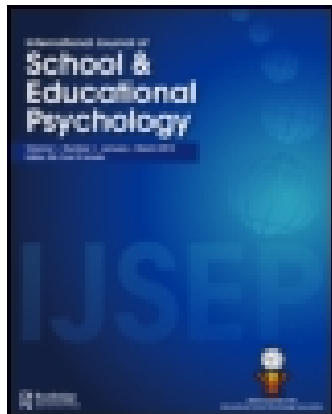


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School-Wide Positive Behavior Support—Norway: Impacts on Problem Behavior and Classroom Climate

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Results from the first study of the three-level School-Wide Positive Behavior Support model in Europe (SWPBS, called N-PALS) are presented. Using a strengthened nonrandomized design, data was collected from more than 1,200 teachers and 7,640 students at four measure points over four school years in 28 Norwegian intervention schools and 20 controls. Multilevel analyses revealed significant positive main and differential intervention effects on student problem behavior and classroom learning climate. Moreover, the number of segregated students decreased in the intervention group, while it increased in the control group. Implementation quality moderated the outcomes. Study results, limitations, and future directions are discussed.

Keywords: Positive behavior intervention support, program evaluation, prevention, behavior problems, inclusion, implementation quality, multilevel analysis

In Norway as in several other countries, school problem behavior is among the unmet challenges, including serious conduct problems, norm- and rule-breaking behavior, and less serious indicators of disruptive behavior. The prevalence of problem behavior among students is an indicator of schools that fail, and is correlated with truancy, bullying, reduced learning engagement, and low achievement (Algozzine, Daunic, & Smith, 2010). During the last 10–15 years, student reports from the annual National Student Survey and international surveys indicate more school problem behavior in Norway than in most other countries (e.g., Kjærnsli & Olsen, 2013). A study of student problem behavior in primary school (Grades 1–7) demonstrated that the prevalence of teacher-reported problem behavior within the classroom context had been stable over a decade, from 1998 to 2008 (Sørliie & Ogden, 2014a). The study also documented an increase in problem behavior outside the classrooms, including verbal and physical conflicts among students, lack of concern for others, and running in the corridors.

Student problem behavior has been a concern for Norwegian teachers and school leaders and has led to an increased demand for intervention strategies that may

prevent problem behavior and promote positive behavior. One promising model is the multilevel School-Wide Positive Behavior Support Model (SWPBS; Sprague & Walker, 2005), which has been adapted to Norwegian primary schools by Anne Arnesen and Wilhelm Meek-Hansen under the acronym N-PALS (Ogden, Sørliie, Arnesen, & Meek-Hansen, 2012). The N-PALS has shown promising outcomes after two years in the first four schools that implemented this model in Norway (Ogden, Sørliie, & Hagen, 2007; Sørliie & Ogden, 2007). The present article examines the impacts of N-PALS after three years of implementation in a strengthened nonrandomized experiment with 28 intervention schools and 20 “regular practice” schools serving as controls. To our knowledge, this is the first study that investigates the cumulative effects of all three levels or tiers of the SWPBS model, and also the first effectiveness study of SWPBS conducted in Europe and in a non-English-speaking country.

THE NORWEGIAN SCHOOL SYSTEM

Norway has a population of 5.1 million people (15% immigrants) and a school system that is mandatory for all children aged 6 to 16. It is founded on the principles of equity, inclusion, and adapted education for all, based on a single national curriculum. The unified compulsory school system indicates that all children have an unconditional

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legal right to 13 years of free schooling; primary education (Grades 1–10) is the responsibility of the 436 Norwegian municipalities. Schooling and social and health services are mostly public and free of charge. Students who do not obtain satisfactory learning outcomes from regular teaching are, according to the Education Act (section 5–1), entitled to special needs education. The right is, however, conditional on an expert assessment from the local Educational and Psychological Counseling Service, and the assessment is used to make an individual decision on the need for special educational assistance or special education. The Educational and Psychological Counseling Service is a public service agency that provides expert assessment, advice, and guidance to schools, municipalities, and county authorities on the establishment of measures, individual subject curriculums, and other initiatives for children and adolescents with special education needs.

Inclusive Education

There is a broad political consensus on the idea of inclusive education in Norway, which implies that placements in special schools and groups should be limited or avoided. There are no empirical studies that have examined how successful the strategy of mainstreaming students in Norway has been, but there are indications that some groups of marginal students, particularly those who have externalizing behavior problems, have proven difficult to include. In the period from 2007 to 2011, more than 5,000 students in compulsory school (most with behavior problems), received most of their education outside ordinary classes, that is, in segregated settings (Jahnsen, Nergaard, & Grini, 2011). Secondary students with problem behavior are most at risk for being pulled out of class, but even if fewer primary students are pulled out of class, it is important to verify how many students are fully or partly educated in separate groups or classes due to problem behavior.

In an effort to better adapt the mainstream education to fit all students, and to reduce the level of student problem behavior, implementation of a culturally adjusted version of the SWPBS model was initiated by The Norwegian Center for Child Behavioral Development in 2002. The N-PALS model has currently been implemented in 215 Norwegian primary schools (7.4%). The present article examines the impacts of N-PALS after three years of implementation in a strengthened nonrandomized experiment with 28 intervention schools and 20 regular-practice schools serving as controls.

THEORY OF CHANGE

The N-PALS model draws from social interaction learning theory and coercion theory (Patterson, 1982), and social ecological theory (Bronfenbrenner, 1979). Additionally, the

model builds on theoretical principles of functional behavior analysis and applied behavior modification in school (e.g., Greer, 2002). The theory of change underlying the prevention model emphasizes a social-environmental approach suggesting that schools, as a major context of social development, may influence the students' behavior, both positively and negatively. One of the key elements is that the students' social behavior is directly influenced by how teachers and other members of staff collectively model behavior, how they express positive expectations, how they teach and enforce discipline, and how they support social skills. The model emphasizes various forms of positive behavior support in which the school staff teaches rules, and praises and acknowledges rule-governed and prosocial behavior. Another key element is a school-wide approach in which there is consistency in the communication of common expectations and rules both within the school and across family and school (Horner, Sugai, & Anderson, 2010). In line with recent research findings, school-wide interventions are expected to influence all staff and all students more effectively than those that address only a limited group of teachers or classes (e.g., Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Sklad, Diekstra, deRitter, Ben, & Gravesteyn, 2012). Although the majority of students seldom misbehave, they are entitled to positive behavior support, good social and academic teaching, and classroom management. But some students are in need of additional support in order to adapt to the student role (e.g., students with language problems, learning problems, and conduct problems). Consequently, the N-PALS model is organized as a multilevel intervention model in which components are carefully matched to the students' needs and level of functioning.

Another key element of the theory of change refers to the importance of implementing the model in accordance with the developers' and implementers' description. The core components are described in a handbook, but also adapted to the local context in each school. Each school engages in a self-assessment procedure in which its administration decides which interventions should be prioritized at the universal, the selected, and the indicated level. Usually, the school may choose among several options at each level, and the staff has to decide which interventions should be prioritized and the order of intervention implementation. High implementation quality has repeatedly been found to predict positive outcomes across settings and programs (Fixsen, Naoom, Blasé, Friedman, & Wallace, 2005). A review of six meta-analyses including 542 interventions indicated that the largest effects are gained when programs are implemented as intended (Sørli, Ogden, Solholm, & Olseth, 2010). Similarly do school-based evaluation studies, including prior studies of SWPBS (e.g., Dix, Slee, Lawson, & Keeves, 2012), show larger effects in schools with high fidelity scores. Consequently, a distinction is made between the core components of the N-PALS model and the structure

of transfer. The structure of transfer describes the procedure for the implementation and monitoring of the model.

