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A Large-Scale Randomized Controlled Trial of Two Universal Parenting Programs for Adolescents: Effects on Mental Health, Substance Use, Parenting, and Family Relationships

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Abstract

Background: Evidence for brief universal parenting programs during adolescence in routine services remains limited. This study evaluated group-based ABC-Teen and internet-delivered ParentWeb.

Methods: In a three-arm randomized trial, 1,247 families (1,327 parents of adolescents aged 13–19 years) were allocated to ABC-Teen, ParentWeb, or waitlist. The programs comprised four sessions or modules delivered by practitioners in routine settings. Assessments occurred at baseline, the 4-month assessment, and 12-month follow-up. The waitlist ended after the 4-month assessment, and

subsequent analyses compared only the two programs. Parent-reported SDQ Total Difficulties was the primary outcome. Secondary outcomes covered parenting, family relationships, parental well-being, and adolescent substance use; other adolescent-reported outcomes were assessed in a subsample. Longitudinal models accounting for repeated observations and family clustering compared changes between conditions.

Results: Both programs produced greater reductions in parent-reported SDQ Total Difficulties than waitlist (ABC-Teen: standardized mean difference [SMD] = 0.17, 95% CI [0.06, 0.28], p = .003; ParentWeb: SMD = 0.24, 95% CI [0.11, 0.38], p < .001). Both also improved several parent-reported parenting and family outcomes relative to waitlist, although improvements were observed across a broader range of outcomes for ABC-Teen. Despite this broader pattern of improvements for ABC-Teen relative to waitlist, the two programs did not differ at the 4-month assessment or the 12-month follow-up on the primary or secondary outcomes. ParentWeb participants completed slightly more modules than ABC-Teen participants completed sessions, whereas satisfaction was higher for ABC-Teen. No statistically significant between-group differences were found for adolescent-reported psychosocial outcomes or tobacco or alcohol use; illicit-drug use was too infrequent for stable inferential analysis.

Conclusions: Two brief universal parenting programs produced small but statistically significant improvements in parent-reported adolescent mental health and several parenting and family outcomes compared with a waitlist control in routine Swedish services. Both programs may therefore represent useful low-intensity options for supporting parents of adolescents. No statistically significant differences were detected between the programs, although the trial was not designed to establish equivalence. Further research involving longer controlled follow-up and additional evidence on adolescent-reported effects and cost-effectiveness is needed to guide implementation decisions.

Trial registration: ClinicalTrials.gov, NCT06366438, retrospectively registered on April 19, 2024.

Background

Adolescence is a period of substantial biological, psychological, and social change. Although increasing autonomy and involvement with peers are normative aspects of this developmental stage, adolescence also coincides with the onset or escalation of many mental health problems and risk behaviors. Internationally, depression, anxiety, and related difficulties constitute a considerable burden among young people [1], and Swedish data indicate similarly concerning patterns [2,3]. Accessible preventive strategies that can reach families before problems become severe are therefore an important complement to indicated treatment and specialist services.

Parents remain influential throughout adolescence, although the nature of their influence changes as adolescents become more autonomous. Parenting characterized by warmth, constructive communication, emotional support, and appropriate monitoring is associated with fewer internalizing and externalizing problems, whereas harsh, conflictual, or psychologically controlling parenting is associated with poorer outcomes [4,5]. Supporting parents may consequently provide an indirect and potentially scalable means of promoting adolescent well-being.

Parenting interventions are well established for younger children [6], and intensive family-based or systemic interventions have demonstrated benefits for adolescents with serious behavioral or substance-related problems [7]. Much less is known, however, about universal preventive interventions offered to parents of adolescents who have not been selected on the basis of elevated risk, diagnosed disorders, or existing service involvement. In particular, relatively few studies have examined programs delivered primarily or exclusively to parents, with the aim of changing parenting practices and family relationships as a pathway to improved adolescent outcomes.

Evidence from randomized trials in which parenting interventions have been offered universally to families of adolescents remains limited and mixed. Relatively small trials of group-based programs have reported improvements in parenting, family relationships, parental well-being, and adolescent problems. Group Teen Triple P produced medium-to-large improvements in parenting and family relationships, with several effects corroborated by adolescents and maintained at six-month follow-up [8]. The Parents Plus Adolescent Programme similarly produced improvements in parent-reported

adolescent problems and parental well-being [9], while Tuning in to Teens produced small-to-medium improvements in emotion-related parenting, family conflict, and adolescent externalizing problems [10].

Randomized evaluations of online programs have found improvements in parenting but smaller or less consistent effects on adolescents. Short- and longer-term findings from the Partners in Parenting trial showed sustained medium-sized improvements in parent-reported parenting risk and protective factors, whereas effects on adolescent depression and anxiety were limited and generally not corroborated by adolescents [11,12]. A fully automated single-session intervention showed a similar pattern [13]. In the Family Check-Up Online trial, small improvements in parental self-efficacy and parent-reported adolescent emotional problems were found when the program included coaching support [14]. These findings suggest that parents remain a viable target for universal prevention, but changes in parenting do not necessarily translate rapidly or consistently into benefits experienced by adolescents. This pattern is also reflected in a recent meta-review, which found limited and inconsistent evidence that universal parenting interventions prevent mood disorders, disruptive behavior, or broader mental health problems, but more consistent evidence that they can delay the initiation of alcohol and cannabis use [15]. Confidence in most of the underlying reviews was nevertheless rated as low or critically low. Evaluations should therefore distinguish parenting and parental well-being from adolescent outcomes, include reports from both parents and adolescents where possible, and consider that effects may differ across adolescent outcome domains. More broadly, substantial gaps remain concerning the populations studied, the intensity and scalability of the programs, and their implementation under routine conditions.

Three gaps are particularly relevant. First, trials of universally offered group programs have generally been small, and most studies have focused on early adolescence, often around the transition to secondary school. Evidence concerning families with older adolescents is therefore particularly limited. Previously evaluated programs have also often required six to eight group sessions or contacts [8-10], while more extensive online programs have included up to nine tailored modules and professional support [11,12]. Such interventions may be difficult to justify and sustain when expected

effects are modest. Conversely, very brief unsupported interventions can be scalable but insufficient to produce detectable adolescent benefits [13,14]. Small individual-level effects can nevertheless be meaningful at the population level if an intervention is inexpensive, accessible, and widely adopted [16]. The balance between program intensity, reach, cost, and effect is therefore central. An economic evaluation of the brief Swedish universal parenting program All Children in Focus, developed for parents of younger children, found only borderline cost-effectiveness despite relatively low delivery costs and medium-sized effects [17].

Second, trials of parenting interventions should more consistently assess parental mental health—including depression, anxiety, and parenting stress—because it may both influence parenting and constitute an important intervention outcome in its own right. The Family Stress Model proposes that distal stressors, such as economic hardship, can affect children partly through parental psychological distress and subsequent disruptions in parenting [18]. Longitudinal evidence also suggests that parental affective disorders may increase offspring vulnerability to dysfunction in the family environment [19]. Although parenting programs for younger children can improve parental psychosocial health [20], evidence concerning parents of adolescents remains limited. A recent systematic review of universal parenting interventions for adolescents found that parental outcomes were primarily focused on parenting behavior, with parental mental health often overlooked [21]. Some universal programs for parents of adolescents have reported improvements in parenting stress or well-being [9]. In a pilot trial of a more extensive version of ParentWeb among parents of adolescents with elevated externalizing problems, the intervention also reduced parenting stress and depressive symptoms [22]. More recent trials in other selected or high-risk samples have similarly reported reductions in caregiver stress or mental health problems [23-25].

Third, much of the previous evidence comes from efficacy trials in which researchers have had substantial responsibility for intervention delivery or implementation support. Such studies can maximize adherence to protocols and internal validity, but their findings may not generalize to routine services, where interventions are delivered by regular practitioners under ordinary organizational and resource constraints [26,27]. Large-scale effectiveness trials are therefore needed to determine

whether benefits can be achieved under the conditions in which programs would ultimately be disseminated. Implementation under routine conditions is also insufficiently documented. A recent scoping review found that studies of parenting programs in real-world community settings generally reported no more than two implementation outcomes, most commonly fidelity and acceptability, while costs, sustainability, and the consequences of program adaptations received limited attention [28].

The mode of delivery is also important. Group-based programs provide opportunities for discussion, skills practice, and support from other parents and trained leaders, whereas internet-delivered programs may reduce geographical, scheduling, and practical barriers and allow parents to work at their own pace. Both formats can be suitable for dissemination, but direct comparisons are uncommon, particularly in universal interventions for parents of adolescents. In a Swedish routine-care trial involving younger children with disruptive behavior problems, an internet-delivered parenting program was noninferior to the same program delivered in a group setting, although parents initially reported greater intervention satisfaction and more favorable outcomes on some short-term secondary measures with the group format. These differences were no longer evident at follow-up [29]. Whether similar patterns apply to brief universal programs for parents of adolescents remains uncertain. Parents' preferences may also matter: receiving a preferred format could facilitate engagement, although associations between preference fulfillment and participation cannot be interpreted causally unless preference is incorporated into the experimental design.

The present three-arm randomized controlled trial addressed these gaps by evaluating two brief, universal parenting programs for families with adolescents aged 13–19 years: ABC-Teen, a manualized four-session group program, and ParentWeb, a four-module internet-delivered program with asynchronous support from a trained guide. Both programs aim to promote adolescent well-being by strengthening parenting practices and parent–adolescent relationships, although their specific content and modes of delivery differ. The interventions were implemented primarily by regular practitioners within municipal services across Sweden, providing an opportunity to examine their effects under routine service conditions.

