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ORIGINAL ARTICLE

Predictors of Program Use and Child and Parent Outcomes of A Brief Online Parenting Intervention

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Abstract Web-based parenting interventions have the potential to increase the currently low reach of parenting programs, but few evidence-based online programs are available, and little is known about who benefits from this delivery format. This study investigated if improvements in child behavior and parenting, following participation in a brief online parenting program (Triple P Online Brief), can be predicted by family and program-related factors. Participants were 100 parents of 2–9-year-old children displaying disruptive behavior problems. Regression analyses showed that higher baseline levels of child behavior problems, older parental age and more intense conflict over parenting pre-intervention predicted greater improvement in child behavior at 9-month follow-up. Improvement in parenting was predicted by higher pre-intervention levels of ineffective parenting. Family demographics, parental adjustment and program related factors did not predict treatment outcomes. Younger child age and lower disagreement over parenting pre-intervention predicted completion of the recommended minimum dose of the program.

Keywords Child behavior problems · Parenting program · Online intervention · Moderator · Triple P

Parenting interventions have long been recognized as one of the methods of choice for the prevention and treatment of child behavior problems [1]. In recent years, online parenting interventions have received increasing attention as they have considerable potential for increasing reach and uptake of programs among families that face barriers to accessing more 'traditional' face-to-face programs [2–4]. The number of evidence-based online parenting programs available for children with behavior problems is still very limited, but research has shown their effectiveness in improving parenting and child behavior [e.g., 5–7]. A caveat that has emerged from recent trials is that there is often considerable attrition, as well as high variability in the use of such programs and in achieved outcomes for families. This variability can be harnessed to help understand who uses programs in what way, and assist better targeting of interventions to parents that are most likely to benefit. It may also assist the development of support strategies for families who might not benefit as much from online programs in their current format. If we could identify basic, easily assessable parent, child and family characteristics that may impact intervention effects (e.g., age, gender, education, single-parenthood), it would enable us to recommend a particular type of intervention to a particular type of family. Aligning interventions closer with user characteristics could in turn lower dropout rates and increase benefits.

The present study aims to identify predictors of program use and outcomes of a recently developed brief online version of the Triple P—Positive Parenting Program, Triple P Online Brief (TPOL Brief), with a particular focus on child and parent demographic characteristics. TPOL Brief is a five-module low-intensity parenting intervention that aims to promote the use of positive parenting strategies and reduce child behavior problems. Using data from a randomized controlled trial investigating the effectiveness of TPOL Brief [8], secondary analyses were conducted to identify socio-demographic, parent and child related as well as program related variables associated with greater module completion and improved treatment outcome.

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To the best of our knowledge, studies of predictors of program use and treatment outcome have been conducted almost exclusively on face-to-face programs [9], as web-based programs are a recent addition to the suite of services offered to parents. Therefore the current study approach is exploratory and predominantly guided by the literature on predictors in face-to-face parenting interventions.

Previous research points to a variety of factors that can be associated with a family's level of engagement in parenting interventions (online or face-to-face), and their achieved treatment outcomes. For example, program effects might differ as a function of demographic characteristics of the child or parent, as a function of more substantive characteristics like parental or child behavior, adjustment or mental health, or because of characteristics of the program itself or the way in which it is used.

The evidence relating to the influence of parent and child demographic characteristics shows that child factors like age and gender as predictors of intervention outcomes are inconclusive. Early child behavior problems have been shown to be stable over time [10]. Therefore, older child age could mean that problems are more entrenched and harder to change through intervention. Male gender is also a marker for the severity of conduct problems, with conduct problems being three to four times more likely to be present in boys than girls [11]. Hence, male gender could also influence the effectiveness of parent programs. Although these factors have been associated with poorer outcomes in some studies [12], there were no decreased intervention effects in others [13, 14].

Socio-demographic factors of the parents, such as age, gender, marital status and education, have failed to emerge as consistent predictors of engagement in online programs [e.g., for a review of health-related computer-based systems see 15]. At the same time, these factors have been found to influence outcomes in traditional parenting programs. Numerous studies, including two meta-analyses [16, 17] suggest that children of disadvantaged parents, including those with depression, low income, and single parents, show poorer intervention outcomes compared to those facing less adversity. This may be particularly true for self-help online programs. Without the additional support and motivation that a therapist may offer, significant adversity such as low income, single parenthood or parental mental health problems might exert a greater role on the outcome of the intervention. More dysfunctional or disadvantaged families may experience greater barriers to program use, lack motivation or have difficulties successfully managing the demands of a self-directed program without additional support. Therefore the results of self-help online programs could be inferior for such families.