RESEARCH ON THE SWPBS MODEL

Most evaluations of SWPBS have focused on the universal tier only, with promising outcomes after one to three years, although mostly in single case studies or in small-scale quasi-experiments with few schools (e.g., Arnold, 2013). Only three randomized controlled trials examining intervention effects (Bradshaw, Mitchell, & Leaf, 2010; Bradshaw, Pas, Goldweber, Rosenberg, & Leaf, 2012; Bradshaw, Waasdorp, & Leaf, 2012; Horner et al., 2009; Waasdorp, Bradshaw, & Leaf, 2012) and a few larger-scale quasi-experiments (e.g., Martin & Filce, 2013) have been conducted. Except for two small-scale studies, one evaluating the social and academic effects of SWPBS in a Canadian school district (McIntosh, Bennett, & Price, 2011) and the other investigating psychosocial factors that are important determinants of academic success in Australia (Yeung, Mooney, Barker, & Dobia, 2009), all previous studies of the SWPBS have been conducted in the United States. Overall, the findings indicate several benefits following the implementation of SWPBS: (a) reduced problem behaviors at school or at the individual level such as office discipline referrals, suspensions, tardiness, aggression, and concentration problems (e.g., Bradshaw et al., 2010, 2012; McIntosh, Bennett, & Price, 2011); (b) increased prosocial behavior and emotion regulation (e.g., Bradshaw et al., 2012); and (c) improved school climate, as indicated by positive teacher-student relations, student relations, and increased school safety (e.g., Backenson, 2012). There has been limited research on the separate and combined effects of the three tiers, and the results have been equivocal (Humphrey, Lendrum, Barlow, Wigelsworth, & Squire, 2013). But some small-scale studies have demonstrated promising outcomes of selected level interventions (e.g., Hawken, MacLeod, & Rawlings, 2007) or indicated level interventions (e.g., Iovannone et al., 2009). The effects of SWPBS on student behavior as rated by teachers seem to be modest ($d = .08-.17$) as reported by Bradshaw and colleagues (2012) in their randomized controlled trial and by Solomon, Klein, Hinze, Cressey, and Peller (2012) in their meta-analysis of single case studies.

Implementation Studies

Prior studies of SWPBS have repeatedly found that high implementation quality predicts positive outcomes (e.g., Dix et al., 2012) including the N-PALS pilot study (Sørli & Ogen, 2007). Moreover, increased teacher self-efficacy and reductions in teacher burnout were found in a study of high-implementation schools (Ross, Romer, & Horner, 2012).

One study demonstrated that withdrawal of external implementation support reduced the schools' implementation quality scores and increased the number of office discipline referrals (ODRs) (Jolivet et al., 2014). Other studies examined factors that successfully influenced initial and sustained implementation quality (McIntosh et al., 2011; McIntosh, Predy, Upreti, Hume, & Mathews, 2014). McIntosh et al. (2011) found that among the nine participating schools in their study, schools that had implemented SWPBS with higher fidelity showed higher levels of academic achievement and had higher student ratings of school safety (although safety was measured with only one item).

Reviews

Horner et al. (2010) concluded their review of research that the SWPBS model could be classified as evidence-based due to sufficient experimental support. Using a more sophisticated approach, Chitiyo, May, and Chitiyo (2012) reviewed most of the same research, but came to a different conclusion. They were critical to studies using only one outcome variable, mostly ODR, and found that only two of 10 experimental studies published in 34 articles had satisfactory implementation quality. They recommended more studies with rigorous research designs, measures of implementation integrity, and the use of more valid and reliable student outcome measures.

As noted, there are limitations to the outcome research on the SWPBS model. First, most of the studies only evaluate one of the three levels of intervention, while the possible impact of the other two is not examined. Second, several prior studies do not have an adequate design to make valid conclusions about effects. Third, statistical approaches have mostly ignored nesting of data, and several authors have questioned the validity of ODR as an outcome variable (e.g., Chitiyo et al., 2012). Accordingly, these limitations were taken into account in the design of the current study.

STUDY AIMS AND RESEARCH QUESTIONS

The primary purpose of the present study was to examine the effectiveness of the full three-tiered N-PALS model on student problem behavior and on the learning climate in class. A second aim was to investigate whether the quality of implementation had moderating effects on the outcomes. The research questions were: (a) Do schools that implement the three-level N-PALS model demonstrate lower prevalence of teacher- or staff-rated student problem behavior inside and outside the classroom over time and a more positive learning climate in class (as rated by staff and students) than comparison schools?; and (b) Are the intervention outcomes moderated by implementation quality?

METHOD

A strengthened nonrandomized experimental design was used in the study due to the fact that most of the schools initially invited to participate were not willing to accept randomization. A nonequivalent comparison group design (NEC) was considered to best serve the purpose of the study. The validity of outcomes in nonrandomized studies is, however, disputed due to several potential validity threats—especially validity threats stemming from selection bias (e.g., Shadish, Cook, & Campbell, 2002). Several elements were thus added to the design to reduce potential threats to the internal validity (Sørliie & Ogden, 2014b). Measures were taken to secure sufficient statistical power to detect intervention effects in the small to moderate range, and schools were randomly invited according to predefined inclusion and exclusion criteria. Moreover, a stratification and matching procedure was applied, as were active rather than passive controls, use of relevant and reliable measures, and multiple informant groups at multiple measure points. Additionally, an open cohort design was applied, in which new staff members and new fourth graders could be enrolled at each measure point. Due to lack of resources, students who moved or left the participating schools by the end of seventh grade were not followed.

Questionnaire data were collected from staff members (principals, teachers, assistants, special education teachers, after-school personnel) and students in Grades 4 to 7 (9–12 years) at four measurement points each (T1–T4) across four successive school years in the 28 participating N-PALS schools and the 20 comparison schools doing regular practice. The study had a double baseline with T1 (staff ratings only) at the end of the school year 2006–2007, and T2 (T1 for students) six months later, at the beginning of a new school year and close to the initiation of the intervention. T3 (T2 for students) was conducted after one year of implementation, while posttest (T4) was conducted after three years of implementation. The students also contributed at a second intermediate measure point after two years of implementation. The outcome evaluation was conducted after one and three years of experience with N-PALS (2010–2011).

Participants

School and student characteristics

Baseline descriptives are shown in Table 1. Participants in the current study were 48 Norwegian primary schools (Grades 1–7) with a total number of 13,570 students in first to seventh grade at baseline (N-PALS = 7,964, control = 5,606), of whom 51% were boys and about 6% had ethnic minority background. The mean school size was 282 students (var. 77–525), and the student-teacher ratio per class was 1.7. The number of schools invited to

participate in the study was matched to the national proportion of small (10%), medium (25%), and large (65%) schools in Norway. Twelve of the schools were considered small (less than 200 students), while 24 were of medium size (201–350 students) and 12 (351–780 students) of large size. No initial group differences were detected between the intervention and comparison schools, except for reading performance (test scores in fifth grade), where the N-PALS group scored lower than the comparison group, $F(1,47) = 4.81$, $p = .03$. The participating schools did not differ from the national average on standardized test performance scores nor on student ratings of the learning environment from the annually conducted National Student Survey (Statistics Norway, 2009).