The primary aim was to determine whether ABC-Teen and ParentWeb reduced parent-reported adolescent mental health problems from baseline to the 4-month assessment compared with a waitlist condition. Secondary aims were to examine effects on parent mental health and stress, parenting behaviors and parental self-efficacy, parent–adolescent and family relationships, adolescent school engagement, and adolescent tobacco, alcohol, and illicit drug use. Corresponding adolescent-reported outcomes, including adolescent-reported mental health problems, were examined as secondary outcomes among participants in the optional adolescent survey. Parents' engagement with and satisfaction with the programs were assessed using session or module completion, completion of between-session assignments, and ratings of program satisfaction. Because the waitlist condition ended after the 4-month assessment, longer-term analyses compared changes between ABC-Teen and ParentWeb through the 12-month follow-up and examined change within each program after the 4-month assessment. The study also explored whether receiving one's preferred intervention was associated with engagement. Overall, the study sought to clarify whether brief, low-intensity universal parenting support delivered under routine-service conditions can produce detectable improvements across a broad span of adolescence and whether group-based and internet-delivered formats represent viable alternatives for large-scale implementation.

Methods

Design

This study was a three-arm, parallel-group randomized controlled trial evaluating the effects of two universal parenting interventions (ABC-Teen and ParentWeb) compared to a waitlist control group. The trial was conducted in Sweden from 2021 to 2024. Ethical approval was obtained from the Swedish Ethical Review Authority (Approval number: 2020-05689). The trial was retrospectively registered at ClinicalTrials.gov (NCT06366438) on April 19, 2024, after recruitment and data collection had commenced but before the outcome analyses were conducted. The registration record is available at https://clinicaltrials.gov/study/NCT06366438. The primary outcome, assessment time

points, and broad analytical approach had been specified in the original ethics application before recruitment and randomization began. The planned analyses were described in greater detail in the trial registration before the data were analyzed.

Public and stakeholder involvement

Members of the public and other stakeholders were not involved in the design, conduct, analysis, interpretation, or reporting of the present trial. However, parents, adolescents, and practitioners contributed to the earlier development of the interventions. During the development of ABC-Teen, adolescents and parents completed surveys, while practitioners contributed through surveys and focus groups and provided ongoing feedback during pilot testing. Focus groups with adolescents informed the development of ParentWeb.

Participants

Participants were recruited from 58 sites across 52 of Sweden's 290 municipalities, representing approximately 18% of all Swedish municipalities. Participating sites were primarily municipal social service units providing preventive support to children and families. No formal eligibility criteria were specified for participating sites beyond being services that provided, or were positioned to provide, parenting support. Families with adolescents aged 13–19 years were eligible if at least one participating parent lived with the adolescent at least part-time. Exclusion criteria were (a) ongoing treatment or assessment concerning a child or adolescent in psychiatric services, social services, primary care mental health services, habilitation services, or equivalent services, and (b) health-related or language difficulties that would impede questionnaire completion or participation in group-based or online parenting support.

Procedure

Participants were recruited through local advertisements in schools and municipal online channels. Interested parents were referred to a website containing additional information and a consent form. When the adolescent had two legal guardians, consent from both was required for the family to be

included, irrespective of whether both participated in the study. Parents selected one adolescent in the family as the focus of questionnaire responses. If that adolescent was aged 15 years or older, the adolescent also had to consent before the family could be included. Both parents in two-parent households were encouraged to participate in the interventions, although only one was required to do so. At least one parent in each participating family was required to contribute questionnaire data. The other parent, when applicable, and all adolescents in the family were also invited to participate. After the required parent baseline assessment had been completed, families were randomized to one of the two interventions or to a waitlist control condition. Assessments were conducted at 4 months after baseline (4-month assessment) and at 12 months after baseline (follow-up). After the 4-month assessment, families in the waitlist condition were offered an intervention of their choice (ABC-Teen or ParentWeb). The controlled waitlist comparison therefore ended at the 4-month assessment.

Families were enrolled from August 31, 2021, through November 8, 2022. In total, 1,247 families provided informed consent and were randomized. The family was the unit of randomization. At baseline, the 1,247 randomized families comprised 1,327 parent respondents and 471 adolescent respondents from 441 families. When more than one parent or adolescent within a family provided questionnaire data, responses from all participating family members were retained for analysis. Consequently, the number of individual respondents could exceed the number of randomized families. Parent baseline assessments were completed before randomization. Adolescent participation in the baseline survey was not required for randomization, and the survey could be completed after allocation but had to be completed before the intervention began. Consequently, although participating adolescents were analyzed according to their family's randomized allocation, the adolescent analytic sample was potentially subject to post-randomization selection. As the programs were universal preventive interventions rather than treatments, participants were not restricted from seeking or receiving other services or support during the trial. The use of such services was not systematically recorded.

Randomization

Randomization was stratified by site. Before participant enrollment began, the principal investigator (MF) generated a separate computer-generated randomization sequence for each of the 58 participating sites using Randomize.org. The sequences used permuted blocks of four with a 2:1:1 allocation ratio to ABC-Teen, ParentWeb, and waitlist, respectively. Parents enrolled electronically, either independently or after receiving information or a recommendation from local staff. Each enrollment received an unambiguous electronic timestamp. A co-author (AM) then assigned eligible families strictly in chronological order to the next available position in the corresponding site-specific sequence, without discretion to alter the enrollment order or group assignment. Neither parents nor local staff had access to the allocation sequences or knowledge of the upcoming assignment. They were informed that the probability of allocation to ABC-Teen was higher, but the exact allocation ratio and sequence details were not disclosed during recruitment. After assignment, the administrator informed the family and the local site of the allocated condition. The principal investigator was not involved in participant enrollment or the assignment of individual families. No deviations from the prespecified allocation sequences occurred.

Interventions

Both ABC-Teen and ParentWeb are universal parenting interventions aimed at promoting adolescent mental health by strengthening the parent–adolescent relationship and supporting positive parenting practices. Both programs draw on social learning and attachment theories and address four main areas: positive parent–adolescent interactions, communication and validation, management of parenting stress and conflict, and collaborative problem-solving. The programs primarily differ in their mode of delivery. The content and sequence of the four ABC-Teen sessions and ParentWeb modules are summarized in Table 1.

Table 1. Overview of content in the ABC-Teen sessions and ParentWeb modules

Meeting/ Module	ABC-Teen	ParentWeb

1	Creating opportunities for spending more time together.	
2	Active listening and validation.	
3	Parenting stress management and emotional regulation.	Picking battles and collaborative problem solving.
4	Picking battles, collaborative problem solving and hold firm on boundaries.	Parental emotional regulation and autonomy support of teenagers.

ABC-Teen is a manualized, group-based intervention delivered in four 2.5-hour face-to-face sessions over approximately three months, followed by one or two optional follow-up sessions addressing either supporting school functioning or intimate relationships. Groups typically consist of 10–15 parents and are led by two trained group leaders. Sessions include brief theoretical content, group discussions, exercises, and role-play, and parents practice the strategies between sessions.

ParentWeb is an internet-based intervention consisting of four modules completed individually over approximately 6–8 weeks. Each module takes approximately 1–1.5 hours and includes text, videos, reflective questions, exercises, and assignments for parents to practice between modules. Parents also have access to optional material addressing specific adolescent-related issues, including mental health and school problems. Throughout the intervention, participants receive asynchronous written support and feedback from a trained parent guide via a secure messaging system.

ABC-Teen group leaders and ParentWeb guides were primarily professionals working in municipal social services, but also in schools and other settings. No formal professional eligibility criteria were specified for intervention providers. Practitioners delivered parenting advice and support as part of their regular roles within the participating services and completed the relevant program-specific training before delivering the intervention. ABC-Teen group leaders received training comprising three 6-hour sessions and one 3.5-hour session over four months. ParentWeb guides were professionals from the same settings as ABC-Teen. They received online training, consisting of a full-day seminar and a 3-hour follow-up session approximately two months later, and completed the ParentWeb program themselves before supporting participants.

Participant exposure to the interventions was assessed by the number of sessions or modules completed, and engagement was additionally assessed through completion of between-session assignments. Intervention delivery fidelity was not formally assessed through session recordings, independent ratings, or structured adherence checklists.

Measures

The primary outcome, adolescent mental health problems, was assessed by parent report using the Strengths and Difficulties Questionnaire (SDQ), a 25-item measure comprising five subscales. The 20 items covering emotional symptoms, conduct problems, hyperactivity/inattention, and peer problems were summed to form the Total Difficulties score (0–40), with higher scores indicating greater difficulties [30]. In the present study, Cronbach's alpha ranged from .80 to .82 across the three assessment points.

Secondary parent-reported outcomes included adolescent school engagement, parent–adolescent relationship quality, parenting, family cohesion and collaboration, and parental mental health. School engagement was assessed with four items from the Stockholm School Survey concerning whether schoolwork was perceived as interesting, enjoyable, stimulating, and difficult (α = .83–.86).

