

# Review of Studies on Class-Wide Positive Behavior Support: A Systematic Analysis

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## Abstract

Class-wide positive behavior support refers to practices that enable teachers to support students' academic, social, and emotional learning by creating a positive classroom environment and help with convenient class management by eliminating students' problematic behaviors and providing them with positive behaviors. This research focuses on interventions performed with class-wide PBS and presents a systematic review of studies conducted in this respect. In line with scanning, inclusion and exclusion criteria, 18 studies were examined within the scope of this review. Considering the findings, it is observed that there were Tier 1 interventions, in other words, preventive interventions, in most of the class-wide PBS studies. Moreover, it is seen that class-wide PBS interventions were carried out on both group on-task behavior and teacher praise and reprimands, and outcomes of the interventions were effective. According to the findings, an investigation is required on what differences class-wide PBS interventions, which are performed in classes where only students with disabilities receive education, will create in both student outputs and teacher praise and reprimands.

*Keywords:* Positive behavior support, class-wide positive behavior support, review, systematic review.

## INTRODUCTION

Problematic behaviors commonly observed in both typically developing children and those with developmental disabilities negatively affect not only the children's own lives but also their educational and social environments (Erbaş, 2002). In classroom settings, such behaviors disrupt the learning atmosphere, reduce instructional efficiency, and lead to teacher demoralization and decreased motivation, ultimately hindering the learning process (Närhi et al., 2015). These behaviors not only pose a risk to students' academic achievement but also act as a significant source of stress for teachers. In addition to common behavioral challenges, classrooms often involve unique difficulties related to instructional content and physical conditions (Nelson et al., 2018). Therefore, teachers must be equipped with effective classroom management strategies to foster a positive learning environment. However, many novice teachers begin their careers with insufficient training in behavior management and acquire these skills through experience (Lastrapes et al., 2018). As a result, disruptive behaviors such as talking, making noise, walking around without permission, and interrupting peers may persist and even increase (Cihak et al., 2009). Although teachers often attempt various strategies to address such behaviors, they frequently fail to achieve lasting success (Ünlü et al., 2013).

Positive Behavior Support (PBS), which emerged in the mid-1980s as an alternative to punitive approaches for managing severe behavior problems in individuals with disabilities, focuses on modifying environmental factors and using principles of applied behavior analysis to reduce challenging behaviors and promote appropriate ones (Carr et al., 1999; Ünlü et al., 2013). The

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growing body of research supports the effectiveness of PBS in enhancing individuals' quality of life and promoting shared living environments that are more positive and functional.

PBS interventions are implemented at three levels: (1) **Universal Interventions** aimed at all students to prevent the emergence of behavioral problems, (2) **Targeted Interventions** designed for students who do not respond to universal supports, and (3) **Intensive Interventions** individualized for students with persistent challenges, based on functional behavior assessments (Nelson et al., 2018). These tiers are commonly applied in both school-wide and class-wide contexts (McIntosh et al., 2014; Missouri Department of Elementary and Secondary Education, 2017; Park et al., 2019; Aspiranti et al., 2018; Bolt et al., 2019; Caldarella et al., 2019; Monson et al., 2020).

Class-wide PBS interventions, which involve systematic strategies implemented by teachers to support both academic and social-emotional development, help establish positive classroom climates. These interventions foster pro-social behaviors, reduce disruptions, and enhance teaching effectiveness through strategies such as physical environment arrangement, clear routines and expectations, and reinforcement of appropriate behaviors (Cihak et al., 2009; Fox et al., 2003; Hieneman et al., 2005). Studies also indicate that class-wide PBS helps teachers shift from corrective feedback to proactive reinforcement, thereby improving classroom management and overall learning outcomes (Lastrapes et al., 2018; Närhi et al., 2015).

Despite the demonstrated benefits of class-wide PBS, only two systematic reviews have been identified in the literature, both of which focused on studies published prior to 2015 and excluded studies with methodological limitations. This has resulted in a significant gap in understanding the current landscape of class-wide PBS implementation. The absence of a comprehensive review addressing recent studies—including variables such as participant characteristics, settings, dependent measures, study reliability, and social validity—limits the field's ability to apply up-to-date, evidence-based practices. Therefore, this study uniquely contributes to the literature by synthesizing class-wide PBS interventions conducted between 2014 and 2025. The findings are expected to inform future research and guide educators in designing more effective classroom behavior support strategies.

## **METHOD**

### **Research Desing**

In this study, a systematic review was conducted to examine single-subject studies in which class-wide PBS interventions were used. According to Higgins & Green (2011), a systematic review is the collection and structured analysis of the relevant literature in line with predetermined criteria in order to answer a specific research question. In this context, the studies included in the study were examined in terms of the variables determined and evaluated with a descriptive analysis approach.

### **Search Procedures**

A search was done in the electronic database of the Educational Resources Information Center (ERIC), Google Scholar, Pubmed, Scopus to determine which studies to include in this review. The search was limited to peer-reviewed studies with publication years of 2014-2025 and whose full texts could be accessed. In the database, the search was done using the keywords "sınıf çaplı olumlu davranışsal destek," "sınıf çaplı ODD," "class-wide positive behavior support," and "CW-PBS." The database was scanned simultaneously by two authors on 10/02/2025 between 21:00-23:50. The authors filed 26 studies after reviewing their titles and abstracts. To determine whether the filed 26 studies met the inclusion criteria, both authors reviewed the studies at different times (See Inclusion and Exclusion Criteria). Eighteen studies meeting the inclusion criteria were determined, and recurring studies (n=8) were excluded. A total of 18 studies were included in the review.