Throughout the study, only students in fourth to seventh grades with parental consent were invited as respondents. The students were evenly distributed across class levels with 24.8% in fourth grade, 25.1% in fifth grade, 25.5% in sixth grade, and 24.6% in seventh grade. Fifty-one percent were boys and 60% were students from intervention schools.

Staff characteristics

At T1 the total staff amounted to 1,064 in the intervention schools and 750 in the comparison schools (Table 1). Of these, 64% were employed as teachers, 16.5% were teacher assistants, and 22% were after-school personnel. About 56% of the staff had teacher training, 12% had additional special education training (minimum one year), while 4% had no formal training. About 80% were females and older than 35 years. No group differences were found in the staff characteristics at baseline. Only staff members who were in daily and direct contact with a group of students were invited to participate as respondents. Therefore, the actual study sample counted 1,266 persons at baseline, of which 1,211 (96%) contributed to the study.

In total, significant group differences were found on only one of 29 school, staff, and student group variables. Differences on three (10%) could be expected due to the many analyses conducted. Thus, even if potential differences on unobserved variables cannot be ruled out due to the nonrandomized design, the analyses indicated that the groups were initially comparable on the variables assessed in this study and allowed for meaningful between-group comparisons of change across time.

Procedures

The schools were recruited from 17 municipalities located in the southern and western parts of Norway. In order to match the comparison group with the intervention group on key characteristics, all primary schools in the municipalities were stratified and matched on school size (> 100 students) and geographical location (Figure 1) prior to invitation. Schools whose home page reported (validated by phone or

TABLE 1
Baseline Descriptives ($n = 48$ Schools)

	<i>M</i>	<i>SD</i>	<i>Variance</i>
Students	282.70	99.38	77–525
Size (2 = medium, 201–350 students)	2	0.72	1–3
Classes	14.06	4.28	7–24
Student-teacher ratio per class	1.72	0.31	1.14–2.44
Learning climate ^a	20.01	1.26	16.7–22.8
Special education hours (07–08)	1,736	2,035	12–7,486
Programs implemented last 1–5 years	2.29	0.99	1–5
<i>Staff characteristics</i>			
Gender (1 = male, 2 = female)	1.83	0.38	1–2
Age (years, 3 = 36–45, 4 = 46–55)	3.43	1.08	1–6
Working experience (years, 3 = 5–10, 4 = 11–15)	3.96	1.49	1–6
Trained as teachers (%)	56.09	15.54	0–78
No formal training (%)	4.13	8.50	0–38
Teachers (%)	64.36	8.09	46–78
Teacher assistants (%)	16.46	5.04	7–26
After-school personnel (%)	22.06	6.63	8–36
Working part time (%)	22.79	16.37	2–44
Special education training (%)	12.11	6.80	0–33
<i>Student body characteristics</i>			
Special education students (%)	5.20	0.34	1–15
Nonnative background (%)	5.78	0.60	0–34
Math performance ^b	1.90	0.20	1.6–2.3
English performance ^b	1.93	0.20	1.5–2.4
Reading performance ^b	1.94*	0.20	1.6–2.5
Referred to Psycho-Educational Services (%)	4.47	0.40	1–17
Referred to Child Welfare/Psychiatric Services (%)	1.94	0.25	0–16
Reported to the police (%)	0.08	0.02	0–1
Expelled due to behavior (%)	0.02	0.02	0–2
Transferred due to behavior (%)	0.01	0.03	0–2
Fully/partly segregated (%)	0.07	0.10	0–5
Living in densely populated area (%)	26.68	1.80	0–85

^a National Student Survey, seventh grade. ^b Nationally standardized test, fifth grade. * $p > .05$.

e-mail) that they were actively implementing other structured school-wide or community-wide programs were excluded as potential participants to avoid program contamination. This procedure resulted in 126 schools being considered eligible for the study. Following our sample size estimation and initial problems in recruiting schools to the study, 52 schools were randomly selected by blind drawing of numbers from a container and were invited as intervention schools. Twenty-eight schools (54%) agreed to participate. Next, 44 schools were randomly selected and invited to participate in a longitudinal study of student behavior and school failure and informed that they also would serve as comparison schools in an evaluation of N-PALS. To minimize the possibility of program contamination to the control group, only schools located more than five kilometers away from an intervention school were invited. Twenty schools agreed to participate as controls (45.5%). No significant differences were found between the participating and the declining schools.

Measures were completed during ordinary working time (staff; 1 hr) or class (student; 1–2 hr with a teacher present) and could be completed both on Internet and paper.

Written instructions were given to standardize the assessment procedures. Assent from the staff was obtained immediately before completion of the questionnaire, while informed and written assent from the students' parents were obtained in advance. To secure privacy, a randomly derived ID-code was used as an anonymous substitute for name or e-mail address. In addition, the name of the school was made anonymous through the use of a two-digit code. The schools were annually offered a small compensation (e.g., staff candy or fruit boxes, free textbooks on behavior problems, baseline situation report) for contributing to the study (for more detailed information about the design and procedures, see Sørli & Ogden, 2014b).

The Intervention

SWPBS/N-PALS is a structured yet flexible model (Sugai & Horner, 2009) which is used to implement school-wide interventions in order to establish a positive and inclusive learning climate for all students, and simultaneously promote long-term changes in the behavior of high-risk students (Bradshaw, Reinke, Brown, Bevans, & Leaf, 2008).