A more differentiated picture emerges from a meta-analysis by Leijten [18], who showed that both disadvantaged and non-disadvantaged samples benefit equally when initial problem behaviors are severe. However, disadvantaged samples show less immediate improvement when initial problem severity is low. Regardless of baseline problem severity, disadvantaged samples also experience more difficulties maintaining positive outcomes at 1-year follow-up. Accordingly, the extent of problems at baseline seems to be another factor to consider.

Research supports the idea that families with higher levels of problems at baseline benefit as much (if not more) from parenting interventions as families with lesser problems. Several studies and meta-analyses indicate that families who report higher levels of baseline child behavior problems also report greater improvements from parenting interventions [e.g., 19–22]. However, in most of these studies, families displaying fewer problems at pre-intervention still had fewer problems at post- and follow-up assessment. This means that although families with greater initial problems improve more, they still don't catch up to the families displaying fewer problems at baseline. In addition, there is support for the opposing hypothesis that more severe externalizing behavior problems are stable over time and more resistant to change [e.g., 23]. Very little is known about the interplay of the online modality and the severity of presenting problems. It is possible that web-based programs, particularly self-help interventions, could be more suitable for families with mild to moderate problems.

Children with more severe behavior problems are more difficult to parent. Parents often identify their behavior as frustrating or anger provoking. This frustration can be intensified when parents lack the parenting skills to deal with the misbehavior effectively [24]. Increased frustration and anger puts parents at higher risk for the use of ineffective, coercive and harmful parenting strategies [25]. Since parental anger responses may follow or be intensified by more severe child behavior problems, they could also play a role in treatment outcomes.

Another factor to be considered is inter-parental conflict. Conflict over parenting has been associated with externalizing behavior problems [26, 27] and aggression [28] in preschoolers. Parents that have frequent disagreements over parenting may struggle to complete and implement a parenting program together, which could in turn impact intervention outcome. However, in a study by Dittman, Farruggia, Palmer, Sanders and Keown [29], neither parental anger nor inter-parental conflict emerged as significant predictors of outcome in an online parenting program, despite correlating significantly with levels of child behavior problems and dysfunctional parenting at post-intervention.

To date, very little is known about the influence of program characteristics on parenting program effectiveness. Research suggests that a greater dosage of an online program is associated with increased behavior change. This

seems true for online parenting interventions [29] as well as other health interventions, [e.g., interventions targeting voluntary health behaviors, 30]. However, as online interventions typically have higher attrition than face-to-face programs [31, 32], ensuring that users receive a sufficient dose of the intervention can be a challenge. Users may be more likely to benefit from online interventions if they have prior experience with web-based programs or feel comfortable using the Internet [33]. The actual design of the intervention, its components and its features can potentially also influence intervention use and outcome. However, to the best of our knowledge, no research has been published that investigates the relationship between these aspects of online parenting programs and their effectiveness.

The aim of the current study is to examine if socio-demographic characteristics of the family, along with other variables, can predict: (1) completion of the minimal recommended dose of TPOL Brief, a low-intensity online parenting program; and (2) improvements in child behavior and parenting at follow-up. Given the current lack of data on Internet-based parenting programs, an exploratory approach was employed that included a wide range of potential predictors: (1) child and parent demographics, including age, gender and indicators of disadvantage; (2) baseline levels of child behavior problems, dysfunctional parenting and parental adjustment difficulties; and (3) program related variables, such as number of completed modules.