### Inclusion and Exclusion Criteria

Studies needed to meet the following criteria to be included in this review: First, the study should be class-wide or conducted in a classroom. Second, the study should include a single-subject evaluation. Third, the studies should be written in English and/or Turkish. Qualitative and mixed studies on class-wide PBS were excluded. Finally, 18 studies met the inclusion criteria. Within the scope of this study, data collection was carried out in accordance with the steps outlined in the PRISMA 2020 Checklist (Page et al., 2021). The identification process of the included studies is presented in Figure 1.

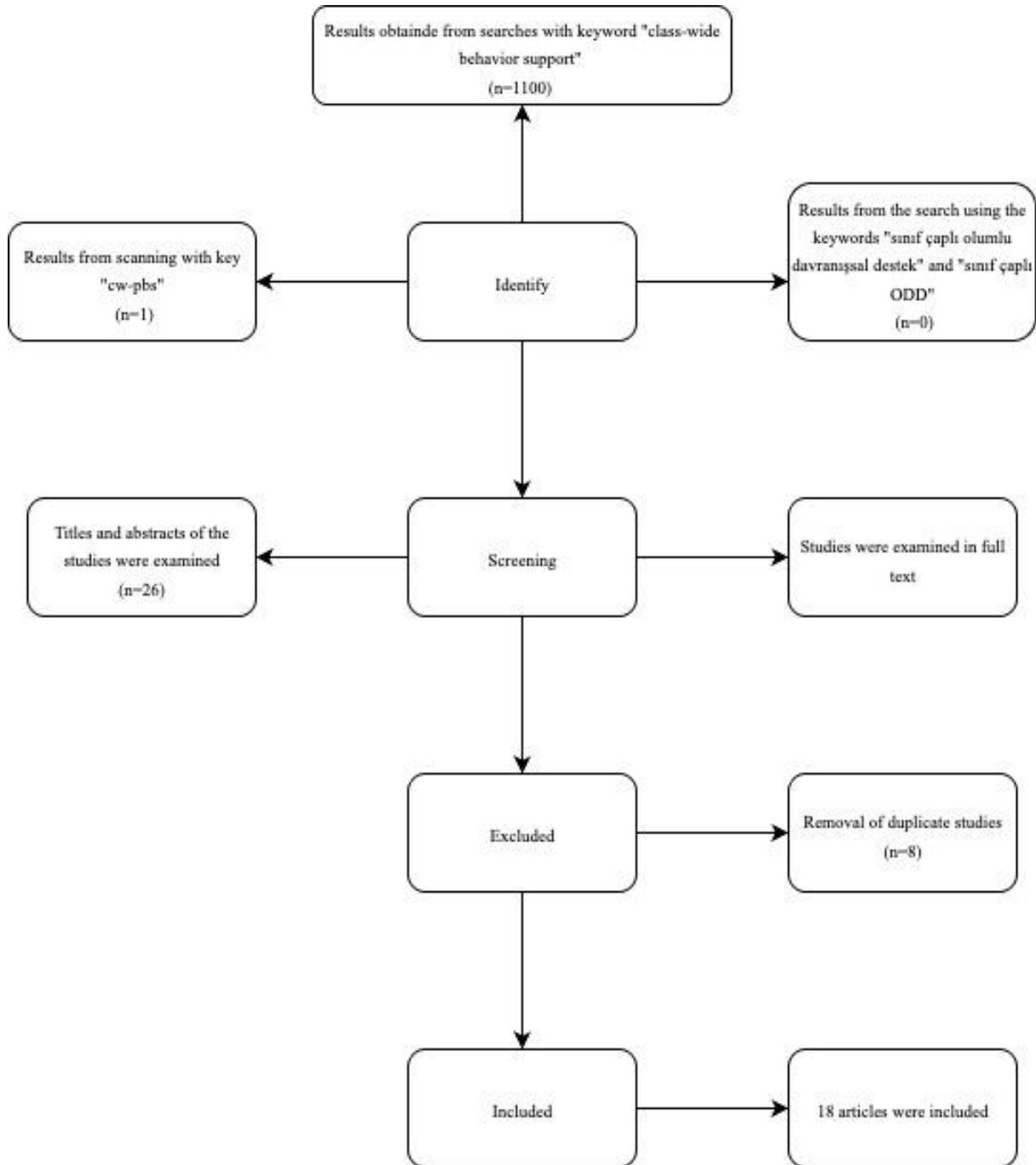


Figure 1. Scanning and review process

## Reliability of Search and Coding Procedures

The first database search was done simultaneously by two authors on different computers, and a total of 26 articles were determined. Later, both authors independently sorted these studies according to the inclusion and exclusion criteria and decided on which article would be included in the study. The studies included by the two authors were compared, and it was seen that both authors included the same 18 studies. These 18 studies were summarized separately by both authors in terms of (a) participant characteristics, (b) implementers, (c) dependent variables, (d) setting, (e) research design, (g) social validity, (g) reliability, and (f) limitations-recommendations. The authors' summaries were compared. To ensure the accuracy of summaries and intercoder reliability, the authors used a five-question checklist: (a) Are the participants defined correctly? (b) Are the implementers defined correctly? (c) Are the dependent variables defined correctly? (d) Is the setting defined correctly? (e) Is the research design of interventions defined correctly? (f) Are social validity data defined correctly? (g) Were the reliabilities of these interventions analyzed? (h) What are the intervention limitations and recommendations? If a summary was considered incorrect, both authors reviewed the study again and then made corrections after reaching a consensus.

## RESULTS

Each of the 18 studies was synthesized and summarized in terms of (a) participant characteristics, (b) implementers, (c) dependent variables, (d) setting, (e) research design, (f) social validity, (g) reliability, and (h) limitations-recommendations.