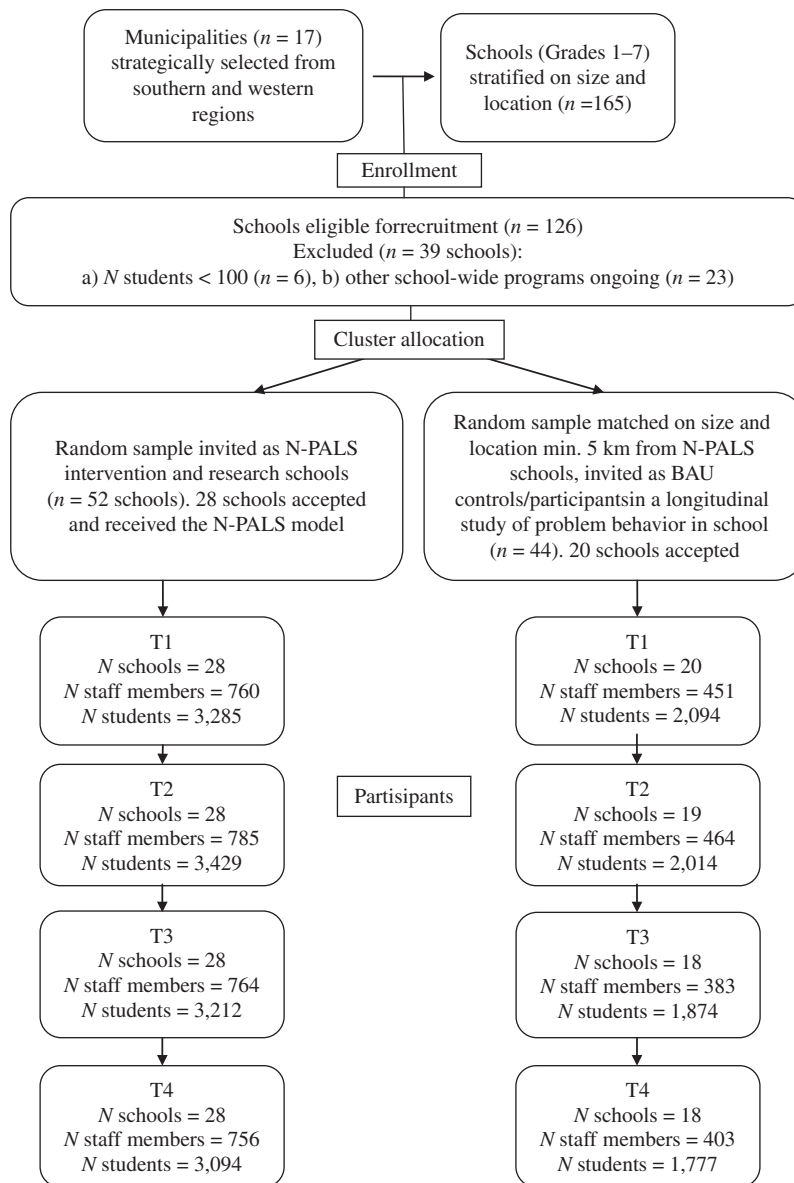


FIGURE 1 Flow chart.

The primary aim is to prevent and reduce behavior problems and promote positive student behaviors by altering the school environment through evidence-based interventions and inclusive strategies. The core components of N-PALS as described in a handbook are: (a) school-wide positive behavior support strategies including teaching of school rules, positive expectations and social skills, and systematic praise and encouragement of positive behavior (including reward cards), (b) monitoring of student behavior on all arenas of school by using the School-Wide Information System (SWIS), (c) collectively applied school-wide corrections with mild and immediate consequences (response cost), (d) time-limited small-group instruction or training in academic or social topics, (e) individual

interventions and support plans, (f) classroom management skills for teachers, and (g) parent information and collaboration strategies.

At the universal level all students are entitled to the following interventions delivered by all staff: (a) school-wide positive behavior support strategies including teaching of school rules, positive expectations and social skills, and systematic praise and encouragement of positive behavior (including reward cards), (b) monitoring of student behavior on all arenas of school by using the SWIS, (c) collectively applied school-wide corrections with mild and immediate consequences (response cost), (d) classroom management skills for teachers, and (e) parent information and collaboration strategies. At the *selected* level, students

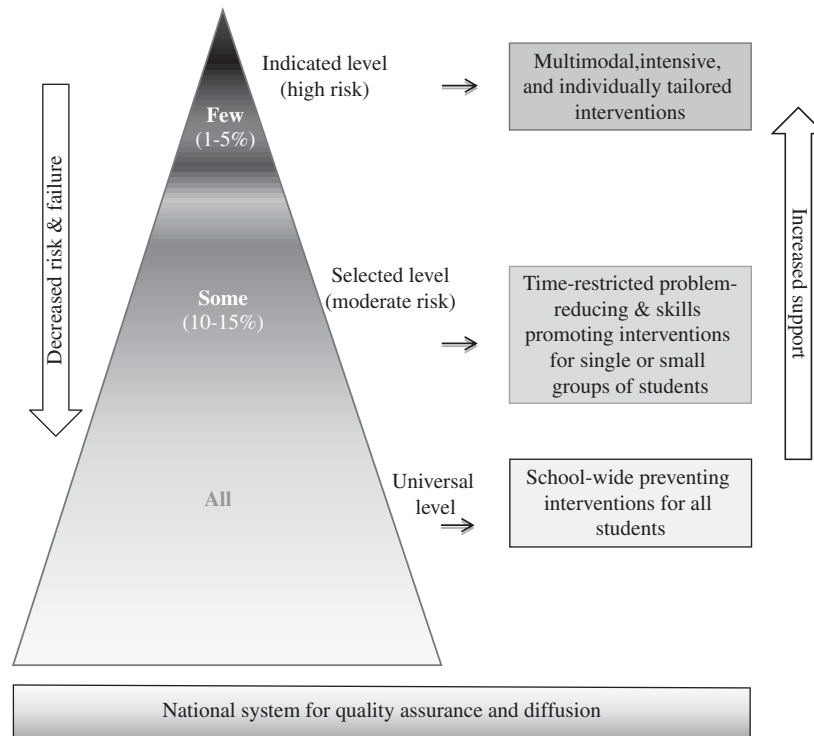


FIGURE 2 The N-PALS pyramid: A continuum of differentiated and evidence-based interventions.

who do not profit from interventions at the universal level are identified, and the school behavior support team plans inclusive interventions based on their particular needs. Students with common needs and difficulties receive: (a) time-limited small-group instruction or training in academic or social topics, or (b) the behavioral education program Check-In/Check-Out (CICO; Todd, Campbell, Meyer, & Horner, 2008), which meets students' needs for positive support and feedback efficiently. At the *indicated* level, high-risk students are provided with an individualized and functional behavior support plan based on assessment of the high students' academic competence and achievements, which includes: (a) individual special education, (b) intensive individual social skills training, for example, the cognitive behavioral program Stop-Now-And-Plan (SNAP; Augimeri, Farrington, Koegl, & Day, 2007), or (c) family interventions (e.g., counseling based on parenting principles). The support team will plan, implement, monitor, and evaluate the progress made (for more details about content and structure, see Arnesen & Meek-Hansen, 2010; Arnesen, Meek-Hansen, Ogden, & Sørli, 2014; Ogden et al., 2012).

The core model components and the basic training and implementation features are common to the Norwegian and U.S. versions. Except for minor adaptations of the training materials (e.g., pictures, videos, response cards, concepts), no changes of the original model were made. The only difference between the U.S. and Norwegian versions is

a nationally standardized system of quality assurance. The transportation of SWPBS to the Norwegian context was done carefully and in close cooperation with the University of Oregon. The intervention model has a multilevel structure (Figure 2). Based on assessments of the students' risk level and the school's needs, a continuum of evidence-based interventions is successively implemented at the universal level (targeting all students and staff), the selected level, and the indicated level. Interventions at the selected level are designed for the 5–10% of students who barely respond to interventions at the universal level (Muscott, Mann, & LeBrun, 2008). The indicated level targets the 1–5% of high-risk students who need more intensive and comprehensive interventions than those offered at levels 1 and 2. These are based on Functional Behavior Assessment (FBA), and a plan of action is formulated and implemented by a school-internal behavior support team. There is no manual describing when and how students should move within and between the levels or tiers, and practice may vary across schools (Algozzine et al., 2010). Likewise, in the present study, no explicit indicators were reported for matching students to intervention level.

Structure of transfer

It takes 3 to 5 years to fully implement the SWPBS/N-PALS model. To secure sufficient long-term support, each school's readiness for implementation was assessed and approval

from at least 80% of the staff was required. Each of the N-PALS schools appointed a school team (three to four teachers, the principal, a school psychologist, and a parent representative) who were trained on a monthly basis to plan, inform, carry out, monitor, and report on the interventions and outcomes at their school. The teams received local training and supervision from a certified N-PALS coach for a period of 2 years (2 hr/10 training sessions per year). The coaches were trained for one year, certified by the national implementation team at NCCBD, and recruited from the School Psychological Services or the Regional Special Education Services. All training was nationally standardized and free of charge (except for travel costs). The school team lectured and trained the rest of the staff in key features and intervention components for 2 hr per month and spent about 2 hr per week on implementation activities. Additionally, the teams attended four half-day regional network meetings per school year, in which booster sessions and sustaining implementation activities were provided. The schools used various Web-based feedback systems based on nationally standardized assessment tools in order to secure systematic data-driven decisions and procedures, and in order to sustain implementation quality.