Parent–adolescent warmth was assessed using an adapted six-item subset of the Closeness subscale of the Child–Parent Relationship Scale (CPRS) [31], with higher scores indicating greater warmth and closeness (α = .85–.86), and five items assessing adolescent disclosure to parents, adapted from Stattin and Kerr [32] (α = .79–.81). Parenting was assessed with two items each for positive parenting (praise and shared activities; inter-item r = .43–.45) and negative parenting (anger and harsh responses; r = .55–.61). Parent–adolescent conflict was assessed across seven common areas of disagreement, yielding a conflict frequency score (α = .79) and, for conflicts that occurred, a mean rating of parents' perceived efficacy in managing them (conflict-resolution efficacy; α = .82–.88). Parental self-efficacy was assessed using the Me as a Parent scale (MaaP; α = .88–.89) [33], and family cohesion and collaboration using a 15-item version of the Brief Family Relationship Scale (BFRS) [34], comprising Cohesion, Expressiveness, and Conflict items (α = .90–.91). One Conflict item referring to family

violence was omitted as it was not considered appropriate for the present context. Parental depressive and anxiety symptoms were assessed using the Patient Health Questionnaire 9-item (PHQ-9; α = .84–.86) [35] and Generalized Anxiety Disorder-7-item (GAD-7; α = .85–.88) [36], respectively. Parenting stress was assessed using eight negatively worded items from the Parental Stress Scale (PSS) [37], selected from the stressor component of the scale. Items were rated from 0 to 4 and summed (range 0–32) and Cronbach's alpha from .77 to .81 in the present sample. Finally, program satisfaction was assessed among parents in the two intervention conditions using seven program-specific items covering satisfaction with program content and delivery, perceived helpfulness and impact, and willingness to recommend the program to others (α = .83–.91).

Adolescents who participated in the optional survey completed corresponding measures of the SDQ, school engagement, relationship warmth, adolescent disclosure, and conflict frequency. These adolescent-reported measures were treated as secondary outcomes because participation in the adolescent survey was optional and did not comprise the full randomized sample.

Participant-reported negative effects

At the 12-month follow-up, parents in the two intervention conditions were asked: "Have you noticed any negative effect of participating in ABC-Teen/ParentWeb?" (yes/no). Participants responding yes were asked: "If yes, briefly describe what was negative." Responses were summarized descriptively. Because potential negative effects were assessed retrospectively, only at the final follow-up, and only among respondents, no formal between-group comparison was conducted. No prospective or systematic adverse-event monitoring was conducted.

Statistical analyses

Analyses were conducted in jamovi version 2.7.6.0 using the GAMLj module. Logistic generalized estimating equation models were fitted in R through the jamovi Rj editor using the geepack package.

Available-case analyses followed the intention-to-treat principle, with respondents analyzed according to their family's randomized condition. The family was the unit of randomization, whereas the

individual parent or adolescent was the unit of observation. All available outcome data were included, including responses from multiple members of the same family, and no assessment-level outcome data were imputed. Continuous outcomes were analyzed using linear mixed-effects models with random intercepts for participant and family to account for repeated measurements within individuals and multiple respondents within families. Models included group, categorical time, and the group × time interaction as fixed effects and were estimated under the assumption that data were missing at random, conditional on the variables included in the models.

All outcome analyses from baseline to the 4-month assessment included all three randomized conditions. Planned group × time contrasts compared differences in change between each pair of conditions: ABC-Teen versus waitlist, ParentWeb versus waitlist, and ABC-Teen versus ParentWeb. Because the waitlist condition ended after the 4-month assessment, analyses of change from baseline to the 12-month follow-up were restricted to ABC-Teen and ParentWeb. These models included data from all three assessment points, with the planned longer-term contrast directly comparing change from baseline to the 12-month follow-up between the two programs. The same condition structure was used in the attrition analyses. Additional exploratory within-program contrasts examined change in parent-reported outcomes from the 4-month assessment to the 12-month follow-up. Analyses of the SDQ subscales and associations between receipt of the preferred intervention and engagement were also exploratory.

Standardized mean differences (SMDs) were calculated from estimated marginal means obtained from models fitted to standardized outcomes. Each outcome was standardized across the full longitudinal dataset using a common mean and standard deviation, and between-group SMDs represented differences in model-estimated change over time. No adjustment was made for multiple comparisons of secondary or exploratory outcomes. All tests were two-sided, with $p < .05$ considered statistically significant.

Adolescent-reported tobacco and alcohol occurrence were analyzed separately as binary outcomes indicating any versus no use. Initial binomial generalized linear mixed-effects models produced

extreme random-effect variance estimates and implausibly large odds ratios with very wide confidence intervals, consistent with sparse-data separation and unstable estimation despite nominal convergence. Tobacco and alcohol occurrence were therefore analyzed using population-averaged logistic generalized estimating equations with a binomial distribution and logit link. Models included group, time, and the group × time interaction, with family as the clustering variable to account for repeated observations from the same adolescent and the inclusion of more than one adolescent from some families. An independence working correlation structure and robust sandwich standard errors were used. Separate inferential analyses of illicit-drug occurrence were not reported because the small number of events and zero-event cells produced unstable estimates; observed frequencies and proportions were instead reported descriptively. Exponentiated group × time coefficients are reported as interaction odds ratios with 95% confidence intervals and represent ratios of change in odds over time between groups. In comparisons with waitlist, values below 1 indicate a smaller increase in the intervention condition. Direct comparisons were coded as ABC-Teen versus ParentWeb, with values below 1 indicating a smaller increase in ABC-Teen. Analyses of substance-use quantity were planned only following a statistically significant and stable group × time effect on the corresponding occurrence outcome. This criterion was not met, and quantity analyses were therefore not conducted.

Complete-data sensitivity analyses were conducted for all parent- and adolescent-reported outcomes analyzed inferentially, using the same models as in the primary analyses. The 4-month sensitivity analyses required outcome data at baseline and the 4-month assessment. The 12-month sensitivity analyses required outcome data at baseline and the 12-month follow-up; data at the 4-month assessment were not required. Continuous outcomes were reanalyzed using the same linear mixed-effects models, and tobacco and alcohol occurrence were reanalyzed using the same logistic generalized estimating equation models.

Additional analyses examined program engagement and satisfaction at the 4-month assessment. Program engagement was assessed through the number of sessions (ABC-Teen) or modules (ParentWeb) completed (range 0-4) and completion of between-session assignments, which parents rated on a four-point scale (0 = not at all, 1 = quite little, 2 = quite a lot, 3 = very much). These

outcomes were compared between ABC-Teen and ParentWeb. In an exploratory analysis among participants who had expressed an intervention preference before randomization, completion and assignment completion were also compared between those who did and did not receive their preferred intervention; participants reporting no preference were excluded.

Finally, analyses examined participation in the adolescent survey and attrition among parent and adolescent respondents. Online questionnaires could only be submitted after all required items had been completed. Thus, there was no item-level missingness within submitted questionnaires, and attrition was defined as non-completion of an assessment rather than separately for each outcome. Parent attrition at 4 and 12 months was examined using logistic regression. Predictors were randomized condition, baseline parent-reported SDQ Total Difficulties, parent age, parent gender, university education, employment or study status, country of birth, single-parent status, number of children, and the focal adolescent's age and gender.

Because participation in the adolescent survey was optional, selection into the adolescent baseline sample and subsequent attrition were examined separately. Selection into the baseline sample was analyzed at the family level among all 1,247 randomized families. When two parents provided baseline data, continuous parent variables were averaged across respondents, whereas dichotomous characteristics indicated whether the characteristic was present for at least one participating parent. Among the 471 adolescents who completed the baseline survey, logistic regression examined whether attrition at 4 and 12 months was associated with randomized condition, baseline adolescent-reported SDQ Total Difficulties, age, gender, or living with one parent. No adjustment was made for multiple comparisons in the attrition analyses. Odds ratios are reported with 95% confidence intervals.

Sample size

The original sample-size calculation indicated that 600 analyzable families would be required to detect a small effect (Cohen's $d = 0.20$) with 80% power at $\alpha = .05$. Because randomization used a 2:1:1 allocation ratio, the target analyzable sample was increased by 200 families to ensure approximately 200 families in each of the two smaller conditions, corresponding to 400 families in

ABC-Teen, 200 in ParentWeb, and 200 in waitlist. The resulting target was therefore 800 families with outcome data. Allowing for anticipated attrition of approximately 35%, the recruitment target was increased to 1,231 families (800/0.65). Because recruitment occurred concurrently across 58 sites and families already in the enrollment process could not be included or excluded at a precisely defined cut-off, the final randomized sample comprised 1,247 families, slightly exceeding the recruitment target.

Use of generative artificial intelligence

During manuscript preparation, the authors used OpenAI's ChatGPT/Codex for language editing and consistency checks. All generated content was critically reviewed and revised by the authors, who take full responsibility for the final manuscript.

Results

Participants and baseline characteristics

A total of 1,247 families, comprising 1,327 parent respondents, were randomized to ABC-Teen, ParentWeb, or waitlist. Participant flow through the study is shown in Figure 1, and demographic characteristics and baseline outcome scores are presented in Table 2a. The parent sample was predominantly female (82%), 74% had a university degree and 93% were employed or studying. The adolescent in focus was female in 48% of families. Baseline characteristics were generally similar across conditions.

The adolescent survey was completed by 471 adolescents from 441 families at baseline, of whom 55% were girls; their mean age was 14.5 years (SD = 1.2). Demographic characteristics and baseline outcome scores for the adolescent-report sample are presented in Table 2b. Adolescent age was similar across randomized conditions.

Figure 1. Participant flow diagram.

