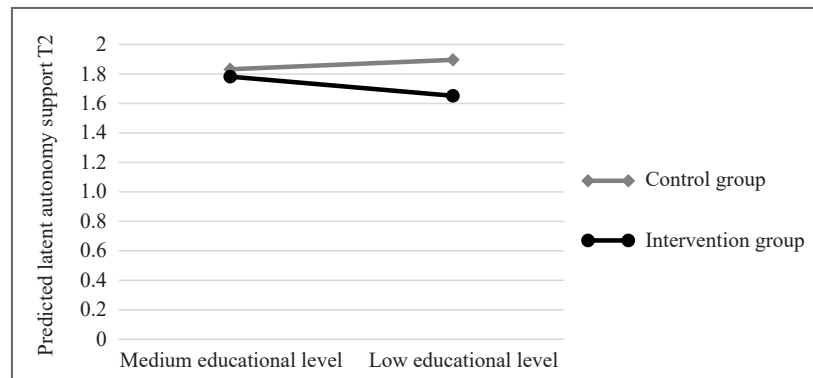


Figure 3. Interaction effect between training participation and educational level on autonomy support T2

Note: Intervention group = parents who participated in the training. The y-axis represents model-implied predicted values of the latent outcome at T2

3.5 Sensitivity analysis: Main training effects comparing groups A and B

The main analyses compared parents in the parent-training condition (Group A) with those in the no-parent-training control condition (Groups B and C). To assess potential spill-over effects of the school-based SRL intervention, sensitivity analyses compared Group A with Group B only (excluding Group C), using the same specification as Model 2.

The pattern of main training effects was only partly consistent with the primary analyses. The positive effect of parent training on growth mindset was no longer significant ($\beta = 0.04$, $SE = 0.07$, $p > 0.05$). In contrast, the negative effect of parent training on controlling behavior remained significant ($\beta = -0.12$, $SE = 0.05$, $p < 0.01$), with parents in the training group reporting lower controlling behavior at T2. As in the primary analyses, no significant main effects of parent training were found for failure mindset ($\beta = 0.06$, $SE = 0.06$, $p > 0.05$), or autonomy support ($\beta = 0.01$, $SE = 0.07$, $p > 0.05$).

4. Discussion

Supporting children's learning is one of the most common forms of home-based parent involvement, yet many parents experience it as challenging due to conflicts and pressure. Parent trainings may help address these challenges but are rarely implemented in practice. This study provides evidence for the implementation and effectiveness of a brief parent training designed to foster learning-supportive beliefs and behaviors. To our knowledge, it is the first study to demonstrate sustained changes in both beliefs and self-reported behaviors following a short-term parent training over a seven-month follow-up period.

4.1 Inclusive parental participation

Training participation was largely inclusive across sociodemographic groups: Parents with low educational levels and non-German first languages participated at comparable rates to their counterparts. This suggests that the invitation strategy effectively mitigated common access barriers—a frequent challenge in family-focused interventions. It also implies that structural inequalities did not manifest in participation, which is an encouraging finding for educational

equity. The successful engagement of all parents—regardless of background—can likely be attributed to several factors. The training was integrated into existing parent-teacher collaboration structures, lending it a semi-obligatory character, reinforced by the teacher’s signature on the invitation letter. Parents had already consented to attend the parent training when agreeing to participate in the study. This helped establish a sense of commitment, which is generally valued in parent-teacher collaboration. Additionally, the 1.5-hour evening session required minimal time commitment, making attendance easier. However, the gender effect suggests that, compared to mothers, fathers who completed the questionnaire were less likely to invest additional time in the parent training. This finding may indicate that fathers are less likely to participate in school-related activities, although the reasons for this difference remain unclear.

4.2 Lasting impact: Outcomes of the parent training after seven months

One of the central findings is the significant increase in growth mindset and reduction in self-reported controlling behavior among the training participants relative to the control group—regardless of structural characteristics such as gender, educational level, or first language. The sensitivity analyses suggest that the training effect on controlling behavior was robust, whereas the effect on growth mindset warrants greater caution. Spillover effects from the school-based intervention appear unlikely because it had a different focus and produced no significant effects (Schuler et al., 2024). The nonsignificant effect on growth mindset may instead be due to the reduced sample size and lower statistical power. Nevertheless, this finding should be re-examined in future studies.

The observed effects are particularly noteworthy given the long period of seven months between training and measurement. Although the effect sizes for growth mindset and controlling behavior were small, even modest effects may be practically meaningful in the context of a brief 1.5-hour parent training. The combination of short videos and group discussions, which took place in naturalistic settings, likely had a lasting, formative impact. This interactive environment was presumably more sustainable than a laboratory setting.