Measures

Problem behavior in school

The prevalence of student problem behavior was measured by staff ratings using translated versions of the two British scales (Grey & Sime, 1989): “Problem Behavior in the School Environment Last Week” (15 items) and “Problem Behavior in the Classroom Last Week” (20 items). Rather than focusing on the individual student behavior, staff members reported how many times they had observed negative behavior incidences inside and outside classrooms during the week prior to assessment (which was considered to be a random week). Item examples are “Running in corridors” and “Physical attacks on students.” A 5-point Likert scale was applied with scoring alternatives ranging from 1 (*not observed*) to 5 (*observed several times per day*). The scales have shown satisfactory psychometric properties in several prior Norwegian studies (e.g., Kjølbi & Sørli, 2008; Lindberg & Ogden, 2000; Ogden, 1998; Sørli & Ogden, 2007). In the present study the Cronbach alphas for the total scores ranged from $\alpha = .81$ to $.82$ and from $\alpha = .86$ to $.88$ across measure points. Initial factor analyses revealed two underlying subfactors for each measure. “Serious problem behaviors” and “Moderate problem behaviors,” both with acceptable internal reliability ($\alpha = .70$ to $.90$).

Learning climate in class

A translated version of the classic “Classroom Environment Scale” (CES; Moos & Trickett, 1974) was used by teachers to

assess the quality of the general learning conditions in class. The CES is a 14-item scale (current study, $\alpha = .83$ to $.85$) with statements like “The students in this class help each other,” “The students are active and interested during lessons,” and “Usually, the students finish ordered working tasks.” An equivalent 22-item student version ($\alpha = .83$ to $.85$) developed by Sørli and Nordahl (1998), was used to assess the students’ perceptions of the psychosocial learning conditions in class ($\alpha = .86$ to $.88$). Initial factor analyses revealed two underlying subfactors: “Student relations” and “Student-teacher relations” ($\alpha = .78$ to $.82$). Item examples are: “The students in this class are good friends” and “The teacher encourages me if I strive with a task.” For both scales, a four-point rating scale ranging from 1 (*does not fit*) to 4 (*fits completely*) was used. The scales have shown satisfactory psychometric properties in prior Norwegian studies (e.g., Sørli & Ogden, 2007; Sørli & Nordahl, 1998). Additionally, we asked the principals at baseline (T1) and posttest (T4) how many students were fully or partly educated outside ordinary classroom due to problem behavior.

Implementation quality

The Effective Behavior Support Self-Assessment Survey (EBS-SAS, 46 items) was completed by all teachers and school staff in order to assess the implementation quality at the universal, targeted, and individual levels of the N-PALS model in all parts of the school (Sugai, Horner, & Todd, 2009). EBS-SAS is a Web-based questionnaire that is routinely completed once or twice per year in all intervention schools. EBS-SAS has been used in several prior evaluation studies (e.g., Bradshaw et al., 2010), and measures the extent to which the intervention model has been implemented with fidelity at the school level (18 items), in the classroom context (11 items) and in individual cases (8 items) as well as in common areas like hallways and the playground (9 items). The staff members rate how statements corresponded with the actual situation at their school, by using a 3-point scale ranging from 1 (*in place*) to 3 (*not in place*). The alphas for the total scale and subscales in the current study ranged from $\alpha = .90$ to $.92$. Examples of statements are, “Consequences of problem behavior are clearly defined and explained to all students,” and “Expected student behavior is consequently encouraged and positively acknowledged.” To be adequately implemented, an 80% threshold score on the EBS-SAS is considered to be a minimum.

School organizational characteristics

Several school contextual factors may influence the outcomes of an intervention and how well it is implemented into daily practice (e.g., Birnbaum et al., 2003; Brezina, Piquero, & Mazerolle, 2001). Consequently, organizational factors like school size, proportion of students with immigrant background, proportion of special education students, and proportion of staff without any formal

training, as well as proportion working in the after-school services, were included as covariates in the outcome analysis.

Analytic approach

To examine differences in change across time between the control and intervention group, longitudinal multilevel analyses (three levels) were run. The data structure with repeated measurements (level 1, T1, T2, T3, T4) nested within respondents (level 2, staff members or students) and groups (level 3, schools) suggested a multilevel approach. The Mixed Linear procedure in IBM SPSS statistics (version 20) was used to accommodate the hierarchical data structure. In all main effect models, the control group was set as the reference group while baseline was set as the reference time-point, and T2–T4 were included in the analyses. In addition, potential influence from contextual characteristics was statistically accounted for by including school size, proportion of staff members without formal training, portion of staff working in the after-school services, proportion of special education students, and proportion of students with immigrant background as covariates at the school level. All covariates were centered to minimize multicollinearity (Graham, 2003), and non-normally distributed variables were log-transformed (i.e., severe behavior problems in school and classroom setting, behavioral correction).

As the time between measurements varied, an unstructured residual covariance structure was chosen for the level 1 residuals. At the school level, random intercepts were estimated using a scaled identity covariance structure. Main effects were investigated by adding a Time \times Group interaction (control group = 0, intervention group = 1) to the models. A second series of models examined whether there were any moderating effects of implementation quality on the observed outcomes in the N-PALS group. In addition to the original variables, these models were extended by the two-way interaction term Time \times Implementation Quality. All relevant lower-order terms were included to ensure balanced regressions equations. Missing data were estimated using the direct-likelihood method, assuming a missing at random mechanism. Cohen's *d* was calculated according to Feingold's (2013) recommendations for designs with two independent groups and three or more time points (linear models) while the upper and lower confidence intervals were calculated in accordance with Grissom and Kim (2005).

RESULTS

Attrition

At T1 (pretest 1), 1,211 (75%) of 1,609 staff members participated, while 1,249 of 1,654 (76%) participated at T2

(pretest 2), 1,147 of 1,567 (73%) at T3, and 1,159 of 1,718 (67%) at T4 (posttest). As concerns the students, 5,379 of 5,748 (93.6%) with parental consent (75.2%) participated at pretest (T2), while 5,443 of 5,800 (93.8%) participated at T3, 5,086 of 5,536 (91.9%) after two years of implementation (not staff) and 4,871 of 5,331 (91.4%) posttest. The varying staff participating rates and missing data were primarily attributed to school staff quitting their jobs ($N = 560$) while new staff members were successively trained in N-PALS and recruited to the study, and some were on short-term leave of absence ($N = 423$). Missing data and varying student participating rates across time were primarily due to the open cohort design, which implied that new fourth graders and other students new to the schools were included at each measure point ($N = 4,143$), while older students successively left the study by the end of seventh grade ($N = 3,958$). Furthermore, some missing data were related to students changing school ($N = 360$), withdrawal of parental consent ($N = 44$) or absence on the assessment day. In addition, one control school withdrew from the study prior to T2 ($N_{\text{staff}} = 59$) and one prior to T3 ($N_{\text{staff}} = 30$, $N_{\text{students}} = 221$), mainly due to task overload. When comparing the participating staff on baseline data with those missing at posttest, the missing data group had more staff with a university degree, $F(1,1209) = 10.591$, $p < .001$, and more were working in higher than lower grades, $F(1,1209) = 8.565$, $p < .01$. When comparing the student participants with those missing at posttest, we found that the missing group rated the learning climate slightly more positively at baseline, $F(1,2427) = 14.76$, $p < .001$. Neither in the staff analyses nor in the student analyses did any gender or school group differences occur.