### Participants;

Table 1. Distribution of Demographic Characteristics of Students

Demographic Characteristics		f	%
Gender	Male	194	25
	Female	134	17.2
	Not specified	448	57.8
	Total	776	100
Age	2-5	2	11.1
	6-9	2	11.1
	9-12	5	27.7
	Not specified	9	50
	Total	18	100

In the reviewed studies, data on student characteristics were reported. As seen in Table 1, a total of 776 students participated in these studies. Of 776 students, 194 (25%) were male (Aspiranti et al., 2018; Bolt et al., 2019; Caldarella et al., 2019; Caldarella et al., 2017; Chen et al., 2022; Conklin et al., 2016; Johnson et al., 2024; Jolstead et al., 2017; Mahon et al., 2020; Monson et al., 2020; Naylor et al., 2018; Nelson et al., 2018; Orr et al., 2020; Weeden et al., 2016; Wills et al., 2014; Wu et al., 2019), 134 (17.2%) were female (Caldarella et al., 2017; Caldarella et al., 2019; Conklin et al., 2016; Chen et al., 2022; Johnson et al., 2024; Jolstead et al., 2017; Mahon et al., 2020; Monson et al., 2020; Naylor et al., 2018; Nelson et al., 2018; Orr et al., 2020; Weeden et al., 2016), and genders of 448 students (57.8%) were not specified (Aspiranti et al., 2018; Bolt et al., 2019; Caldarella et al., 2019; Naylor et al., 2018; Speight et al., 2020; Torelli et al., 2016). When the distributions of participants by age groups were examined, the average age of students was stated as 4 in the study of (Jolstead et al., 2017), 6 in the study of (Naylor et al., 2018), between 2-5 in the study of (Mahon et al., 2020), between 6-9 in the study of (Weeden et al., 2016), between 8-12 in the study of (Bolt et al., 2019; Nelson et al., 2018), 10 in the study of (Wu et al., 2019), between 11-12 in the study of (Chen et al., 2022) and 12 in the study of (Monson et al., 2020). In the other nine studies (Aspiranti et al., 2018; Caldarella et al., 2019; Caldarella et al., 2017; Conklin et al., 2016; Johnson et al., 2024; Orr et al., 2020; Speight et al., 2020; Torelli et al., 2016; Wills et al., 2014), no information about age is given. Moreover, in twelve articles

(Aspiranti et al., 2018; Bolt et al., 2019; Caldarella et al., 2019; Chen et al., 2022; Conklin et al., 2016; Johnson et al., 2024; Mahon et al., 2020; Naylor et al., 2018; Speight et al., 2020; Torelli et al., 2016; Wills et al., 2014; Wu et al., 2019), students with disabilities are observed among students who took part in the intervention. In the studies reviewed, it is seen that 26 out of 44 teachers took part in the intervention due to both being the implementer and aiming to change the targeted behavior. Upon examining the characteristics of 25 participating teachers, 20 teachers were female (Caldarella et al., 2019; Caldarella et al., 2017; Conklin et al., 2016; Chen et al., 2022; Johnson et al., 2024; Mahon et al., 2020; Monson et al., 2020; Naylor et al., 2018; Nelson et al., 2018; Orr et al., 2020; Wu et al., 2019), and 5 teachers were male (Caldarella et al., 2019; Conklin et al., 2016; Johnson et al., 2024; Monson et al., 2020;). Gender information was not given for 17 teachers (Bolt et al., 2019; Jolstead et al., 2017; Speight et al., 2020; Weeden et al., 2016; Wills et al., 2014). Concerning the ages of the participating teachers, age information is given in ten studies. The age groups varied between 24-55 (Caldarella et al., 2019; Caldarella et al., 2017; Chen et al., 2022; Conklin et al., 2016; Johnson et al., 2024; Jolstead et al., 2017; Mahon et al., 2020; Monson et al., 2020; Nelson et al., 2018; Orr et al., 2020).

### Implementers;

Table 2. Distribution regarding the implementers

Implementers	f	Author & Year
General Education Teachers	4	Chen et al., 2022; Speight et al., 2020
Music Teachers	2	Bolt et al., 2019; Caldarella et al., 2017
Painting Teachers	4	Bolt et al., 2019; Monson et al., 2020; Nelson et al., 2018
Physical Education Teachers	1	Bolt et al., 2019
Preschool Teachers	7	Conklin et al., 2016; Jolstead et al., 2017; Mahon et al., 2020
Primary School Teachers	19	Aspiranti et al., 2018; Caldarella et al., 2019; Conklin et al., 2016; Naylor et al., 2018; Torelli et al., 2016; Weeden et al., 2016; Wills et al., 2014; Wu et al., 2019
Special Education Teachers	5	Bolt et al., 2019; Johnson et al., 2024; Orr et al., 2020; Wu et al., 2019

In all studies reviewed, information about implementers is given. As implementers, a total of 40 teachers and 2 assistants participated. According to the data in Table 2, 19 of the teachers are primary school teachers (Aspiranti et al., 2018; Caldarella et al., 2019; Conklin et al., 2016; Naylor et al., 2018; Torelli et al., 2016; Weeden et al., 2016; Wills et al., 2014; Wu et al., 2019), 7 were preschool teachers (Conklin et al., 2016; Jolstead et al., 2017; Mahon et al., 2020), 5 were special education teachers (Bolt et al., 2019; Johnson et al., 2024; Orr et al., 2020; Wu et al., 2019), 4 were painting teachers (Bolt et al., 2019; Monson et al., 2020; Nelson et al., 2018), 4 were general education teachers (Chen et al., 2022; Speight et al., 2020) 2 were music teachers (Bolt et al., 2019; Caldarella et al., 2017), and one was a physical education teacher (Bolt et al., 2019).