Method

Participants

Participants were 100 Australian parents with a 2–9-year-old child ($M = 4.57$, $SD = 1.88$) with elevated levels of disruptive behavior (75% in the clinical range on the ECBI Intensity scale). Table 1 shows the demographic characteristics of the sample. Most children (81%) lived with their two biological or adoptive parents. Participants were mainly mothers (92%), living with a partner (married or de facto 83%). Their mean age was 35.74 years ($SD = 5.55$). The majority were working part-time (43%). Approximately half the sample was university educated (56%). Twenty-nine per cent of the sample identified as poor or only just getting along financially. All participants reported accessing the Internet every day (96%) or several times a week (4%) and the vast majority was confident or totally confident using the Internet (97%). Seventy-two per cent of families had never accessed a parenting program (online or offline) before enrolling in TPOL Brief.

Recruitment

Recruitment was conducted in the greater Brisbane area, in Queensland, Australia. The main recruitment sources were schools and childcare centers, as well as non-profit agencies that serve ethnic and racial minorities. Parents self-identified as having difficulties with their child's disruptive behavior. Eligibility criteria were: (1) a 2–9-year-old child for whom parents reported elevated levels of child behavior problems as measured by the Strengths and Difficulties Questionnaire [34]; (2) parents identified at least one of four topics covered in the program (i.e. disobedience, fighting and aggression, going shopping, self-esteem) as an area of concern; (3) access to a computer and broadband Internet connection; and (4) the parent's ability to read English at Year 5 level. Families were excluded if the child or parents had a developmental disability, or if the parents were currently receiving psychological help, counseling or seeing a professional for the child's behavior difficulties.

Measures

Demographics

Demographic information collected at pre-intervention assessment included parents' and children's age and gender, family composition, parent marital status, education, employment, cultural background, and financial comfort. Parents also completed questions about their confidence and frequency of use of the Internet.

Child behavior

The *Eyberg child behaviour inventory* [ECBI; 35] is a 36-item measure of perceptions of disruptive behavior in children aged 2–16 years. It includes a measure of the frequency of disruptive behaviors (Intensity scale) rated on a 7-point scale, and a measure of the number of behaviors that parents identify as a problem (Problem scale). Higher scores indicate greater child behavior problems. Both scales had good internal consistency in this sample ($\alpha = 0.88$ and $\alpha = 0.85$, respectively).

Parenting

The *Parenting Scale* [PS; 36] is a 30-item questionnaire that measures three dysfunctional discipline styles: Laxness (permissive discipline), Over-reactivity (authoritarian discipline, anger, meanness and irritability) and Verbosity (long reprimands or reliance on talking), with higher scores indicating more dysfunctional parenting practices. Items are rated on a seven-point scale with the most and least effective parenting strategy being the

anchors. Internal consistency for the Total scale for the current sample was α = 0.82.

Parental anger

The *Parental Anger Inventory* [PAI; 37] assesses anger experienced in response to misbehavior in children aged 2–12 years. Parents rate 50 child-related situations as problematic or not (Problem score), and the degree of anger evoked by each situation on a scale from 1 = *Not at all* to 5 = *Extremely* (Intensity score), with higher scores indicating greater problems and more intense anger. The Problem and Intensity scales showed good internal consistency ($\alpha = 0.87$ and $\alpha = 0.94$, respectively) in the current sample.

Conflict Over Parenting

Parents in two-parent households completed the *Parent Problem Checklist* [PPC; 38]. This 16-item questionnaire measures inter-parental conflict over child rearing (e.g., the extent to which parents disagree over rules and discipline, have open conflict over parenting issues, and undermine each other's relationship with their children). The PPC yields an index of the number of problems (Problem scale), and an intensity rating for the problems listed (Extent scale). Both subscales had good internal consistency in this sample ($\alpha = 0.85$ and 0.93, respectively).

Parental Adjustment

The short form of the *Depression Anxiety Stress Scales* [DASS-21; 39] was used to assess symptoms of depression,

Table 1 Demographic characteristics of the sample

Variable	M	SD
Target child age (years)	4.57	1.88
Respondent age (years)	35.74	5.55
No. of children at home	2.02	0.83
	n	% of $n = 100$
Child gender		
Male	52	52
Female	48	48
Marital status		
Married/cohabiting	83	83
Divorced/separated	8	8
Single	9	9
Parental status		
Mother (Biological/adoptive/step-mother)	92	92
Father (Biological/adoptive/foster)	8	8
Education level		
Some high school	5	5
Completed high school	12	12
Trade/technical college qualification	27	27
University degree	32	32
Postgraduate degree	24	24
Migration background		
Born in Australia	75	75
Lived in Australia 10 years or longer	11	11
Lived in Australia 2–10 years	14	14
Employment		
Full-time	26	26
Part-time	43	43
Not working	31	31
Experienced financial hardship		
Yes	22	22
No	78	78

anxiety, and stress. Parents indicate the extent to which each item applied to them over the past week, on a scale from 0 = *Did not apply to me at all* to 3 = *Applied to me very much, or most of the time*, with higher scores indicating poorer adjustment. The internal consistency of the Total scale in this sample was $\alpha = 0.93$.