In conclusion, the attrition in the current study was rather large, but this could be expected from the open cohort design and normal fluctuations in the staff and student population across time. The comparison analyses revealed few differences between those participating and those missing and no systematic differences in attrition between the intervention and control group. In the multilevel analysis of intervention effects, missing data thus were estimated using the direct-likelihood method, assuming a missing at random mechanism (MAR; Beunckens, Molenberghs, & Kenward, 2005).

Main Intervention Effects

Indications of positive three-year main effects of the N-PALS model were found for moderate and less severe problem behaviors on common school areas and in the quality of the learning climate in class as rated by teachers. Estimates of the fixed effects, shown as group differences in change across measure points and effect sizes (Cohen's *d*) with 95% confidence intervals, are specified in Table 2. The significant intervention effects were relatively modest with Cohen's *d* between .17 and .25.

TABLE 2

Main Effects of N-PALS: Differences in Change Across Time Within and Between the Intervention and Control Group, Fixed Effects Estimates, and Effect Sizes (Cohen's *d*) With Lower and Upper Confidence Intervals

	Change within group				Change between groups					
	N-PALS		Control		ES					
	Pre-Y1	Pre-post	Pre-Y1	Pre-post	Pre-Y1	p	Pre-post	p	d	d 95% CIA
Problem behavior on common school areas	-1.22	-2.70	-0.39	-1.19	-0.83	.043	-1.51	.001	0.25	0.236-0.254
Moderate problem behavior	-0.92	-2.28	-0.74	-1.27	-0.74	.037	-1.27	.001	0.24	0.236-0.244
Serious problem behavior	-0.15	-0.02	-0.01	-0.01	-0.01	.324	-0.01	.033	0.17	0.166-0.174
Problem behavior in classroom	-1.24	-3.13	-1.74	-1.99	0.50	.374	-1.14	.092	0.13	0.126-0.133
Moderate problem behavior	-0.92	-2.45	-1.39	-1.65	0.47	.278	-0.83	.110	0.12	0.116-0.124
Serious problem behavior	-0.32	-0.66	-0.34	-0.34	0.02	.940	-0.32	.162	0.11	0.106-0.114
Classroom climate, staff rated	0.41	1.77	0.30	0.83	0.12	.737	0.93	.017	0.17	0.166-0.174
Classroom climate, student rated	-1.58	-2.57	-1.49	-2.66	0.09	.744	0.10	.761	0.01	0.009-0.011
Student relations	-0.68	-0.77	-0.63	-0.85	-0.05	.738	0.08	.633	0.10	0.099-0.101
Teacher relations	-0.87	-1.63	-0.87	-1.63	-0.00	.994	-0.00	.984	0.00	0.001-0.001

Pre-Y1 = change from first measure point for the staff (T1) and students (T2) to the end of year one with N-PALS. Pre-post = change from first measure point for staff (T1) and students (T2) to the end of year three with N-PALS. Estimates (enhanced values) are based on Satterwaite's (1947) approximate degrees of freedom. All covariates (total number of students, portion of students with foreign background, portion of special education students, and portion on staff without formal education, portion of staff working in after-school services) and the Time x Group interaction are accounted for in the estimates of change.

Problem behavior

The multilevel analysis revealed that the problem behavior occurring in the school's common arenas in the N-PALS group was not significantly different from that in the control group prior to intervention (T1-T2 diff = .14, $p = .722$, not in table). However, after one year of implementation there was a significantly larger decrease in problem behavior in the intervention group than in the control group (T1-T3 diff = -.83, $p = .04$). After three years of implementation, the positive change across time was even more evident in the intervention group as compared to the control group (T1-T4 diff = -1.51, $p = .001$). This finding indicates a significant main school-level effect of N-PALS, and was true both for serious behavior problems (e.g., theft, drug use, physical attack on teacher) and moderate behavior problems (e.g., running in corridors, restlessness while waiting, leaving the school area without permission; T1-T4 diff = -.017, $p = .001$ and -1.27, $p = .033$). The prevalence of problem behavior occurring within the classroom context was also substantially reduced in both groups during the study period (T1-T4 change; N-PALS = -3.13, Control = -1.99), but no significant main effect of the intervention appeared (T1-T4 diff = -1.14, $p = .092$).

Classroom climate and inclusion

Across time the quality of the psychosocial learning conditions in both school groups showed a positive trend as rated by the school staff (Table 2, T1-T4 change; N-PALS = 1.77, Control = 0.83). However, a significantly more positive developmental trend was reported by school staff in the intervention condition than by staff in the control condition (T1-T4 diff = .93, $p = .017$), indicating a positive main effect of N-PALS. On the other hand, no

main effect of the intervention was observed in the students' ratings of the psychosocial learning conditions in class (T1-T4 diff = 0.09, $p = .761$). Different from the staff ratings, the student ratings in both groups showed a downward trend across time and class levels (T1-T4 change; N-PALS = -2.57, Control = -2.66). Moreover, the number of students that were fully or partly educated in segregated settings due to problem behavior declined with 37.5% from baseline to posttest in the N-PALS schools (from $N = 56$, 0.70%, to $N = 35$, 0.47%, not in table), while the number increased with 54% in the control schools (from $N = 17$, 0.30% to $N = 37$, 0.73%).

Implementation Quality

The implementation quality measures indicated that after three years, 75% of the intervention schools ($N = 18$) had implemented N-PALS with required fidelity (minimum 80% on EBS-SAS). How well the intervention model was carried out varied, however, across arenas and intervention levels. In general, the components and strategies related to the school-wide, common arenas and the classroom context were well implemented in most schools (86%-96%). Implementation of model components and interventions for students at moderate to high risk of serious behavior problems (level 2 and 3) seemed to be a weak link in that only 8 (29%) of the schools had reached the 80% threshold by posttest. Generally and as hypothesized, implementation quality and school size were inversely related ($r = -.25$, $p < .01$), indicating higher implementation fidelity in smaller schools. About 37%, 54%, and 53% of the small, medium, and large schools had scores below the mean on the implementation scale ($\chi^2 = .000$), respectively. In the schools with the lowest portion of untrained staff, 81% were

high-implementation schools ($\chi^2 = .000$), and of those with the highest portion of students with immigrant background only 33% were high-implementation schools ($\chi^2 = .000$). Implementing N-PALS with high fidelity was expected to be more problematic in schools with more challenging students. This assumption was partly supported in that a significantly higher portion of the students in low-implementation than in high-implementation schools had special needs education at baseline (5.94% vs. 4.44%, $p = .000$), were fully or partly segregated from their ordinary class (0.92% vs. 0.65%, $p = .000$), were expelled from school (0.16% vs. 0%, $p = .000$) and were reported to the police (0.10% vs. 0.08%, $p = .004$). On the other hand, a higher percentage of the students in high-implementation than in low-implementation schools were referred to the Child Welfare and Mental Health services (2.08% vs. 1.22%, $p = .000$) and to the Educational and Psychological Counseling Service (5.01% vs. 4.10%, $p = .000$).