However, no main effects were reached for failure mindset nor autonomy support. Genuine autonomy support is complex and likely requires more extensive training than the brief intervention allowed. In contrast, reducing controlling behavior is more straightforward, as shown in previous studies. Nevertheless, parents with medium education levels reported greater autonomy support after the training than less educated parents. It may suggest that less educated parents had greater difficulty understanding the concept of autonomy support and how to translate it into supportive behavior. Moreover, given its brief format, the training offered limited opportunity to develop and practice the nuanced skills required for autonomy-supportive parenting. Parents with lower educational levels may have interpreted the autonomy support items primarily as referring to proactive involvement. In response to the training’s emphasis on avoiding excessive involvement, they may therefore have reported lower autonomy support at posttest. These differential effects are important for the design of training programs targeting this group. Autonomy support may be more difficult to convey and implement than reductions in controlling behavior, particularly among parents with lower educational levels. Future parent trainings should therefore clearly distinguish directive assistance from autonomy support. As Su and Reeve (2011) argue, autonomy-supportive parenting involves not only reducing control but also developing concrete autonomy-supportive strategies and distinguishing supportive involvement from both non-involvement and control.

Understanding the items measuring a failure mindset—defined here as viewing failure as a learning opportunity independent of a specific learning context—may not have been straightforward, as reflected in the low scores at both T1 and T2. Moreover, changes in failure mindset were associated with gender, educational level, and first language, independent of training participation. Specifically, fathers and parents with lower educational levels showed greater increases in failure mindset than mothers and parents with medium educational levels. The reasons for these differences remain unclear. One possible explanation is that parents with lower educational levels perceived this perspective as relatively novel and were therefore more receptive to it, although this interpretation requires further empirical investigation.

4.3 Designing parent trainings: Relevant conditions and components

To attribute effects to specific training elements, a comparison of different conditions would be needed—which this study does not provide. Thus, the reasons for its success remain speculative. Nevertheless, some aspects can be considered significant, for example the interactive setting. The comparison with MacDonald et al. (2024) is relevant,

as their study also aimed to promote beliefs and behavior, though without success at the behavioral level. Unlike that laboratory-based study, where parents participated individually, our on-site training incorporated social interaction and opportunities to share experiences. The opportunity for peer exchange likely has a more effective and lasting impact on parents' awareness of their own beliefs and behaviors—especially from a Conceptual Change Theory perspective. This approach of deeper processing through reflection and dialogue may help explain why both attitudes and behaviors could be sustainably changed. However, given the absence of main effects in autonomy support and failure mindset, it is clear that a brief training should focus on a limited amount of content.

The study showed that expert-led training can be effective, likely due to the perceived competence of academically qualified trainers. However, this approach is not scalable for broader implementation. Instead, strategies are needed to disseminate training via educational professionals in schools or teacher professional development. Whether the effects can be sustained under these conditions remains to be examined.

4.4 Limitations

One limitation of this study is its reliance on parent self-reports which may affect the accuracy and validity of the findings. Responses may be influenced by people's desire to present themselves in a favorable light (social desirability bias) or by a tendency to agree with statements regardless of their content (response bias). Thus, the effects found in our study could be partly due to such biases. Parents may have reported beliefs and behaviors that aligned with the training's expectations, such as lower controlling behavior, which could result in an overestimation of the training's effects. However, the seven-month interval between training and measurement may support the robustness of the effects despite the reliance on self-reports. It can be assumed that a measurement performed closer to the training would have yielded even stronger effects, as participants might have remembered the training content more clearly. Nevertheless, in future studies, behaviors which are easily observable by others could be complemented—and thereby validated—by data collected from the child's perspective to provide a more comprehensive assessment of changes in parental behavior.

A further limitation is the relatively low internal consistency of the growth mindset and autonomy support scales. Although their reliability estimates were slightly below the conventional threshold of 0.70, latent variable modeling partly mitigates this limitation by explicitly modeling measurement error rather than treating observed scores as error-free. Nevertheless, future research should improve the reliability of these measures to increase the robustness of the findings.

Furthermore, the study used a purely quantitative design without exploring process mechanisms underlying changes in parental beliefs and behaviors. Qualitative data, such as semi-structured interviews or focus group discussions, could provide further insight into the quantitative results.

Another limitation of the study is the confounding of two program components. Children of parents who participated in the training simultaneously received a school-based intervention on self-regulated learning. Although the content did not overlap with the parent training and the intervention had no effects on students' SRL, spill-over effects cannot be entirely ruled out. The sensitivity analysis was conducted to address this limitation and confirmed the effect on parents' controlling behavior, but not on growth mindset. However, because parents had no detailed knowledge of the school-based intervention spillover effects of the school-based intervention on parents' beliefs appear highly unlikely.

This study focused on the effects of the training on parents. Ultimately, however, the goal of parent training is to bring about changes in the child (e.g., academic performance), with parents serving merely as mediators. It therefore remains unclear whether the implemented training can also have an impact on the child level beyond the effects identified (MacDonald et al., 2024). Future research could examine whether parents of low-performing children—or those with other specific traits—benefit more. Additionally, the sustainability of training effects should be examined through follow-up assessments extending beyond seven months after the training.