Table 2a. Demographic characteristics and baseline parent-reported outcomes

	ABC (n = 724)	ParentWeb (n = 306)	Waitlist (n = 297)	Total (n = 1327)
Demographics				
Single parent	21%	29%	23%	23%
University degree	72%	74%	79%	74%
Employed or studying	92%	93%	93%	93%
Mothers	80%	85%	84%	82%
Born in Sweden	84%	84%	83%	84%
Blended family	31%	39%	31%	33%
Girls (adolescent in focus)	48%	48%	47%	48%
Adolescent age (adolescent in focus)	14.2 (1.4)	14.2 (1.3)	14.0 (1.3)	14.2 (1.3)
Parent age	46.7 (5.5)	46.0 (6.1)	46.7 (5.5)	46.5 (5.7)
Outcome measures				
SDQ Total Difficulties	11.1 (5.2)	11.1 (5.2)	10.6 (5.3)	11.0 (5.2)
Parental depressive symptoms (PHQ-9)	5.1 (4.5)	4.7 (4.3)	4.9 (4.3)	5.0 (4.4)
Parental anxiety symptoms (GAD-7)	3.8 (3.7)	3.5 (3.4)	3.8 (4.0)	3.7 (3.7)
Parenting stress (PSS)	13.5 (6.3)	13.4 (6.6)	13.3 (6.4)	13.4 (6.4)
Positive parenting	6.8 (2.1)	6.8 (1.9)	6.7 (2.0)	6.8 (2.1)
Negative parenting	6.2 (2.4)	6.3 (2.4)	6.1 (2.4)	6.2 (2.4)
Parental self-efficacy (MaaP)	43.9 (9.6)	45.0 (10.0)	44.0 (10.3)	44.2 (9.8)
Conflict frequency	9.7 (4.9)	9.6 (4.8)	9.6 (4.8)	9.7 (4.9)
Conflict-resolution efficacy	37.2 (11.8)	37.1 (11.1)	35.5 (11.1)	36.8 (11.5)
Closeness in relationship (CPRS)	15.2 (5.6)	15.2 (5.6)	15.4 (5.8)	15.3 (5.6)
Adolescent disclosure	11.7 (4.4)	11.5 (4.0)	11.6 (4.3)	11.7 (4.3)
Family cohesion and collaboration (BFRS)	90.3 (43.3)	92.6 (43.5)	92.8 (43.4)	91.4 (43.3)
School engagement	6.4 (2.8)	6.2 (3.0)	6.4 (2.8)	6.3 (2.8)

Note. n refers to parent respondents; some families contributed data from two parents. In such families, both parents' characteristics and separate outcome ratings are included, whereas shared family and focal-adolescent characteristics are represented for each participating parent. Values are percentages or means (standard deviations).

Table 2b. Demographic characteristics and baseline adolescent-reported outcomes

	ABC (n = 285)	ParentWeb (n = 107)	Waitlist (n = 79)	Total (n = 471)
Demographics				
Living with single parent	13%	15%	16%	14%
Living in blended family	31%	37%	24%	31%
Girl	56%	50%	58%	55%
Age	14.6 (1.3)	14.5 (1.2)	14.5 (1.2)	14.6 (1.2)
Outcome measures				
SDQ Total Difficulties	11.9 (5.9)	12.1 (6.7)	11.7 (5.5)	11.9 (6.0)
Conflict frequency	7.5 (4.8)	8.0 (4.6)	7.3 (4.5)	7.6 (4.7)
Closeness in relationship (CPRS)	11.6 (4.0)	12.0 (4.5)	12.5 (4.0)	11.9 (4.1)
Adolescent disclosure	9.9 (3.4)	9.9 (3.8)	10.2 (3.5)	9.9 (3.4)
School engagement	6.4 (2.5)	6.4 (2.8)	6.8 (2.5)	6.4 (2.6)
Ever used tobacco	25%	20%	18%	23%
Ever used alcohol	34%	27%	27%	31%
Ever used illicit drugs	4%	3%	0%	3%

Note. n refers to adolescent respondents; some families contributed data from more than one adolescent. In such families, each adolescent's characteristics and separate outcome ratings are included. Values are percentages or means (standard deviations).

Participation and attrition analyses

At the 4-month assessment, 342 of 1,327 parent respondents (25.8%) did not complete the questionnaires. In the adjusted attrition analysis, ParentWeb participants had higher odds of attrition than ABC-Teen participants (OR = 1.51, 95% CI [1.10, 2.06], p = .009). Attrition was less likely in ABC-Teen than in waitlist (OR = 0.73, 95% CI [0.53, 0.99], p = .049), whereas ParentWeb did not differ from waitlist (OR = 1.09, 95% CI [0.77, 1.56], p = .626). Attrition was also less likely among university-educated and older parents and more likely among parents of older adolescents. Baseline parent-reported SDQ Total Difficulties and the remaining baseline characteristics were not associated with attrition. At the 12-month assessment, 374 of 1,030 parent respondents (36.3%) in ABC-Teen and ParentWeb did not complete the questionnaires. Attrition was more likely in ParentWeb than in ABC-Teen (OR = 1.54, 95% CI [1.17, 2.02], p = .003), among single parents, and among fathers or other non-mother respondents. Baseline parent-reported SDQ Total Difficulties and the remaining baseline characteristics were not associated with attrition.

Among the 1,247 randomized families, 441 included at least one adolescent who completed the baseline survey, comprising 471 adolescent respondents. Adolescent baseline data were more likely to be available in ABC-Teen than in waitlist (OR = 1.66, 95% CI [1.22, 2.25], p = .001), whereas ParentWeb did not differ significantly from either condition. Participation was less likely with increasing adolescent age and higher family-mean parent-reported SDQ Total Difficulties and more likely among girls.

At the 4-month assessment, 166 of 471 adolescents (35.2%) did not complete the follow-up questionnaire, and at 12 months, 160 of the 392 adolescents in ABC-Teen and ParentWeb (40.8%) did not complete the follow-up questionnaire. Adolescent attrition did not differ significantly between

randomized conditions at either assessment. Girls had lower odds of attrition than boys at both 4-months (OR = 0.46, 95% CI [0.31, 0.69], p < .001) and 12 months (OR = 0.63, 95% CI [0.41, 0.97], p = .035). Attrition was not significantly associated with baseline adolescent-reported SDQ Total Difficulties, adolescent age, or living with one parent.

Primary outcome

Both interventions resulted in greater improvements in parent-reported adolescent mental health from baseline to the 4-month assessment than the waitlist condition (Table 3). The average SDQ Total Difficulties score decreased from 11.1 to 9.8 in ABC-Teen and from 11.1 to 9.6 in ParentWeb, compared with 10.6 to 10.4 in the waitlist condition. The differences in change relative to waitlist were significant for both ABC-Teen (SMD = 0.17, 95% CI [0.06, 0.28], p = .003) and ParentWeb (SMD = 0.24, 95% CI [0.11, 0.38], p < .001). Compared to each other, ABC-Teen and ParentWeb did not differ significantly in change from baseline to either the 4-month assessment (SMD = −0.07, 95% CI [−0.19, 0.04], p = .212) or the 12-month follow-up (SMD = 0.00, 95% CI [−0.12, 0.13], p = .959). In exploratory within-program analyses, parent-reported SDQ Total Difficulties decreased slightly from the 4-month assessment to the 12-month follow-up in ABC-Teen (SMD = .07, 95% CI [.00, .13], p = .045), whereas no significant change was found in ParentWeb (SMD = −.01, 95% CI [−.12, .10], p = .859).

Exploratory analyses of the parent-reported SDQ subscales indicated greater reductions from baseline to the 4-month assessment in emotional symptoms and conduct problems for both ABC-Teen and ParentWeb compared with waitlist (all p ≤ .041). ParentWeb also showed a greater reduction in hyperactivity/inattention compared to waitlist (p = .011), whereas the corresponding effect for ABC-Teen did not reach statistical significance (p = .057). No statistically significant differences relative to waitlist were found for peer problems or prosocial behavior. In direct comparisons, ABC-Teen and ParentWeb did not differ significantly in change from baseline to either the 4-month assessment or the 12-month follow-up on any SDQ subscale (all p ≥ .282).

[PLACE TABLE 3 ABOUT HERE]

Secondary parent-reported outcomes

Compared with waitlist at the 4-month assessment, ABC-Teen showed significantly greater improvements in parental depressive symptoms, parenting stress, conflict frequency, conflict-resolution efficacy, parent–adolescent warmth, parental self-efficacy, negative parenting, and family cohesion and collaboration, with SMDs ranging from 0.14 to 0.31 (Table 4). ParentWeb showed significantly greater improvements than waitlist in conflict frequency, conflict-resolution efficacy, parent–adolescent warmth, negative parenting, and family cohesion and collaboration, with SMDs ranging from 0.18 to 0.30. Neither intervention differed significantly from waitlist in parental anxiety symptoms, adolescent disclosure, positive parenting, or school engagement. ParentWeb also did not differ significantly from waitlist in parental depressive symptoms, parenting stress, or parental self-efficacy. In direct comparisons, ABC-Teen and ParentWeb did not differ significantly in change from baseline to either the 4-month assessment or the 12-month follow-up on any secondary parent-reported outcome (all $p \geq .064$).

Exploratory within-program analyses examined change from the 4-month assessment to the 12-month follow-up separately for each program. In ABC-Teen, there were further improvements in conflict frequency (SMD = 0.13, 95% CI [0.06, 0.20], $p < .001$), negative parenting (SMD = 0.08, 95% CI [0.00, 0.16], $p = .044$), and parental self-efficacy (SMD = 0.10, 95% CI [0.04, 0.17], $p = .002$). In ParentWeb, further improvements were found in parenting stress (SMD = 0.13, 95% CI [0.02, 0.24], $p = .019$), parental self-efficacy (SMD = 0.14, 95% CI [0.03, 0.25], $p = .010$), and family cohesion and collaboration (SMD = 0.10, 95% CI [0.00, 0.19], $p = .045$). Positive parenting decreased between the 4- and 12-month assessments in both ABC-Teen (SMD = −0.09, 95% CI [−0.17, −0.00], $p = .045$) and ParentWeb (SMD = −0.15, 95% CI [−0.29, −0.01], $p = .032$). No statistically significant changes between these assessments were found for the remaining parent-reported secondary outcomes. Given the exploratory nature of these analyses, the number of tests conducted, and the absence of adjustment for multiple comparisons, the findings should be interpreted cautiously.