### Dependent Variables;

Table 3. Distributions related to the dependent variables

Depent Variables	f	Author & Year
Attention-Seeking Problem Behaviors	2	Mahon et al., 2020, Torelli et al 2016

Table 3. (Continued) Distributions related to the dependent variables

Decrease Inappropriate Behavior	1	Aspiranti et al., 2018
Disruptive Behavior	4	Bolt et al., 2019, Caldarella et al., 2019, Wu et al., 2019, Wills et al., 2014

Group On-Task Behavior	10	Bolt et al., 2019; Caldarella et al., 2017; Caldarella et al., 2019; Jolstead et al., 2017; Johnson et al., 2024; Monson et al., 2020; Naylor et al., 2018; Nelson et al., 2018; Orr et al., 2020; Speight et al., 2020; Weeden et al., 2016; Wills et al., 2014
Teacher Praise & Reprimands	12	Bolt et al., 2019; Caldarella et al., 2017; Caldarella et al., 2019; Jolstead et al., 2017; Johnson et al., 2024; Monson et al., 2020; Naylor et al., 2018; Nelson et al., 2018; Orr et al., 2020; Speight et al., 2020; Weeden et al., 2016; Wills et al., 2014
Teacher-Student Relationship	1	Chen et al., 2022
Social Skills	1	Mahon et al., 2020
Student On-Task Behavior	8	Caldarella et al., 2019; Chen et al., 2022; Conklin et al., 2016; Mahon et al., 2020; Monson et al., 2020; Naylor et al., 2018; Speight et al., 2020; Wu et al., 2019

According to the data in Table 3, eighteen studies targeted children's behaviours and ten studies additionally targeted teacher behaviours. Behavioral changes were targeted regarding group on-task behavior in ten studies (Caldarella et al., 2017; Caldarella et al., 2019; Johnson et al., 2024; Jolstead et al., 2017; Monson et al., 2020; Naylor et al., 2018; Nelson et al., 2018; Orr et al., 2020; Weeden et al., 2016; Wills et al., 2014), teacher praise and reprimands in twelve studies (Bolt et al., 2019; Caldarella et al., 2017; Caldarella et al., 2019; Johnson et al., 2024; Jolstead et al., 2017; Monson et al., 2020; Naylor et al., 2018; Nelson et al., 2018; Orr et al., 2020; Speight et al., 2020; Weeden et al., 2016; Wills et al., 2014), disruptive behavior in four studies (Bolt et al., 2019; Caldarella et al., 2019; Wu et al., 2019; Wills et al., 2014), students on task behavior in eight studies (Caldarella et al., 2019; Chen et al., 2022; Conklin et al., 2016; Mahon et al., 2020; Monson et al., 2020; Naylor et al., 2018; Speight et al., 2020; Wu et al., 2019), teacher-student relationship in one study (Chen et al., 2022), social skills in one study (Mahon et al., 2020), decrease inappropriate behaviors in one study (Aspiranti et al., 2018), and attempts to exhibit problematic behavior to attract attention in two studies (Mahon et al., 2020; Torelli et al., 2016).

**Setting;**

Table 4. Distribution related to the setting

Setting	Number of Studies	Author & Year
Kindergarten Class	1	Jolstead et al., 2017
Middle School Art Class	1	Monson et al., 2020
Middle School General Education Classes	4	Caldarella et al., 2019; Chen et al., 2022; Conklin et al., 2016; Speight et al., 2020
Middle School Special Education Classes	1	Orr et al., 2020
Music Class	1	Caldarella et al., 2017
Preschool	1	Mahon et al., 2020
Primary School Art Class	1	Nelson et al., 2018
Primary School General Education Classes	7	Aspiranti et al., 2018; Conklin et al., 2016; Naylor et al., 2018; Torelli et al., 2016; Weeden et al., 2016; Wills et al., 2014; Wu et al., 2019
Special Education Math Class	1	Johnson et al., 2024
Summer School Internship Class	1	Bolt et al., 2019

According to Table 4, seven of the 18 studies (Aspiranti et al., 2018; Conklin et al., 2016; Naylor et al., 2018; Torelli et al., 2016; Weeden et al., 2016; Wills et al., 2014; Wu et al., 2019) were conducted in general education classes in primary school. A study was performed in a middle school art class (Monson et al., 2020), a study was performed in a summer school internship class (Bolt et al., 2019), four studies was performed in a middle school general education class (Caldarella et al., 2019; Chen et al., 2022; Conklin et al., 2016; Speight et al., 2020), a study was

performed in a middle school special education class (Orr et al., 2020), a study was performed in a preschool (Mahon et al., 2020), a study was performed in a primary school art class (Nelson et al., 2018), a study was performed in a music class (Caldarella et al., 2017), a study was performed in a special education math class (Johnson et al., 2024) and a study was performed in a kindergarten class (Jolstead et al., 2017). Moreover, Table 4 shows that Conklin et al. (2016) conducted the study in two different settings.

**Research Design;**

Table 5. Distributions related to research design

Research Design	f	Author & Year
ABAB desing	7	Caldarella et al., 2017; Caldarella et al., 2019; Conklin et al., 2016; Johnson et al., 2024; Monson et al., 2020; Naylor et al., 2018; Weeden et al., 2016
AB + ABAB combination	1	Nelson et al., 2018
ABAC desing	1	Orr et al., 2020
ABABCBC desing	1	Wu et al., 2019
Alternating treatment design	1	Bolt et al., 2019
Delayed multiple probe design across classes with reversal model	1	Jolstead et al., 2017
Multiple baseline design	3	Chen et al., 2022, Mahon et al., 2020, Speight et al., 2020
Multiple probe design embedded in alternating treatments model	1	Torelli et al., 2016
Nonconcurrent multiple probe design	1	Wills et al., 2014
Unspecified	1	Aspiranti et al., 2018

According to the data in Table 5, the ABAB design was used in seven studies (Caldarella et al., 2017; Caldarella et al., 2019; Conklin et al., 2016; Johnson et al., 2024; Monson et al., 2020; Naylor et al., 2018; Weeden et al., 2016), the AB design was used with the ABAB design in one study (Nelson et al., 2018), the delayed multiple probe design across classes with reversal model was used in one study (Jolstead et al., 2017), the multiple probe design embedded in alternating treatments model was used in one study (Torelli et al., 2016), the ABAC design was used in one study (Orr et al., 2020), the ABABCBC design was used in one study (Wu et al., 2019), the multiple baseline design was used in three study (Chen et al., 2022; Mahon et al., 2020; Speight et al., 2020), the nonconcurrent multiple probe design across abilities was used in one study (Wills et al., 2014), and the alternating treatment design was used in one study (Bolt et al., 2019). Moreover, no information regarding the research design was provided in a study (Aspiranti et al., 2018).