In this randomized controlled trial, the training followed a 'one-size-fits-all' approach, which meant that prior knowledge—a core factor in any educational context—and other characteristics could not be considered. The identified interaction effects indicate that parents respond differently to the training in some respects. Future studies could examine whether a more tailored format—combining brief introductory training with optional in-depth modules on topics like autonomy support, attitudes toward failure, or child characteristics—better meets diverse needs and yields stronger effects.

Because the study was conducted in two German-speaking Swiss cantons, the findings may not generalize to other

cultural contexts or educational systems. Future studies should examine whether these effects can be replicated across countries, in more culturally diverse populations, and among fathers.

4.5 Implications for policy, practice and research in an international context

The findings of this study point to several important implications for policy and practice beyond the immediate cultural context. First, they highlight the potential of very short, low-threshold interventions to modify both parental beliefs and self-reported behaviors: a single 1.5-hour session was sufficient to foster a more adaptive growth mindset and reduce controlling learning support several months later in all participants. This suggests that schools and policymakers worldwide can meaningfully strengthen home-based learning support without extensive, resource-intensive programs, for example by embedding brief, evidence-informed parent workshops into parent-teacher evenings, or community-based services. At the same time, the pattern of interaction effects underscores the need to tailor interventions to specific subgroups. Practitioners should therefore design trainings that explicitly address potential unintended consequences, for instance, by clearly differentiating between active involvement and controlling behavior, and by providing concrete, culturally and educationally sensitive examples of autonomy-supportive strategies. Tailoring may include adapted materials for parents with lower formal education, and specific outreach and framing to engage fathers. Finally, future research in diverse educational systems should examine how such short interventions can be culturally adapted, which design features are most effective for different parent groups, and how changes in parental beliefs and behaviors translate into long-term gains in students' motivation and achievement.

5. Conclusions

Parental learning support is a highly relevant topic due to its ongoing impact on children's learning and achievement. Yet, its importance remains largely overlooked in social education research and practice. This study shows that parent trainings can be promising tools for promoting supportive parenting styles and ultimately fostering children's academic adjustment, autonomy, and self-regulated learning. The potential of parent trainings should be further explored, particularly in terms of promoting equal opportunities by mitigating the effects of social background. Research should focus on how such programs can be made effective for a broad range of parents, which specific needs must be addressed, and what organizational factors support widespread participation.

Given the crucial role parents play in learning support, this topic deserves greater attention from teachers and policymakers. This begins with recognizing parents as relevant partners in education due to their influence in motivating and structuring their children's learning. Where necessary, teachers should be provided with the resources and support needed to foster effective collaboration with parents. However, sustained changes in beliefs and behaviors require long-term effort. Achieving lasting impact calls for learning-supportive school cultures that reflect shared values and practices among educators—teachers who serve as role models and promote positive attitudes and constructive behaviors in their collaboration with parents.

Supplementary information

Supplementary materials associated with this article are available online and can be accessed via the journal website: <https://ojs.wiserpub.com/index.php/SER/article/view/9925>.

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Ethical considerations

Ethical standards (Morgans & Allen, 2005) were considered throughout the project. The study protocol was reviewed and approved by the Ethics Committee of the University of Teacher Education Bern (reference no. 20w 0009 04). The University of Teacher Education Bern served as the coordinating institution and was responsible for overall ethical oversight of the study, including implementation of the approved study procedures, informed consent, and data management. The participating schools did not conduct separate ethical reviews but implemented the study under the approved protocol and with permission from the relevant educational authorities.

Written informed consent was obtained from participating parents before their involvement in the study. The information provided with the consent form explained the aims of the project, the study procedures, and the planned data collection, and explicitly stated that participation was voluntary and that participants could withdraw from the study at any time without negative consequences. Consent forms were distributed and collected by the participating teachers and subsequently forwarded to the research team. To safeguard voluntariness, teachers were instructed not to exert pressure on parents to participate and not to impose any negative consequences on parents or their children if they chose not to participate.

The invitation letters for the parent training were distributed only after parents had already provided written consent to participate in the study. Thus, the teacher-signed invitation to the training did not constitute the initial request for consent to study participation. Participation in the training remained voluntary, and parents were free to decline without negative consequences. During implementation, project staff were available to answer questions and provide further information. After completion of the study, the main findings were shared with teachers and parents through three plain-language newsletters. For reasons of fairness, parents in Groups B and C were offered the parent training after completion of the study.

To protect participants' privacy, each participant was assigned a unique study identification code. Directly identifying information was stored separately from the research data. The analytical dataset therefore contained no direct personal identifiers. Electronic data were stored on a secure Swiss cloud storage service for the Swiss education and research community, with access restricted to authorized research team members. The study results were reported only in aggregated form, to avoid the possibility of identifying individual participants or schools. Data will be retained for ten years in accordance with institutional requirements and subsequently deleted.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation of this work the author(s) used ChatGPT-4 and DeepL Write to improve language and readability of the manuscript. After using these tools, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the manuscript.

Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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