[PLACE TABLE 4 ABOUT HERE]

Adolescent-reported psychosocial outcomes

No significant intervention effects relative to waitlist at the 4-month assessment were found for adolescent-reported mental health, conflict frequency, parent–adolescent warmth, adolescent disclosure, or school engagement (all ps ≥ .267; Table 5). In direct comparisons, ABC-Teen and ParentWeb did not differ significantly in change from baseline to either the 4-month assessment or the 12-month follow-up on any adolescent-reported outcome (all p ≥ .092).

Adolescent-reported substance use

For tobacco use, changes in occurrence from baseline to the 4-month assessment did not differ significantly between ABC-Teen and waitlist, interaction OR = 0.94, 95% CI [0.51, 1.73], p = .836, or between ParentWeb and waitlist, interaction OR = 0.97, 95% CI [0.45, 2.07], p = .937 (Table 6). The change in proportions also did not differ between ABC-Teen and ParentWeb at the 4-month assessment, interaction OR = 0.97, 95% CI [0.54, 1.72], p = .907, or from baseline to the 12-month follow-up, interaction OR = 1.29, 95% CI [0.62, 2.70], p = .501.

For alcohol use, changes from baseline to the 4-month assessment did not differ significantly between ABC-Teen and waitlist, interaction OR = 0.87, 95% CI [0.51, 1.49], p = .616, or between ParentWeb and waitlist, interaction OR = 1.32, 95% CI [0.69, 2.52], p = .395. ABC-Teen and ParentWeb did not differ in change from baseline to the 4-month assessment, interaction OR = 0.66, 95% CI [0.40, 1.09], p = .102, or from baseline to the 12-month follow-up, interaction OR = 1.14, 95% CI [0.60, 2.16], p = .686. Illicit-drug occurrence was uncommon, and sparse event counts and zero-event cells precluded stable inferential analysis; observed frequencies and proportions are presented descriptively in Table 6. Because none of the stable occurrence analyses indicated a statistically significant intervention effect, the conditional analyses of substance-use quantity were not conducted.

[PLACE TABLE 5 and 6 ABOUT HERE]

Program engagement, satisfaction, and preference

ParentWeb participants completed slightly more modules than ABC-Teen participants completed sessions (M = 3.29, SD = 1.24 vs. M = 3.08, SD = 1.24; SMD = .17, 95% CI [.01, .34], p = .037). Completion of between-session assignments did not differ significantly between ABC-Teen (M = 1.56, SD = 0.71) and ParentWeb (M = 1.52, SD = 0.76; SMD = .06, 95% CI [−.11, .22], p = .498). Satisfaction was higher in ABC-Teen (M = 15.83, SD = 3.13) than in ParentWeb (M = 13.82, SD = 4.62; SMD = .54, 95% CI [.38, .71], p < .001).

In exploratory analyses among participants who expressed a preference for either intervention, receiving the preferred intervention was associated with higher program completion (SMD = .18, 95% CI [.02, .35], p = .026) and greater completion of between-session assignments (SMD = .23, 95% CI [.06, .39], p = .006).

Participant-reported negative effects

At the 12-month follow-up, 5 of 450 responding parents in ABC-Teen (1.1%) and 7 of 154 responding parents in ParentWeb (4.5%) answered yes when asked whether they had noticed any negative effect of participation. The trial did not include a prespecified harms objective; this question was included as an exploratory descriptive assessment of participant-perceived negative experiences. In ABC-Teen, the descriptions concerned increased awareness of disagreement between co-parents when only one caregiver participated, time burden, limited attendance and a mismatch between the participant's expectations and the program's focus, and concern that stepping back from conflict had enabled further adolescent withdrawal and screen use. In ParentWeb, the descriptions concerned emotional strain or heated family discussions, stress related to finding time for the program, dissatisfaction with the online format or lack of interpersonal contact, difficulties implementing new approaches when the other caregiver had not participated, and limited capacity to participate during an already difficult family situation. One respondent also suggested involving adolescents more directly. The responses varied in content and did not distinguish adverse effects from dissatisfaction, program burden, implementation difficulties, or contextual problems.

Complete-data sensitivity analyses

Sensitivity analyses were conducted separately among participants with complete outcome data at baseline and the 4-month assessment and among those with complete outcome data at baseline and the 12-month follow-up. For parent-reported outcomes, the 4-month assessment included 939 families (985 parents) with data at baseline and 4-month assessment, whereas the 12-month analyses included 626 families (656 parents) with data at baseline and the 12-month follow-up. Results were consistent with the primary intention-to-treat analyses. Complete-data analyses of the adolescent-reported psychosocial outcomes and tobacco and alcohol occurrence were also consistent with the primary analyses, with no changes in the statistical significance of the prespecified between-group comparisons.

Discussion

Principal findings

This large multisite randomized controlled trial found that two brief universal parenting programs, ABC-Teen and ParentWeb, produced improvements in parent-reported adolescent mental health problems relative to waitlist at the 4-month assessment. The standardized differences in change on SDQ Total Difficulties were in the small range (0.17 for ABC-Teen and 0.24 for ParentWeb), consistent with expectations for universal preventive programs. Both programs also improved several parent-reported aspects of parenting and family functioning relative to waitlist. Neither program affected parent- or adolescent-reported school engagement relative to waitlist at the 4-month assessment. ABC-Teen showed a broader pattern of significant short-term effects, including improvements in parental depressive symptoms, parenting stress, and parental self-efficacy. However, direct comparisons showed no differences between ABC-Teen and ParentWeb in change on the primary outcome or parent- or adolescent-reported secondary outcomes at either the 4-month assessment or the 12-month follow-up. No intervention effects were found for adolescent-reported tobacco or alcohol occurrence, either in comparisons with waitlist at the 4-month assessment or in direct comparisons between ABC-Teen and ParentWeb at the 4-month assessment or the 12-month follow-up. Illicit-drug occurrence was too infrequent for stable inferential analysis. Complete-data

sensitivity analyses yielded the same overall conclusions as the primary analyses of both parent- and adolescent-reported outcomes.

Because the waitlist condition ended after the 4-month assessment, longer-term development could not be evaluated against an untreated control condition. The exploratory within-program analyses of parent-reported outcomes were characterized primarily by stability rather than continued improvement on the primary outcome. Parent-reported SDQ Total Difficulties decreased slightly between the 4-month assessment and the 12-month follow-up in ABC-Teen but did not change significantly in ParentWeb. Some secondary outcomes improved further, including conflict frequency and parental self-efficacy in ABC-Teen and parenting stress, parental self-efficacy, and family cohesion and collaboration in ParentWeb. One finding pointed in an unfavorable direction: parent-reported positive parenting decreased in ParentWeb. Because numerous secondary tests were conducted without adjustment for multiple comparisons, isolated findings should be interpreted cautiously. Moreover, in the absence of a waitlist comparison, these within-program trajectories cannot establish whether initial intervention effects were maintained or whether subsequent changes reflected intervention effects, natural development, or other contemporaneous influences.

The discrepancy between parent and adolescent reports is substantively important but should not be interpreted as indicating that either informant provides a definitive account. Parent–adolescent agreement on the SDQ Total Difficulties is generally only low to moderate, and discrepancies may reflect differences in perspective, context, symptom visibility, and characteristics of both informants. In a large general-population sample of 17-year-olds, adolescents reported more difficulties than their parents, with particularly pronounced discrepancies for emotional symptoms; discrepancies also varied with adolescent sex and parental psychological distress [38].

In the present trial, parents were the direct recipients of the programs and may therefore have been especially sensitive to changes in their own behavior, interpretations, or family interactions. Adolescents could very well have experienced smaller changes, could have evaluated the same changes differently, or may have been less aware of changes primarily involving parental behavior. At

the same time, the adolescent survey produced a substantially smaller and potentially selective sample, and the possibility of post-randomization entry into that sample means that the adolescent-reported comparisons have weaker causal interpretability than the parent-reported analyses. The findings therefore provide clearer evidence of parent-perceived change than of change experienced or reported by adolescents, rather than conclusive evidence that the programs did or did not affect adolescents themselves.

Interpretation in relation to previous research

The findings add evidence that parenting remains modifiable during adolescence. They are broadly consistent with randomized trials reporting improvements in parenting, family relationships, parental well-being, or adolescent outcomes following universally offered group-based and online parenting programs [9-12,14]. The findings add to the still limited evidence from randomized trials of universally offered parenting programs for adolescents. Previous trials have generally been relatively small and have often focused on early adolescence. The present study extends this evidence by evaluating two substantially briefer interventions in a considerably larger sample spanning early to late adolescence. It also extends evidence derived mainly from efficacy trials by evaluating programs delivered primarily by regular practitioners across 58 sites in routine municipal services.

The modest effects on parent-reported adolescent mental health are also consistent with the broader evidence base and expectations for universal prevention. A recent meta-review found that universal parenting interventions produced inconsistent effects on disruptive behavior, mood disorders, and general mental health, although more consistent evidence was found for delaying alcohol and cannabis initiation [15]. Small average effects are common in universal prevention because many participants have limited room for improvement at baseline [39]. Such effects can nevertheless be meaningful at the population level when an intervention has broad reach, low burden, and reasonable costs [16].However, the present trial did not assess population-level impact or whether the observed effects would justify large-scale dissemination; such conclusions would also require information about reach, uptake, delivery costs, and cost-effectiveness.