Program Related Factors

A variety of program related factors were also assessed: (1) the number of modules completed out of five; (2) per cent of program pages and activities completed out of 128; and (3) completion of minimum dose (defined as completion of the introductory module plus at least one of the exemplar modules).

Procedure

This project followed the National Health and Medical Research Council's ethical guidelines for participation of human subjects and received ethical approval from The University of Queensland Social and Behavioural Sciences Ethical Review Committee (project number: 2012000161). The randomized controlled trial was registered with the Australian New Zealand Clinical Trials Registry (ANZCTR) (ID: ACTRN12613000025730). Informed consent was obtained from all participating families. Eligible parents completed pre-intervention assessment and were randomized to either the intervention group who received access to TPOL Brief, or an Internet-use-as-usual waitlist control group. Both groups were then assessed at 8-weeks post intervention and 9-months follow-up. For the purpose of the current study, pre- intervention and follow-up assessment data was used for the intervention group sample.

Intervention

TPOL Brief [40] is a low-intensity, self-help online parenting program that aims to promote positive parenting practices, including the use of teaching strategies, antecedent strategies to avoid problems in high-risk situations, positive attention and praise to encourage desirable child behavior, and effective discipline for misbehavior. Users receive personal log in details to the 5-module intervention and complete the program by themselves at their convenience. The first module needs to be completed to gain access to the other modules, which can then be completed in the order of the user's choice.

The first module introduces positive parenting strategies and makes parents aware of parent traps. The remaining modules focus on exemplars of behavior-specific (Disobedience, Fighting and aggression, Self-esteem) and setting-specific (Going shopping) applications of this knowledge and skill set. For the initial efficacy trial of the intervention users received access for 8 weeks and were encouraged to complete at least the first module and one of the additional topic-specific modules. Completing the introductory module plus one of the exemplar modules (ideally of a personal concern) exposes the parent to all core content, which was therefore defined as the 'minimum dose'. The exemplar modules show how the strategies are operationalized into a parenting plan. It is hypothesized that completing one of the exemplars is sufficient for parents to generalize their skillset across behaviors and settings.

The intervention is designed to be engaging and interactive. It includes video-based modeling of parenting skills with multicultural families. The built-in interactive exercises aim to improve knowledge acquisition and prompt parental problem solving, decision-making and behavior activation. The program is personalized and employs a self-regulatory framework that enables parents to select goals informed by their own values, beliefs and traditions. To enhance usability and encourage sharing of information with partners, TPOL Brief also offers a number of downloadable resources.

Statistical Analyses

Criterion Variables

The dependent variables in this study were:

1. *Completion of minimum dose*, defined as finishing the introductory module plus at least one of the additional exemplar modules.
2. *Change in child behavior*, defined as the difference in pre-treatment ECBI Intensity scores and those at follow-up assessment. Positive change scores indicate symptom improvement, with higher scores suggesting more change.
3. *Change in dysfunctional parenting*, defined as the difference in pre-treatment PS Total scores and those taken at follow-up assessment. Positive change scores indicate improvement in parenting style, with higher scores suggesting more change.

The same pattern of results emerged when using absolute scores at follow-up instead of change scores as the criterion variables, so results for change scores are presented.