Differential Intervention Effects

To explore the differential effects of N-PALS more thoroughly, moderation analyses of fidelity were run while other potentially influencing variables were accounted for (school, staff, and student characteristics). As can be seen in Table 3, implementation quality significantly moderated the effects of N-PALS on both the primary outcome variables (problem behavior outside and within the classroom context, $t = -.596$, $p = .000$ and $t = -4.34$, $p = .000$), and this was true both for moderate and severe problem behavior. Implementation quality also moderated the effects on the learning conditions in class as rated by the school staff ($t = 2.77$, $p = .006$), and on the fourth through seventh graders' ratings of the relationship between students in class ($t = 4.12$, $p = .000$).

To get a clearer picture of the differential effects (Figure 3), we divided the intervention schools into two

groups according to their implementation scores at posttest (1 = *high level*, above the mean score for all schools, 2 = *low level*, below the mean). Even if we found no main effect of N-PALS on problem behavior occurring in the classroom context, there was a substantial decrease across time in the high-implementation schools (Figure 3a). There also was a drop from pre- to postassessment in the low-implementing schools, but the drop was only marked between T2 and T3 (i.e., during year one with N-PALS). Additionally, the analyses revealed that the schools with higher implementation quality had a larger reduction both of serious and moderate problem behaviors in common school arenas (Figure 3b). Moreover, the greatest increase in the quality of learning climate in class as rated by staff was found in schools with the highest fidelity scores (Figure 3c). As concerns the general negative developmental trend observed in the students' ratings of the classroom climate, this trend was significantly less marked for student relations in the intervention schools with the highest fidelity scores as compared to those with the lowest scores (Figure 3d).

DISCUSSION

In this article we examined whether the three-level SWPBS model (called PALS in Norway) had any main or differential effects on the level of student problem behavior and on the quality of the learning conditions in class in a sample of 48 Norwegian primary schools (Grades 1–7). The intervention effects were examined after one and three years of implementation in a stratified and matched sample of 28 intervention schools and 20 comparison schools. The longitudinal multilevel analyses indicated a significant positive main effect of the N-PALS model across time on the level of student problem behavior occurring in common school arenas. Relative to the control schools, lower levels of all kinds of problem behavior were observed in the N-PALS schools. This was especially true for schools with high implementation quality. Improvements of students' behavior in unstructured settings such as hallways, transitions, and playground are of great interest to school personnel, because they have contextual features that tend to increase student problem behavior (Algozzine et al., 2010). Moreover, student problem behavior in unstructured settings outside classrooms showed the sharpest increase in the Norwegian survey study covering the 10 years leading up to the study (Sørli & Ogden, 2014a). The positive change found in the N-PALS schools can partly be attributed to the common set of behavioral expectations, teaching of rules and social skills, consistent consequences, and other aspects of the School-Wide Positive Behavior Support model (Lewis, Power, Kelk, & Newcomer, 2002).

As concerns serious and moderate problem behavior in the classroom context, positive intervention effects were evident only in N-PALS schools with high implementation

TABLE 3
Moderating Effects of Implementation Quality: Estimates of Fixed Effects

Outcome variable	Time \times implementation quality			
	Estimate (SE)	df	t	Sign
1. Problem behavior common areas	-.25 (.04)	657.73	-5.96	.000
Moderate problem behavior	-.20 (.04)	654.04	-5.24	.000
Serious problem behavior	-.00 (.00)	764.87	-6.03	.000
2. Problem behavior in classroom	-.27 (.06)	667.88	-4.34	.000
Moderate problem behavior	-.19 (.05)	706.51	-3.98	.000
Serious problem behavior	-.00 (.00)	655.24	-0.40	.000
3. Learning climate in class (T)	.10 (.04)	720.32	2.77	.006
4. Learning climate in class (S)	.05 (.03)	3482.74	1.64	.101
Student relations	.07 (.02)	3679.97	4.12	.000
Teacher–student relations	-.02 (.02)	3566.67	-.97	.331

T = staff ratings, S = student ratings

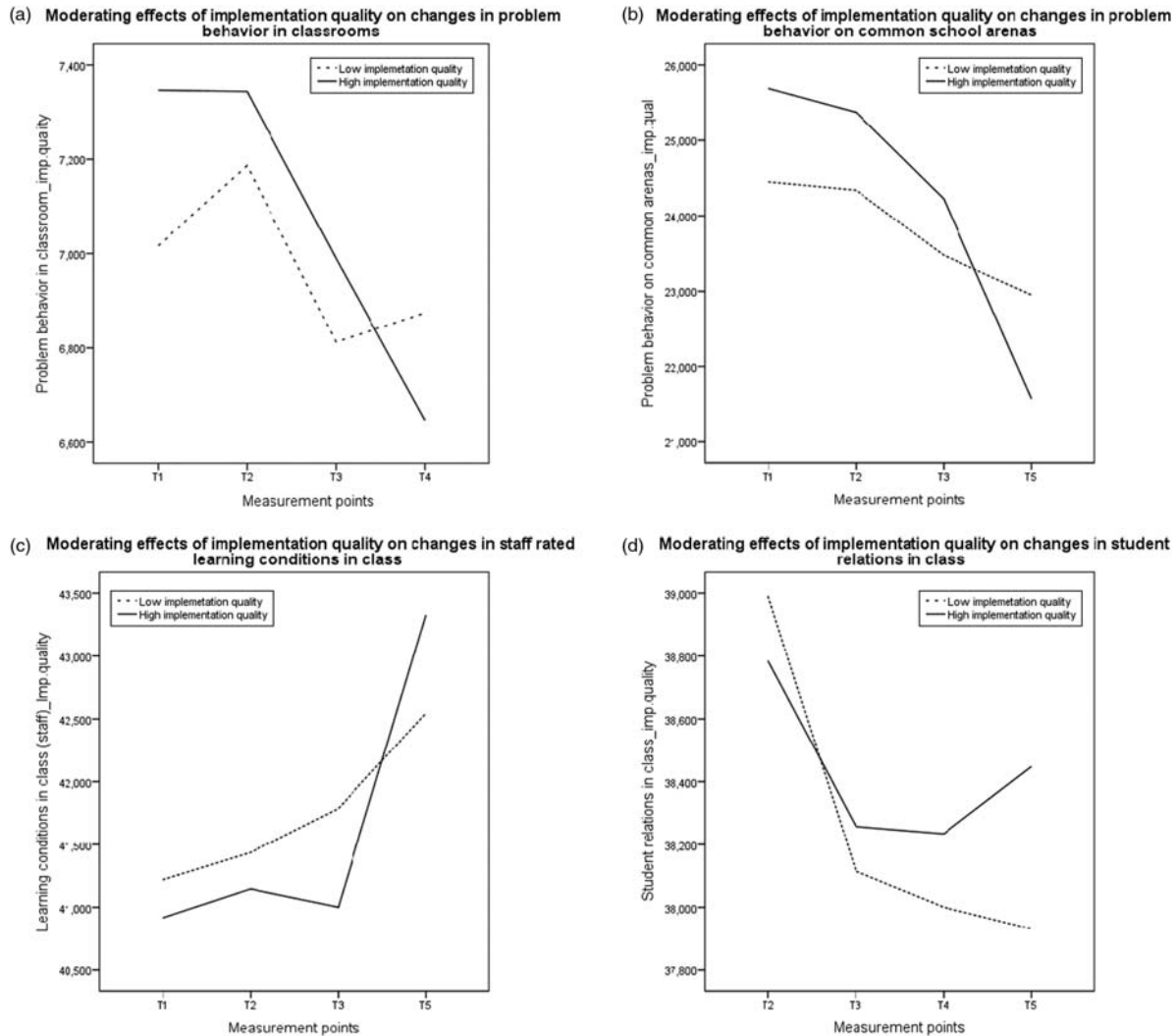


FIGURE 3 Better effects in high-implementation schools.

quality. Given the strong emphasis on comprehensive school-wide positive behavior support in the N-PALS schools, a main effect of the intervention on classroom-related problem behavior could be expected. The finding indicates that the teachers in the comparison schools had equally effective methods and procedures for preventing and managing classroom problem behavior as about half of the intervention schools. So, even if there was a substantial reduction in classroom problem behavior also in the N-PALS schools with lower implementation scores, this expected development was matched by a similar reduction in the comparison schools.