Parental mental health has often been overlooked in evaluations of universal parenting interventions for adolescents [21]. By including parental depressive symptoms, anxiety symptoms, and parenting stress, the present trial addresses this gap. ABC-Teen produced small reductions in parental depressive symptoms and parenting stress relative to waitlist, whereas no corresponding effects were found for parental anxiety symptoms or for any of these outcomes in ParentWeb. The findings therefore add to the limited evidence that universal parenting programs for adolescents may benefit parental well-being [9,22], while also indicating that such effects may not occur consistently across programs or mental-health outcomes. Because parental well-being, parenting, and adolescent outcomes were analyzed separately, the study cannot determine whether changes across these domains were related.

Delivery format, engagement, and preference

Both programs improved several outcomes relative to waitlist, and direct comparisons detected no differences between ABC-Teen and ParentWeb on the primary outcome or the parenting, family, or adolescent-reported outcomes at either the 4-month assessment or the 12-month follow-up, suggesting that both formats may be viable options. This pattern is compatible with a Swedish noninferiority trial in which internet-delivered Comet was noninferior to group-delivered Comet for disruptive behavior problems among younger children, although parents initially reported greater satisfaction and some more favorable secondary outcomes with the group format [29]. The populations, intervention intensity, and study objectives differed substantially, however, and the present trial was not designed as an equivalence or noninferiority study. The absence of statistically significant differences should therefore not be interpreted as demonstrating that ABC-Teen and ParentWeb are equally effective.

Although no statistically significant differences in effectiveness were detected between the programs, the findings concerning satisfaction and preference may inform how parenting support is offered. ParentWeb participants completed slightly more modules than ABC-Teen participants completed sessions, whereas completion of between-session assignments did not differ between the programs. Satisfaction was nevertheless substantially higher for ABC-Teen. Qualitative research suggests that

parents' engagement in parenting programs is influenced by both relational factors, such as learning with trusted people and receiving support from others, and practical considerations concerning time and accessibility [40]. Group delivery may therefore provide valued opportunities for discussion, normalization, and peer support, whereas internet delivery may better suit parents who value flexibility or experience barriers to group participation.

Receiving the preferred intervention was associated with slightly higher program completion and assignment completion, consistent with previous findings that treatment preference predicted completion in a comparison of group- and internet-delivered parent training [29]. These observational findings suggest that offering different modes of delivery could improve the fit between programs and families. However, preference fulfillment was not randomized in the present study, and the associations should not be interpreted causally.

Substance use

The GEE analyses provided no evidence that either ABC-Teen or ParentWeb affected change in tobacco or alcohol occurrence relative to waitlist at the 4-month assessment. The programs also did not differ from each other in change in either outcome from baseline to the 4-month assessment or from baseline to the 12-month follow-up. Complete-data sensitivity analyses yielded the same conclusions. Illicit-drug occurrence was uncommon, and sparse event counts and zero-event cells precluded stable inferential analysis; these data were therefore reported descriptively.

Previous reviews suggest that parent- and family-based interventions can reduce adolescent substance use, but their applicability to the present trial is uncertain. The evidence base is not limited to universally offered, parent-only programs, and many interventions included direct adolescent participation and substance-specific content [41,42]. A recent meta-review found some evidence that universal parenting interventions may delay alcohol and cannabis initiation, although confidence in most of the underlying reviews was low or critically low [15].

The findings should not be interpreted as demonstrating equivalence or excluding potentially meaningful effects. Event frequencies were relatively low, the adolescent sample was considerably

smaller and potentially more selective than the parent sample, and the confidence intervals were compatible with effects in either direction. No inferential conclusion could be drawn for illicit-drug use. Larger adolescent samples, more detailed measurement, and longer follow-up would be needed to detect or exclude small preventive effects.

Participant-reported negative effects

Few participants reported having noticed a negative effect of participation (1.1% in ABC-Teen and 4.5% in ParentWeb). The open-ended responses primarily described dissatisfaction with program content or delivery, time burden, implementation difficulties, or challenging pre-existing circumstances, although a few described emotional strain or family conflict. Given the broad retrospective question, the small number of responses, and the absence of systematic prospective assessment, these findings should not be interpreted as estimates of intervention-related adverse events. Future studies should distinguish potential adverse effects from dissatisfaction, burden, and implementation barriers.

Strengths and limitations

Major strengths include the large sample, three-arm randomized design, and statistical power to detect small effects on the primary outcome. The pragmatic, multisite design also strengthens the external validity of the findings. Participants were recruited across 58 sites in 52 geographically dispersed municipalities of varying population size, corresponding to almost one fifth of Sweden's municipalities. Moreover, the interventions were delivered by regular practitioners within routine municipal services rather than by research staff under specialized trial conditions. The findings therefore provide evidence about the effectiveness that can be achieved when brief universal parenting programs are implemented under conditions resembling their intended real-world delivery. Additional strengths include the broad assessment of parent and family outcomes, the inclusion of adolescent reports, and follow-up of the two intervention groups through 12 months.

Several limitations qualify the conclusions. Participants and providers could not be blinded, and all outcomes were based on participant reports. Parents received the interventions and also reported the

primary outcome, creating scope for expectancy, demand, and shared-method effects. The absence of effects in adolescent reports therefore reinforces the need for caution when interpreting the parent-reported improvements as benefits experienced by adolescents. At the same time, including reports from both parents and adolescents made it possible to identify this informant discrepancy rather than relying exclusively on intervention recipients.

Because the waitlist condition ended after the 4-month assessment, outcomes at 12 months could only be compared between ABC-Teen and ParentWeb. The longer-term analyses could describe whether improvements within the intervention groups were sustained and whether their trajectories differed, but they could not determine whether outcomes would have differed from those in an untreated control group. Accordingly, the observed maintenance of improvements should not be interpreted as evidence of sustained causal effects.

Attrition was higher in ParentWeb than in ABC-Teen at both follow-up assessments and was associated with selected sociodemographic characteristics, although not with baseline parent-reported adolescent mental health problems. Selective follow-up participation therefore remains possible. However, the mixed-effects and GEE models incorporated all available observations, and complete-data sensitivity analyses yielded the same overall conclusions. The findings nevertheless depend on assumptions about the missing-data mechanism, particularly if loss to follow-up was related to unobserved outcomes after accounting for measured characteristics.

Completion of the adolescent survey was not required for family randomization, resulting in a substantially smaller and selective adolescent sample. Because adolescents could complete the baseline survey after treatment allocation, although before intervention delivery, inclusion in these analyses involved post-randomization selection. Availability of adolescent baseline data differed by randomized condition and was associated with age, gender, and parent-reported mental health problems. Although participating adolescents remained analyzed according to their family's randomized allocation, these features weaken the protection against selection bias and reduce statistical power and generalizability. Subsequent attrition did not differ clearly between conditions,

but boys were more likely than girls to be lost to follow-up. Adolescent-reported findings should therefore be interpreted more cautiously than findings from the full parent sample.

Secondary and exploratory outcomes were examined without adjustment for multiple comparisons, increasing the probability of chance findings. The preference analyses were observational and cannot support causal conclusions, and the program-specific satisfaction items may not have been strictly comparable across formats.

Although the pragmatic multisite design supports generalizability across Swedish municipal service settings, the participant sample was predominantly female, highly educated, and employed or studying. Generalizability may therefore be stronger across service contexts than across population subgroups, particularly with regard to fathers, socioeconomically disadvantaged families, families facing language barriers, and families already receiving psychiatric or social services.

Intervention fidelity was not assessed directly, so variation in adherence to the manuals, practitioner competence, and local adaptations could not be examined as explanations for differences in engagement or outcomes. This limitation should be considered alongside the study's pragmatic character: delivery by regular practitioners across numerous sites increases external validity but necessarily provides less control over implementation than a tightly monitored efficacy trial.

Finally, the trial was registered retrospectively, limiting independent verification that all outcome and analysis decisions preceded recruitment and data collection. However, the primary outcome, assessment time points, and broad analytical approach were documented in the ethics application before recruitment and randomization, and the analyses were specified in greater detail in the trial registration before the data were analyzed. Analyses not covered by these documents are identified as exploratory.

Conclusions

ABC-Teen and ParentWeb produced small short-term improvements in the primary outcome, parent-reported adolescent mental health problems, and several parent and family outcomes relative to

waitlist when delivered at scale in regular Swedish services. Improvements were found in parent-reported outcomes, whereas no intervention effects were detected in adolescent-reported outcomes.

No statistically significant differences were detected between the programs, and improvements in the intervention groups were generally sustained at the 12-month follow-up, although the absence of a control condition beyond four months limits causal interpretation of longer-term change. Both programs therefore appear promising as universal parenting-support options. Further research is needed to establish sustained causal effects, benefits experienced by adolescents, and population-level cost-effectiveness.

List of abbreviations

ABC-Teen, All Children in Focus for parents of adolescents; BFRS, Brief Family Relationship Scale; CI, confidence interval; CPRS, Child–Parent Relationship Scale; GAD-7, Generalized Anxiety Disorder-7; GEE, generalized estimating equations; MaaP, Me as a Parent; OR, odds ratio; PHQ-9, Patient Health Questionnaire-9; PSS, Parental Stress Scale; SD, standard deviation; SDQ, Strengths and Difficulties Questionnaire; SMD, standardized mean difference.

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Not applicable.