**Social Validity;**

Table 6. Distribution of Social Validity Data Collection Methods

Respondet Group	f	Author & Year
Teachers & Students	14	Aspiranti et al., 2018; Caldarella et al., 2017; Caldarella et al., 2019; Chen et al., 2022; Conklin et al., 2016; Johnson et al., 2024; Jolstead et al., 2017; Monson et al., 2020; Naylor et al., 2018; Nelson et al., 2018; Orr et al., 2020; Speight et al., 2020; Weeden et al., 2016; Wu et al., 2019
Only teachers	3	Mahon et al., 2020; Torelli et al., 2016; Wills et al., 2014
Only Student	1	Bolt et al., 2019

Social validity data were reached in all 18 studies reviewed. Social validity data were collected from teachers and students in fourteen studies (Aspiranti et al., 2018; Caldarella et al., 2017; Caldarella et al., 2019; Chen et al., 2022; Conklin et al., 2016; Johnson et al., 2024; Jolstead et al., 2017; Monson et al., 2020; Naylor et al., 2018; Nelson et al., 2018; Orr et al., 2020; Speight et al., 2020; Weeden et al., 2016; Wu et al., 2019), only from teachers in three studies (Mahon et al., 2020; Torelli et al., 2016; Wills et al., 2014), and only from students in one study (Bolt et al., 2019).

Sixteen questionnaires were used to assess social validity in the study (Bolt et al., 2019; Caldarella et al., 2017; Caldarella et al., 2019; Chen et al., 2022; Johnson et al., 2024; Jolstead et al., 2017; Mahon et al., 2020; Monson et al., 2019; Naylor et al., 2018; Nelson et al., 2018; Orr et al., 2020; Speight et al., 2020; Torelli et al., 2016; Weeden et al., 2016; Wu et al., 2019; Wills et al., 2014). Two studies used a scale (Aspiranti et al., 2018; Conklin et al., 2016).

**Reliability;**

17 of 18 studies have findings on interobserver agreement and procedural fidelity (Bolt et al., 2019; Caldarella et al., 2017; Caldarella et al., 2019; Jolstead et al., 2017; Monson et al., 2020; Naylor et al., 2018; Nelson et al., 2018; Orr et al., 2020; Torelli et al., 2016; Weeden et al., 2016; Wills et al., 2014). In the study conducted by Aspiranti et al. (2018), there is no information on reliability findings. Considering the findings on procedural fidelity, the lowest value is 77.83% (Nelson et al., 2018), and the highest value is 98.61% (Orr et al., 2020). Concerning interobserver agreement data, the lowest value is 85.23% (Bolt et al., 2019), and the highest value is 99% (Orr et al., 2020).

**Limitations and Recommendations;**

Table 7. Limitation Category

Limitation Category	f	Studies
Insufficient number of participants	15	Bolt et al., 2019; Caldarella et al., 2017; Caldarella et al., 2019; Chen et al., 2022; Conklin et al., 2016; Jolstead et al., 2017; Johnson et al., 2024; Monson et al., 2020; Naylor et al., 2018; Nelson et al., 2018; Orr et al., 2020; Speight et al., 2020; Weeden et al., 2016; Wills et al., 2014; Wu et al., 2019
Low generalization	4	Bolt et al., 2019; Monson et al., 2020; Naylor et al., 2018; Nelson et al., 2018
Applying only Tier 1 in class-wide interventions	5	Caldarella et al., 2019; Jolstead et al., 2017; Monson et al., 2020; Orr et al., 2020; Wu et al., 2019
Limited time of the intervention	4	Bolt et al., 2019; Chen et al., 2022; Naylor et al., 2018; Nelson et al., 2018
Collection of incomplete data due to absenteeism	2	Bolt et al., 2019; Caldarella et al., 2019
Inadequate determination of target criteria when selecting participants	3	Bolt et al., 2019; Caldarella et al., 2019; Monson et al., 2020
Inability of the research design to ensure experimental control	4	Jolstead et al., 2017; Naylor et al., 2018; Orr et al., 2020; Wills et al., 2014
Uneven collection of social validity data from children	1	Orr et al., 2020
Inadequate review of agreement while calculating interobserver agreement	1	Wills et al., 2014
Not checking student satisfaction	1	Wills et al., 2014
No data collected for academic achievement	1	Wills et al., 2014