Moreover, N-PALS seemed to have a positive inclusive impact in that the number of students educated outside their ordinary classrooms declined from pre to post, while the number in fact increased in the control schools. Indications of a positive main effect were also observed on the quality of the learning climate in class as rated by the teachers.

Again, implementation quality moderated the outcomes. According to the student ratings, the quality of the classroom climate gradually declined over time and class levels in all the participating schools. A similar negative development pattern by class level has been found in several cross-sectional studies (e.g., Meld. St. 22, 2010–2011; Nordahl & Sørliie, 1998; Wendelborg, 2014). The longitudinal comparisons of the intervention and control groups showed, however, that if implemented with high fidelity, the N-PALS model significantly decelerated and even countered the expected reduction in the students' perceptions of the psychosocial learning climate. It should be noted that all effect estimates were robust when controlling for several other possibly influencing school factors besides the intervention model itself, including significant characteristics of the staff and student body.

In summary, all study results pointed in the expected direction, indicating positive main or differential impacts of

N-PALS on student problem behavior and the learning conditions in class. But the results also raise a question that needs elaboration: Why did the control group do so well? Closer examination showed that most of the comparison schools had been implementing other school-based programs or projects during the study period. Even if implementation of other school-wide programs was an exclusion criteria, the principals reported at posttest that *during* the study period all but three of the control schools had been implementing one or two evidence-based programs targeting bullying, social skills promotion, or the learning environment. Thus, N-PALS was evaluated using a harder test than initially intended, and these group differences thus may be considered conservative estimates of the N-PALS impact. Rather than comparing the intervention schools with regular practice, they were compared to schools implementing other evidence-based interventions. It was not possible, however, to estimate how the alternative programs may have influenced the outcomes of the comparison schools.

Contextualization of Intervention Effects

The significant effect sizes in the current study were in the range of $d = .13$ to $.25$, which compares nicely with Bradshaw et al. (2012), who reported ES-values of $d = .08$ and $.17$ based on teacher-assessed student behavior in the United States. The magnitude of intervention effects on school problem behavior in the present study also match well with the mean d of $.20$ reported in meta-analyses of universal school programs (Durlak et al., 2011; Wilson & Lipsey, 2007). In consideration of the fact that most Norwegian students behave well (e.g., Nordahl, Mausethagen, & Kostøl, 2009), large effect sizes should not be expected. Still, the reported effect sizes of N-PALS were large enough to be of practical significance to the schools.

The Importance of High Implementation Quality

The moderating effects of implementation quality on the intervention outcomes were in line with prior research and showed that the schools with high implementation scores generally benefited more than schools with lower scores (e.g., Fixsen et al., 2005; McIntosh et al., 2011). The threshold score on the EBS-SAS scale was set by the intervention purveyors at 80% rather than 100% in order to signal that the aim is competent rather than rigid implementation. The intervention schools reached a total implementation degree in the range of 71.5%–90.3%, which allows for the N-PALS model to be flexibly adapted to local variations and the culture of each school. By posttest, less than a third of the schools had reached the 80% threshold for implementation of interventions targeting moderate- to high-risk students. This may be an indication of less need for such interventions in primary

school, and that the universal components were sufficient for most schools. But it may also be an indication of a failing implementation strategy at the selected and indicated level, or that the three-year implementation period may have been too short for most schools to implement the more intensive and tailored interventions needed for at-risk students.

Limitations

Some limitations of the study should be mentioned. First, for practical reasons, a randomized controlled design was not used in the present study. A strengthened quasi-experimental design was applied instead (Sørli & Ogdén, 2014b), and the intervention and comparison group were matched on important background variables. Moreover, the study applied reliable measurement instruments and multilevel and moderation analyses. Still, a strong research design with a large number of schools, measure points, and respondents contributed to high statistical power and valid effect estimates (Sørli & Ogdén, 2014b). Second, even if very few significant group differences were found at baseline, selection bias may have occurred in the process of recruiting schools to the study. Although several measures were taken to secure that the participating schools were representative of Norwegian schools, and in order to match the intervention and comparison group on key variables, there may be undetected group differences on nonobserved variables. Not all of those invited accepted the invitation among the intervention schools nor among the comparison schools, but any selection bias may have been similar in both groups in that no differences were found the declining and accepting school group.

A potential third limitation is that the staff informants were also responsible for implementing the interventions. This may have created a positive response bias in the assessments of implementation quality and student outcomes in the N-PALS schools. As regards student outcomes, any positive bias may have affected both the intervention and the comparison group equally. Teachers are the most common source of children's mental health and special education referrals, and their ratings have been shown to be reliable (Ogdén, 2003) and to predict later mental health problems (Schaeffer, Petras, Ialongo, Poduska, & Kellam, 2009). School staff ratings thus are important in the context of evaluation of school-based interventions such as the N-PALS model. Moreover, the study should be of high practical interest because the respondents were probably the stakeholders most concerned about the challenges of student problem behavior in school.

Implications for Future Research and Practice

Future replications of this study should preferably apply a randomized controlled design in order to strengthen the conclusions about the N-PALS impacts. Several potential outcome variables have not been examined in this study,

such as changes in high-risk student behavior, academic achievement, student motivation, and staff collective and individual efficacy. Also, this study did not focus on parent reports, which will be a topic of future publications. Future efforts also should include analyses of relevant moderators in an attempt to reveal interventions that may improve model effectiveness, and recommendations for improving implementation quality at the selected and indicated level. Investigating the potential long-term effects of the N-PALS model is also called for, and is the topic of a planned study using national school registry data.

CONCLUSIONS

The culturally adapted SWPBS model, N-PALS, seemed effective in reducing the level of student problem behavior and in promoting qualitatively better learning conditions in class. The model also increased the N-PALS schools' ability to reach out to all students and reduce the number of students singled out for individual intervention plans. To our knowledge, this is the first effectiveness study of the SWPBS model in a non-English-speaking context and the first to examine the cumulative effects of the three-level model. Even if the implementation of components at the selected and indicated level seemed to be a weak link in the project, we do not yet know if this was due to implementation failure or to reduced need for such components in the N-PALS schools. The present study is also among the first to demonstrate that schools with high implementation quality benefited the most from the model. The Norwegian outcomes indicate that the SWPBS model may be successfully transferred across the Atlantic without major adaptations, at least to Norway as a representative of the Scandinavian and Western European countries.

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