Declarations

Ethics approval and consent to participate

The study was approved by the Swedish Ethical Review Authority (approval number 2020-05689). The study was conducted in accordance with the Declaration of Helsinki and all relevant guidelines and regulations. Before enrollment, one legal guardian provided electronic informed consent. When the adolescent had a second legal guardian, local municipal staff subsequently confirmed that informed consent had also been obtained from that guardian. Consent from all legal guardians was

required regardless of the adolescent's age; thus, parental or legal guardian consent was obtained for all participating adolescents younger than 16 years. For adolescents aged 15 years or older, municipal staff also confirmed that the adolescent had provided informed consent, irrespective of whether the adolescent chose to complete the optional questionnaires. For adolescents aged 13–14 years, consent from all legal guardians was sufficient. All participating parent respondents provided informed consent for their own participation. All procedures were conducted in accordance with the ethical approval and applicable regulations.

Consent for publication

Not applicable.

Availability of data and materials

The research data is not publicly available because it contains sensitive personal information. Anonymized data and corresponding jamovi analysis files may be made available upon reasonable request, following assessment by Karolinska Institutet and subject to applicable ethical, legal, and institutional requirements. The trial registration is publicly available at ClinicalTrials.gov (NCT06366438). No separate full trial protocol or statistical analysis plan was prepared. The original ethics application, which includes the study protocol and the original statistical analysis plan, is available from the corresponding author upon reasonable request; additional analytical specifications are documented in the trial registration.

Competing interests

ABC-Teen was developed by the City of Stockholm, and ParentWeb was developed at Karolinska Institutet. MF and PE contributed to the development of ParentWeb. AM contributed to the development of ABC-Teen. Neither intervention is commercially marketed by the developing organizations, and the authors receive no financial benefit from its use or dissemination. The authors declare no financial competing interests. The authors' involvement in the development of ParentWeb represents a potential non-financial competing interest.

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Authors' contributions

MF conceived and designed the study, led study planning, acquired funding, conducted the statistical analyses, and drafted the manuscript. MF and PE contributed to the development of ParentWeb. AM contributed to the development of ABC-Teen, study planning, and participant recruitment. LvL contributed to the interpretation of the findings and critically reviewed and revised the manuscript. All authors read and approved the final manuscript.

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Table 3. Primary outcome – Parent-reported SDQ Total Difficulties

	Observed values			Intervention effect (baseline–4 months), waitlist as reference		ABC-Teen vs. ParentWeb (baseline–4 months)		ABC-Teen vs. ParentWeb (baseline-12 months)	
	Families, *n*	Parent respondents, *n*	M (SD)	SMD (95% CI)	*p*	SMD (95% CI)	*p*	SMD (95% CI)	*p*
ABC-Teen									
Baseline	669	724	11.1 (5.2)	0.17 [0.06, 0.28]	.003	−0.07 [−0.19, 0.04]	.212	0.00 [−0.12, 0.13]	.959
4 months	520	558	9.8 (5.0)						
12 months	458	484	9.4 (5.0)						
ParentWeb									
Baseline	297	306	11.1 (5.2)	0.24 [0.11, 0.38]	<.001				
4 months	209	212	9.6 (5.4)						
12 months	168	172	9.7 (5.7)						
Waitlist									
Baseline	281	297	10.6 (5.3)						
4 months	210	215	10.4 (5.2)						

Families, n indicates the number of families for which at least one parent provided SDQ Total Difficulties data at the respective assessment. Parent respondents, n indicates the total number of parents providing data. More than one parent could provide data within a family. SMD = standardized mean difference; CI = confidence interval. All SMDs were oriented so that positive values indicate change in the hypothesized beneficial direction (e.g., lower SDQ Total Difficulties scores). In comparisons with waitlist, positive SMDs favor the respective intervention; in direct comparisons between ABC-Teen and ParentWeb, positive SMDs favor ABC-Teen and negative SMDs favor ParentWeb.

Table 4. Secondary parent-reported outcomes

	Observed M (SD)			Intervention effect (baseline–4 months), waitlist as reference		ABC-Teen vs. ParentWeb (baseline–4 months)		ABC-Teen vs. ParentWeb (baseline–12 months)	
	Baseline	4 months	12 months	SMD (95% CI)	*p*	SMD (95% CI)	*p*	SMD (95% CI)	*p*
Depressive sympotoms (PHQ-9)									
ABC-Teen	5.1 (4.5)	4.2 (4.3)	4.2 (4.7)	0.19 [0.05, 0.32]	.007	0.06 [−0.07, 0.20]	.357	0.05 [−0.10, 0.19]	.541
ParentWeb	4.7 (4.3)	4.3 (4.1)	4.2 (4.4)	0.12 [−0.04, 0.29]	.145				
Waitlist	4.9 (4.3)	5.1 (4.6)	—						
Anxiety symptoms (GAD-7)									
ABC-Teen	3.8 (3.7)	3.1 (3.3)	3.0 (3.8)	0.11 [−0.03, 0.25]	.132	−0.03 [−0.17, 0.11]	.709	0.04 [−0.11, 0.19]	.610
ParentWeb	3.5 (3.4)	2.8 (3.3)	3.1 (3.5)	0.13 [−0.03, 0.30]	.118				
Waitlist	3.8 (4.0)	3.6 (3.5)	—						
Parenting stress (PSS)									
ABC-Teen	13.5 (6.3)	12.0 (6.3)	11.8 (6.7)	0.14 [0.03, 0.26]	.014	0.03 [−0.08, 0.14]	.597	−0.07 [−0.19, 0.06]	.288
ParentWeb	13.4 (6.6)	12.5 (6.9)	11.3 (7.2)	0.11 [−0.03, 0.25]	.109				
Waitlist	13.3 (6.4)	13.4 (6.9)	—						
Conflict frequency									
ABC-Teen	9.7 (4.9)	7.2 (4.4)	6.5 (4.3)	0.21 [0.08, 0.33]	<.001	0.01 [−0.12, 0.13]	.924	0.08 [−0.05, 0.22]	.231
ParentWeb	9.6 (4.8)	7.1 (4.4)	6.9 (4.7)	0.20 [0.05, 0.35]	.009				
Waitlist	9.6 (4.8)	8.2 (4.8)	—						
Conflict-resolution efficacy									
ABC-Teen	37.2 (11.8)	44.1 (11.1)	44.4 (11.1)	0.31 [0.16, 0.46]	<.001	0.01 [−0.14, 0.16]	.924	0.01 [−0.15, 0.17]	.926
ParentWeb	37.1 (11.1)	43.8 (10.3)	44.5 (11.2)	0.30 [0.12, 0.48]	.001				
Waitlist	35.5 (11.1)	38.7 (11.2)	—						
Parent-adolescent warmth									
ABC-Teen	15.2 (5.6)	16.5 (5.3)	16.5 (5.5)	0.18 [0.07, 0.29]	.001	−0.05 [−0.17, 0.06]	.346	0.00 [−0.12, 0.12]	.946
ParentWeb	15.2 (5.6)	16.9 (5.3)	16.8 (5.5)	0.24 [0.10, 0.37]	<.001				
Waitlist	15.4 (5.8)	15.7 (5.6)	—						
Adolescent disclosure									
ABC-Teen	11.7 (4.4)	12.3 (4.2)	12.4 (4.2)	0.01 [−0.12, 0.13]	.933	−0.07 [−0.20, 0.05]	.235	−0.01 [−0.14, 0.13]	.927
ParentWeb	11.5 (4.0)	12.5 (4.1)	12.5 (4.1)	0.08 [−0.07, 0.23]	.289				
Waitlist	11.6 (4.3)	12.1 (4.1)	—						
Parental self-efficacy (MaaP)									
ABC-Teen	43.9 (9.6)	47.7 (9.2)	48.6 (9.0)	0.21 [0.09, 0.32]	<.001	0.11 [−0.01, 0.22]	.064	0.07 [−0.05, 0.19]	.274
ParentWeb	45.0 (10.0)	47.6 (9.8)	49.2 (9.8)	0.10 [−0.03, 0.23]	.144				
Waitlist	44.0 (10.3)	45.0 (10.4)	—						
Positive parenting									
ABC-Teen	6.8 (2.1)	7.3 (2.2)	7.1 (2.3)	0.09 [−0.06, 0.23]	.230	0.07 [−0.07, 0.22]	.311	0.14 [−0.01, 0.30]	.071

ParentWeb	6.8 (1.9)	7.1 (1.8)	6.8 (2.1)	0.01 [−0.16, 0.18]	.882				
Waitlist	6.7 (2.0)	7.0 (2.3)	—						
Negative parenting									
ABC-Teen	6.2 (2.4)	5.1 (2.1)	4.9 (2.1)	0.27 [0.13, 0.40]	<.001	0.02 [−0.12, 0.16]	.773	−0.01 [−0.16, 0.13]	.878
ParentWeb	6.3 (2.4)	5.3 (2.2)	5.0 (2.1)	0.25 [0.09, 0.41]	.003				
Waitlist	6.1 (2.4)	5.7 (2.3)	—						
Family cohesion & collab.									
ABC-Teen	90.3 (43.3)	102.1 (40.7)	103.5 (43.0)	0.24 [0.15, 0.34]	<.001	0.07 [−0.03, 0.16]	.194	0.01 [−0.09, 0.12]	.814
ParentWeb	92.6 (43.5)	100.0 (40.8)	107.4 (43.7)	0.18 [0.06, 0.30]	.003				
Waitlist	92.8 (43.4)	90.3 (43.4)	—						
School engagement									
ABC-Teen	6.4 (2.8)	6.1 (2.8)	6.0 (3.0)	0.01 [−0.12, 0.15]	.830	−0.01 [−0.14, 0.12]	.881	0.00 [−0.14, 0.14]	.999
ParentWeb	6.2 (3.0)	5.8 (2.8)	5.7 (3.0)	0.02 [−0.13, 0.18]	.761				
Waitlist	6.4 (2.8)	5.9 (2.8)	—						

Note. All SMDs were oriented so that positive values indicate change in the hypothesized beneficial direction (e.g., lower PHQ-9 scores or higher Positive parenting scores). In comparisons with waitlist, positive SMDs favor the respective intervention; in direct comparisons between ABC-Teen and ParentWeb, positive SMDs favor ABC-Teen and negative SMDs favor ParentWeb.