According to Table 7, fifteen studies state the limitations as the insufficient number of participants (Bolt et al., 2019; Caldarella et al., 2017; Caldarella et al., 2019; Chen et al., 2022; Conklin et al., 2016; Jolstead et al., 2017; Johnson et al., 2024; Monson et al., 2020; Naylor et al., 2018; Nelson et al., 2018; Orr et al., 2020; Speight et al., 2020; Weeden et al., 2016; Wills et al., 2014; Wu et al., 2019), four studies as low generalization (Bolt et al., 2019; Monson et al., 2020; Naylor et al., 2018; Nelson et al., 2018), five studies as applying only Tier 1 in class-wide

interventions (Caldarella et al., 2019; Jolstead et al., 2017; Monson et al., 2020; Orr et al., 2020; Wu et al., 2019), four studies as the limited time of the intervention (Bolt et al., 2019; Chen et al., 2022; Naylor et al., 2018; Nelson et al., 2018), two studies as collection of incomplete data due to absenteeism (Bolt et al., 2019; Caldarella et al., 2019), three studies as the inadequate determination of target criteria while selecting participants (Bolt et al., 2019; Caldarella et al., 2019; Monson et al., 2020), four studies as the inability of the research design to ensure experimental control (Jolstead et al., 2017; Naylor et al., 2018; Orr et al., 2020; Wills et al., 2014), one study as the uneven collection of social validity data from children (Orr et al., 2020), one study as the inadequate review of agreement while calculating interobserver agreement (Wills et al., 2014), one study as not checking student satisfaction (Wills et al., 2014), and one study as the collection of no data for academic achievement (Wills et al., 2014).

Table 8. Recommendation Category

Recommendation Category	f	Studies
Conduct research with more participants to increase generalizability	12	Caldarella et al., 2017; Caldarella et al., 2019; Chen et al., 2022; Conklin et al., 2016; Jolstead et al., 2017; Johnson et al., 2024; Monson et al., 2020; Naylor et al., 2018; Nelson et al., 2018; Speight et al., 2020; Weeden et al., 2016; Wu et al., 2019
Include students with different disabilities in interventions	3	Bolt et al., 2019; Caldarella et al., 2019; Orr et al., 2020
Apply Tier 2 interventions (targeted support)	6	Caldarella et al., 2019; Jolstead et al., 2017; Johnson et al., 2024; Monson et al., 2020; Orr et al., 2020; Wu et al., 2019
Determine selection criteria carefully when selecting target students	1	Monson et al., 2020
Conduct studies on academic topics	4	Bolt et al., 2019; Chen et al., 2022; Torelli et al., 2016; Wills et al., 2014
Ensure peer educators do not bias student responses in social validity assessments	1	Orr et al., 2020
Have interventions delivered by individuals with pedagogical training	1	Nelson et al., 2018
Ensure interventions are carried out over sufficient time periods	4	Conklin et al., 2016; Nelson et al., 2018; Speight et al., 2020; Wu et al., 2019
Include people outside the research team in intervention delivery	1	Jolstead et al., 2017
Use alternative research models to address design limitations	2	Jolstead et al., 2017; Wills et al., 2014
Increase rigor in interobserver agreement checks	1	Wills et al., 2014
Include student satisfaction measures in social validity data	1	Wills et al., 2014

According to Table 8, twelve studies recommended conducting research with more participants to increase generalizability (Caldarella et al., 2017; Caldarella et al., 2019; Chen et al., 2022; Conklin et al., 2016; Jolstead et al., 2017; Johnson et al., 2024; Monson et al., 2020; Naylor et al., 2018; Nelson et al., 2018; Speight et al., 2020; Weeden et al., 2016; Wu et al., 2019), three studies recommended including students with different disabilities in interventions (Bolt et al., 2019; Caldarella et al., 2019; Orr et al., 2020), six studies recommended applying a Tier 2 intervention

(Caldarella et al., 2019; Jolstead et al., 2017; Johnson et al., 2024; Monson et al., 2020; Orr et al., 2020; Wu et al., 2019), one study recommended determining selection criteria well while selecting target students (Monson et al., 2020), four studies recommended conducting studies on academic topics (Bolt et al., 2019; Chen et al., 2022; Torelli et al., 2016; Wills et al., 2014), and one study recommended ensuring that peer educators do not intervene to prevent bias while social validity questions directed to students are answered (Orr et al., 2020). In a study, it was recommended that interventions should be carried out by individuals who received pedagogical education (Nelson et al., 2018). Four studies recommended carrying out interventions in sufficient periods (Conklin et al., 2016; Nelson et al., 2018; Speight et al., 2020; Wu et al., 2019;). It was recommended in one study to include people other than the research team in the intervention (Jolstead et al., 2017), in two studies to carry out an intervention with a different model to eliminate limitations in the research design (Jolstead et al., 2017; Wills et al., 2014), in one study to check for more agreement while calculating interobserver agreement (Wills et al., 2014), and in one study to collect data on student satisfaction in social validity data (Wills et al., 2014). Studies are observed to give recommendations on limitations in general. In most of the class-wide PBS studies reviewed, Tier 1, in other words, preventive interventions were performed.

Table 9. Descriptive Analysis Results of the Studies Included in the Review

Author	Participant	Implementer	Dependent variable	Setting	Research design	IOA/PF	Social Validity	Limitations-Recommendations
(Aspiranti et al., 2018)	40 students (6 students with ASD)	2 primary school teachers/ 2 assistants	Reducing inappropriate behaviors	Primary school class	-	- / -	+	+ / +
(Bolt et al., 2019)	15 students (3 students with developmental disability) 4 teachers	1 special education teacher 1 physical education teacher 1 painting teacher 1 music teacher	Active participation Disruptive behaviors Correct response Teacher praise and reprimands	Small class in summer internship	Alternating treatment design	+ / +	+	+ / +
(Caldarella et al., 2017)	22 students 1 music teacher	1 music teacher	Group on-task behavior Teacher praise and reprimands	Music Class	ABAB	+ / +	+	+ / +
(Caldarella et al., 2019)	234 students/ (23 with emotional behavior impairment) 9 teachers	9 teachers	Group on-task behavior Teacher praise and reprimands Disruptive behaviors	Middle school classes	ABAB	+ / +	+	+ / +
(Chen et al., 2022)	25 students (4 special education students)	1 teacher	On-task behavior Teacher-student relationship	Middle school class	A multiple baseline design	+ / +	+	+ / +

(Conklin et al., 2016)	80 students (13 special education)	4 teachers	On task, Compliance, Hand-raising, out-of-seat, talking out, teacher praise and reprimands	Preschool, primary school class, middle school class	ABAB	+ / +	+	+ / +
(Johnson et al., 2024)	23 students (14 SLD, 3 ASD, 2 EBD, 4 OHI)	2 special education teachers	Group On-task behavior Teacher praise and reprimands	Two special education math classes	ABAB	+ / +	+	+ / +
(Jolstead et al., 2017)	55 students 3 teachers	3 preschool teachers	Group on-task behavior Teacher praise and reprimands	Kindergarten class	Delayed multiple probe design across classes with reversal model	+ / +	+	+ / +
(Mahon et al., 2020)	32 students (1 student ASD, 3 students with language delay)	3 teachers	Social skills On-task behavior Problem behavior.	Preschool	A multiple baseline design	+ / +	+	+ / +
(Monson et al., 2020)	56 students 2 art teachers	2 art teachers	Group on-task behavior Teacher praise and reprimands	Middle school art class	ABAB	+ / +	+	+ / +
(Naylor et al., 2018)	11 students (3 special education students) 1 teacher	1 primary school teacher	Group on-task behavior Teacher praise and reprimands	Primary school class	ABAB	+ / +	+	+ / +
(Nelson et al., 2018)	66 students 1 painting teacher	1 painting teacher	Group on-task behavior Teacher praise and	Primary school art class	AB / ABAB	+ / +	+	+ / +

			reprimands					
(Orr et al., 2020)	12 students 11 peer educators 1 teacher	1 special education teacher	Group on-task behavior Teacher praise and reprimands	Middle school special education class	ABAC	+ / +	+	+ / +
(Speight et al., 2020)	35 students (8 special education students)	3 teachers	On-task behavior Teacher praise and reprimand statements	Middle school class	A multiple baseline	+ / +	+	+ / +
(Torelli et al., 2016)	37 students (3 special education teachers)	2 primary school teachers	Disruptive attempts to attract attention	Primary school class	Multiple probe design embedded in alternating treatments model	+ / +	+	+ / +
(Weeden et al., 2016)	6 students 1 teacher	1 primary school teacher	Group on-task behavior Teacher praise and reprimands	Primary school class	ABAB	+ / +	+	+ / +
(Wills et al., 2014)	3 students (3 with Behavioral Disorder) 1 teacher	1 classroom teacher	Group on-task behavior Teacher praise and reprimands Disruptive behaviors	Primary school class	Nonconcurrent multiple baseline design across abilities	+ / +	+	+ / +
(Wu et al., 2019)	24 students (1 student ASD)	1 teacher	On-task behavior Disruptive behaviors	Primary school class	ABABCBC	+ / +	+	+ / +

SLD=specific learning disability, OHI=other health impairment, EBD=emotional/behavioral disorder, ID=intellectual disability, ASD=autism spectrum disorder



## CONCLUSION and DISCUSSION

Eighteen studies using single-subject research designs in class-wide positive behavior support interventions were analyzed descriptively in terms of the variables determined. When the number of studies examined from the ERIC, Google Scholar, Pubmed, Scopus database is considered, the low number of studies using the single-subject research design is noteworthy. Therefore, an increase is expected in the number of studies. In this section, data on every finding will be discussed.

In the 18 studies reviewed, it is seen that the genders of most participants are not stated due to the class-wide intervention (Aspiranti et al., 2018; Bolt et al., 2019; Caldarella et al., 2019; Chen et al., 2022; Conklin et al., 2016; Naylor et al., 2018; Speight et al., 2020; Torelli et al., 2016; Wu et al., 2019). Therefore, it is impossible to make a comparison of findings in terms of gender. In prospective studies, interventions can be carried out by dividing participants into groups according to gender, and it can be checked whether there is a difference in effectiveness in terms of gender. Another remarkable finding related to the participants in the studies reviewed is that there was a study in which the number of participants in the class-wide intervention was not stated properly (Wills et al., 2014). In this case, no specific information is given about whether the number of participants in the class-wide intervention was sufficient. Furthermore, in studies, it is observed that the number of participating individuals with disabilities is extremely low. In future studies, it should be encouraged to include more students with disabilities and conduct studies on students with different disabilities.

Concerning the dependent variable findings of the studies, both group on-task behavior and teacher praise and reprimands are focused on in nine studies (Caldarella et al., 2017; Caldarella et al., 2019; Johnson et al., 2024; Jolstead et al., 2017; Monson et al., 2020; Naylor et al., 2018; Nelson, 2018; Orr et al., 2020; Weeden et al., 2016; Wills et al., 2014). As a result of the studies, it is seen that the class-wide PBS intervention was effective on group on-task behavior, teacher praise and reprimands. These findings are consistent with the results of the previous studies conducted with primary school (Kamps et al. 2011) and middle school (Wills et al. 2019) classes. Moreover, target students on-task behavior was examined as a dependent variable only in three studies (Caldarella et al., 2019; Monson et al., 2020; Naylor et al., 2018), and class-wide PBS was effective on student behaviors. As a result of the class-wide intervention of Wills et al. (2016) targeting student behaviors, similar development and increased participation were reported.

In studies, it is seen that interventions were performed rather with participants in primary school. Hence, the findings of the studies are limited to participants in primary school. The fact that interventions were carried out with few classes was indicated as a limitation, whereas it was emphasized that interventions should be carried out with more participants (Bolt et al., 2019; Caldarella et al., 2017; Caldarella et al., 2019; Jolstead et al., 2017; Monson et al., 2020; Naylor et al., 2018; Nelson et al., 2018; Orr et al., 2020; Weeden et al., 2016; Wills et al., 2014). Therefore, it can be suggested that similar studies be conducted with different grades to be able to make comprehensive interpretations of the effectiveness of class-wide interventions. In addition, in only two of the studies examined (Johnson et al. 2024; Orr et al., 2019), it is seen that the classes in which the application is made are special education classes and it is stated that effective results are obtained as a result of the application. In prospective studies, it is recommended to include interventions with special education classes in order to examine whether class-wide interventions are effective for students with special needs and make generalizations.