Table 5. Adolescent-reported outcomes

	Observed M (SD)			Intervention effect (baseline–4 months), waitlist as reference		ABC-Teen vs. ParentWeb (baseline–4 months)		ABC-Teen vs. ParentWeb (baseline–12 months)	
	Baseline	4 months	12 months	SMD (95% CI)	*p*	SMD (95% CI)	*p*	SMD (95% CI)	*p*
SDQ Total Difficulties									
ABC	11.9 (5.9)	11.9 (6.0)	11.5 (5.7)	−0.12 [−0.32, 0.09]	.267	0.01 [−0.17, 0.20]	.883	0.01 [−0.19, 0.21]	.889
ParentWeb	12.1 (6.7)	12.2 (6.3)	11.2 (6.6)	−0.13 [−0.37, 0.11]	.290				
Waitlist	11.7 (5.5)	11.3 (4.8)	—						
Conflict frequency									
ABC	7.5 (4.8)	6.4 (4.6)	5.7 (4.4)	−0.10 [−0.36, 0.16]	.455	−0.11 [−0.35, 0.14]	.393	0.08 [−0.18, 0.34]	.538
ParentWeb	8.0 (4.6)	6.0 (4.0)	6.3 (4.1)	0.01 [−0.30, 0.31]	.962				
Waitlist	7.3 (4.5)	5.8 (3.9)	—						
Parent-adolescent warmth									
ABC	11.6 (4.0)	11.3 (3.9)	12.0 (3.9)	−0.03 [−0.26, 0.19]	.770	−0.17 [−0.38, 0.03]	.101	0.09 [−0.13, 0.31]	.417

ParentWeb	12.0 (4.5)	12.4 (4.2)	12.3 (3.7)	0.14 [−0.12, 0.40]	.293				
Waitlist	12.5 (4.0)	12.2 (3.8)	—						
Adolescent disclosure									
ABC	9.9 (3.4)	9.7 (3.4)	10.0 (3.5)	−0.12 [−0.36, 0.11]	.307	−0.19 [−0.41, 0.03]	.092	−0.07 [−0.31, 0.17]	.567
ParentWeb	9.9 (3.8)	10.2 (3.1)	10.7 (2.9)	0.07 [−0.22, 0.35]	.645				
Waitlist	10.2 (3.5)	10.4 (3.0)	—						
School engagement									
ABC	6.4 (2.5)	6.0 (2.9)	6.1 (2.7)	0.04 [−0.21, 0.29]	.760	−0.13 [−0.36, 0.10]	.279	0.17 [−0.08, 0.42]	.190
ParentWeb	6.4 (2.8)	6.2 (2.8)	5.8 (2.8)	0.17 [−0.13, 0.47]	.267				
Waitlist	6.8 (2.5)	6.3 (2.5)	—						

Note. All SMDs were oriented so that positive values indicate change in the hypothesized beneficial direction (e.g., lower SDQ Total Difficulties scores). In comparisons with waitlist, positive SMDs favor the respective intervention; in direct comparisons between ABC-Teen and ParentWeb, positive SMDs favor ABC-Teen and negative SMDs favor ParentWeb.

Table 6. Adolescent-reported occurrence of tobacco, alcohol, or illicit drug use

	Observed occurrence, n/N (%)			Intervention effect (baseline–4 months), waitlist as reference		ABC-Teen vs. ParentWeb (baseline–4 months)		ABC-Teen vs. ParentWeb (baseline–12 months)	
	Baseline	4 months	12 months	Interaction OR (95% CI)	*p*	Interaction OR (95% CI)	*p*	Interaction OR (95% CI)	*p*
Ever used tobacco									
ABC	71/285 (25%)	56/189 (30%)	69/182 (38%)	0.94 [0.51, 1.73]	.836	0.97 [0.54, 1.72]	.907	1.29 [0.62, 2.70]	.501
ParentWeb	21/107 (20%)	17/70 (24%)	15/58 (26%)	0.97 [0.45, 2.07]	.937				
Waitlist	14/79 (18%)	14/62 (23%)	—						
Ever used alcohol									
ABC	96/285 (34%)	63/189 (33%)	82/182 (45%)	0.87 [0.51, 1.49]	.616	0.66 [0.40, 1.09]	.102	1.14 [0.60, 2.16]	.686
ParentWeb	29/107 (27%)	25/70 (36%)	20/58 (35%)	1.32 [0.69, 2.52]	.395				
Waitlist	21/79 (27%)	18/62 (29%)	—						
Ever used illicit drugs									
ABC	11/285 (4%)	7/189 (4%)	13/182 (7%)	—	—	—	—	—	—
ParentWeb	3/107 (3%)	5/70 (7%)	0/58 (0%)	—	—				
Waitlist	0/79 (0%)	1/62 (2%)	—						

Note. Observed values are presented as n/N (%), where n is the number reporting use and N is the number providing data at the respective assessment. Interaction odds ratios (ORs) were estimated using logistic generalized estimating equations with robust standard errors clustered by family and represent ratios of change in odds over time. For comparisons with waitlist, ORs below 1 indicate a smaller increase in the intervention condition. Direct comparisons were coded as ABC-Teen versus ParentWeb; ORs below 1 therefore indicate a smaller increase in ABC-Teen. Separate inferential analyses of illicit-drug use were not reported because sparse event counts and zero-event cells produced unstable estimates. The waitlist condition ended after the 4-month assessment. CI = confidence interval; OR = odds ratio; — = not estimated

Figures

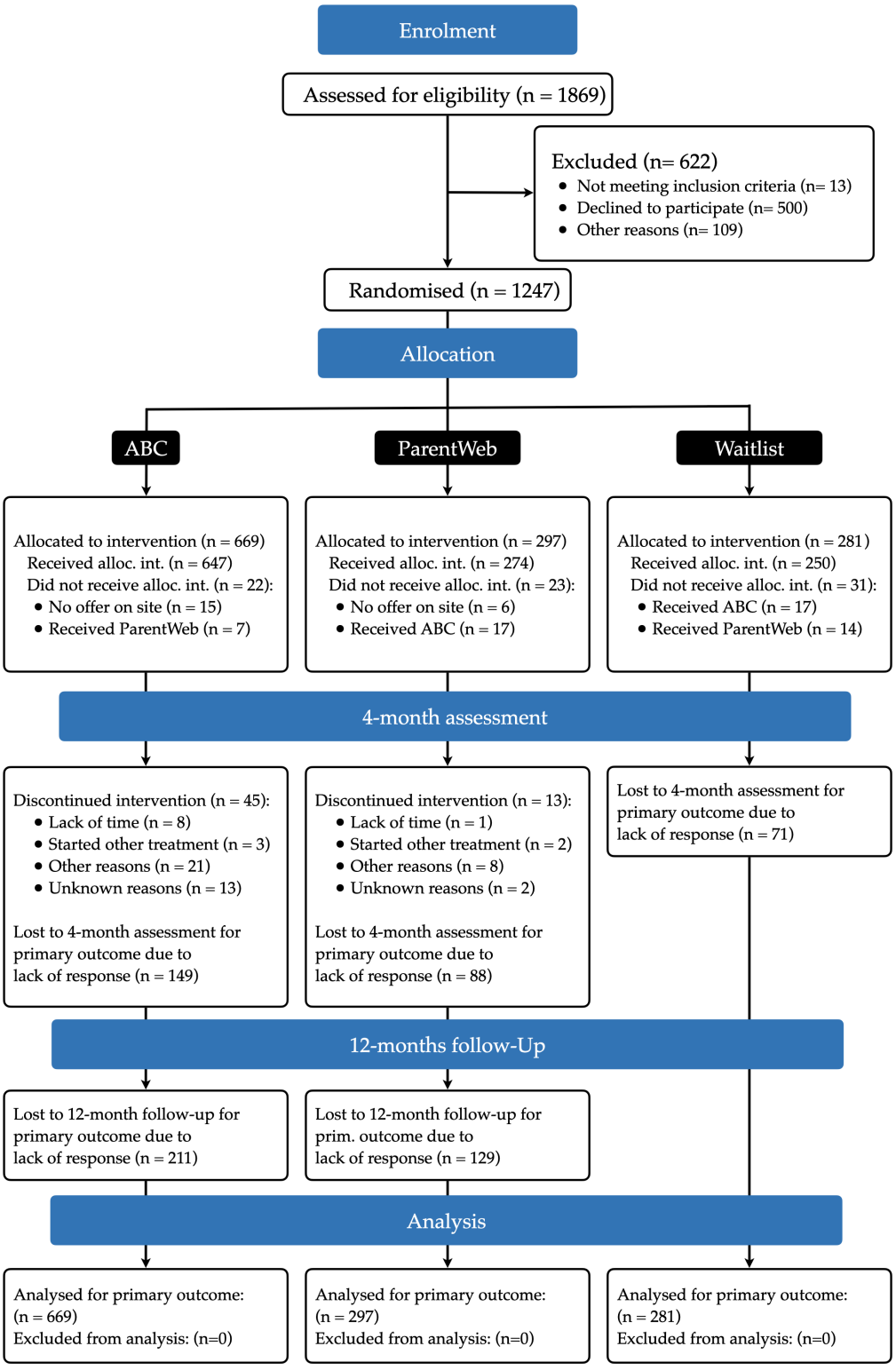


Figure 1

Participant flow diagram.