When the method sections of the studies are reviewed, it is seen that the ABAB design (Caldarella et al., 2017; Caldarella et al., 2019; Conklin et al., 2016; Johnson et al., 2024; Monson et al., 2020; Naylor et al., 2018; Nelson et al., 2018; Weeden et al., 2016) is rather used compared to single-subject interventions. In a study (Wills et al., 2014), the nonconcurrent multiple probe design across abilities was used. There are different descriptions in the literature for the multiple probe design (Riley-Tillman & Burns, 2009), and there are also various studies on

nonconcurrent interventions in the literature (Lastrapes et al., 2018; Orr et al., 2020; Wills et al., 2014). In a multiple baseline design, data collection is classically performed in the same or similar settings concurrently, and the intervention is initiated at the same time, increasing experimental control (Kazdin & Kopel 1975; Riley-Tillman & Burns, 2009). However, it is impossible to concurrently intervene in students with the same problems experienced at the same time due to a lack of teachers and a low number of students (Winn et al., 2004). In such cases, a nonconcurrent multiple probe design is employed to collect data (Watson & Workman, 1981). The research can be conducted using a nonconcurrent multiple prove design when desired interventions for future studies cannot be performed simultaneously due to the reasons stated. Furthermore, a study (Aspiranti et al., 2018) provided no information about the research design. This situation also causes the research design not to be understood completely. In future studies, it is recommended to explain the research design in detail so that study findings can be comprehended better.

When the studies were reviewed in terms of the collection of reliability data, it was seen that interobserver agreement data and procedural fidelity data were collected in 17 studies. The high percentage of collecting reliability data indicates the importance attributed to the collection of reliability data by researchers in recent years. However, in a study reviewed (Wills et al., 2014), the rate of the reliability data collected was below 30%. This was stated as the limitation of the intervention, and it is thought that the rate of reliability data should be above 30% in prospective studies. Another finding on reliability data is that no findings were encountered regarding reliability in a study (Aspiranti et al., 2018). One of the most important requirements in single-subject research designs is that interobserver agreement and procedural fidelity data are collected (Horner et al., 2005; Kratochwill et al., 2013). In future studies, it is recommended to obtain interobserver agreement and procedural fidelity data, one of the standards of single-subject research designs.

Additionally, it is reported in the studies reviewed that follow-up and generalization data on interventions could not be collected due to carrying out the process at the end of the term (Bolt et al., 2019; Torelli et al., 2016), and no behavioral follow-up was performed after the intervention in studies where the reversal model was used. In studies, these circumstances are stated as limitations. In future studies, it is thought that the study period should be planned carefully, and follow-up and generalization data should also be collected to evaluate whether the behavior will return.

In all 18 studies conducted on class-wide PBS, social validity data were collected. Social validity data were collected based on two different definitions (Teacher satisfaction and social validity). Considering the common point of the data collected under these headings, teachers' views on the intervention process and the acceptability of the intervention process were evaluated via different Likert scales and open-ended questions. Only in three studies (Aspiranti et al., 2018; Torelli et al., 2016; Wills et al., 2014), no social validity data were collected on student satisfaction. Moreover, in the data collected on social validity, teachers stated that class-wide interventions were effective on the targeted behavior, but the reward used was not appropriate for some students. It is anticipated that the rewards to be used in future studies should be determined according to students' needs. Teachers and students agreeing on social validity findings stated that they found CW-FIT Tier-1 useful and socially valid. It is seen that these findings are consistent with the study findings of Wills et al. (2010) and Caldarella et al. (2015). Another noteworthy finding concerning social validity data was that incomplete social validity data were collected due to students' absenteeism (Bolt et al., 2019; Caldarella et al., 2019). Furthermore, social validity data were not collected from the parents of students in any of the studies examined. However, parents are the closest to their children, and children can easily tell their parents about the positive/negative situations arising in the classroom. Future studies may collect social validity data from parents to whom children can mention the interventions carried out in the classroom without hesitation. This situation will not only increase the sincerity and

impartiality of the data to be obtained from children but also serve to determine the views of parents on interventions in the classroom.

One of the important contributions of this study to the field is to draw attention to the gaps in this field by systematically revealing the current state of single-subject research focusing on classroom-wide PBS interventions. Evaluations of critical research components such as participant information, designs used, reliability data, social validity and follow-up measures indicate that classroom-level interventions, especially in the field of special education, should be designed more systematically and inclusively. In addition, the fact that social validity data are mostly collected on the basis of teachers and students, that parents' views are not sufficiently included in this process, and that a limited number of special education classes are included in the studies stand out as important areas of improvement for future research. In this context, the study fills an important gap in the literature by providing guiding suggestions to both researchers and practitioners in terms of methodological rigour, participant diversity and expanding the scope of social validity, and provides direction for future scientific studies.

As in every research, there are some limitations in this study. The first limitation is that the studies examined within the scope of the research are limited to single-subject studies. Studies in which different methods are used can also be analysed. In addition, it is also possible that there may be studies that were overlooked by the authors of the study during the scanning.

#### **CONTRIBUTION RATE OF THE RESEARCHERS**

The contributions of the authors in this article are equal.

#### **ETHICS COMMITTEE STATEMENT**

The authors declare that their study is not subject to ethics committee permission and that the rules determined by the Committee on Publication Ethics (COPE) were followed throughout the entire process of the study.

#### **STATEMENT OF CONFLICT OF INTEREST**

There is no conflict of interest between the authors

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