Predictor Variables

Given the current lack of data on predictors of Internet-based parenting programs, the relationships between a wide range of variables assessed as part of the RCT and the dependent variables were examined. The potential

predictor variables were chosen on the basis of the wider literature on moderators of parenting interventions. They include: (1) demographic characteristics: parent age and gender, child age and gender, marital status, relationship to child, type of household (original family, sole parent family), number of children living in the household, parental education, employment status, ability to pay for essential expenses, money left over after paying for essentials, perception of family's financial position, cultural background and migration background, and languages spoken at home; (2) baseline levels of child behavior problems, dysfunctional parenting and parental adjustment difficulties: ECBI (Intensity and Problem scales), PS Total score, DASS-21 Total score, PAI (Problem and Extent scales), PPC (Problem and Extent scales); (3) program related variables: Internet confidence, frequency of Internet use, previous access to parenting programs, completion of minimum dose or more, number of modules completed, per cent of program completed. Only variables with significant bivariate correlations with the dependent variables were then included in regression models to examine the ability of the variables to explain variation in the outcome variable. Where both ECBI subscales correlated with the dependent variable, only one scale (the one that correlated higher with the criterion variable) was chosen for inclusion in the models to reduce the chance of multicollinearity. The same principle was applied for the PPC scales.

Results

Data analyses were based on 100 parents who were randomized to the Intervention group. The 9-month follow-up assessment was completed by 78% of the sample. Missing data due to attrition or missing values were dealt with by using Multiple Imputations (MI), carried out at the individual item level before calculating subscale scores [41]. The Markov Chain Monte Carlo method with 100 iterations was used to produce five multiply imputed data sets.

With regard to program completion, of the 98 parents who activated their account, 62% ($n=61$) completed at least the recommended minimum dose of the introductory module plus one additional exemplar module. In addition, 53% completed three or more modules, 45% completed 4 or more modules, and 40% completed all five modules. Thirteen per cent completed the introductory module only, and 25% did not complete any modules, although the majority of users completed some activities within the introductory module.

Predictors of Completing Minimum Dose

Completing minimum dose was correlated with child age and baseline PPC scores (both subscales). Table 2 shows the bivariate correlation among predictor and criterion variables as well as means and standard deviations or per cent.

Logistic regression was carried out to predict if a program user is likely to complete the recommended minimum dose, based on their child's age and the extent of disagreement over parenting with their partner. No other program related variables were included in these models. The model was a significant fit for the data $\chi^2 = 15.28$, df 2, $p<.001$, and correctly identified 72.8% of cases. Both child age ($B=-0.33$, $SE=0.14$, OR = 0.72, 95%CI [0.55, 0.95], $p=.019$) and PPC Extent ($B=-0.04$, $SE=0.015$, OR = 0.96, 95%CI [0.94, 0.99], $p=.011$) made a significant contribution to the prediction of minimum dose. As child age and the extent of disagreements over parenting issues increases, the chances of completing minimum dose decreases.

Predictors of Change in Child Behavior

Significant correlates of change in child behavior at follow-up were parent age, child gender, and baseline scores on the ECBI (both subscales), PAI Problem scale and PPC (both subscales). None of the program related factors correlated significantly with change in child behavior, and were not included in the regression model. Hierarchical multiple regression was used to assess the ability of the potential predictors to explain variation in change scores on the ECBI Intensity scale. The order in which the variables were entered into the model is as follows: (1) baseline level of the criterion variable (ECBI); (2) parental adjustment (PAI and PPC); (3) demographic characteristics (parent age and child gender). Demographics were entered last because the main interest was in examining the impact of parent, child or family variables beyond what was contributed by other factors.

The first block of the hierarchical regression containing baseline ECBI Intensity scores explained a significant proportion of variance in ECBI Intensity change scores, suggesting that parents that initially report higher intensity of child behavior problems report greater improvements at follow-up (see Table 3 for beta weights, R^2 and F change statistics for each block of predictors). The addition of PAI Problem and PPC Problem scores at block two did not contribute significantly to the prediction, and ECBI Intensity continued to be a significant predictor. The contribution of adding parent age and child gender to the model in block three was inconclusive, as it ranged from significant to non-significant across the multiply imputed data sets, and ECBI Intensity continued to be a significant predictor. However,

PPC Problem and parent age emerged as significant predictors at this step. Parents that were older or reported more disagreements over parenting pre-intervention reported more improvements in child behavior at follow-up. The overall variance explained by the model is $R^2 = 30.9–32.5$, $F\,(2,75) = 6.72–7.22$, $p < .001$.

Predictors of Change in Dysfunctional Parenting

Change in dysfunctional parenting style was correlated with baseline ECBI scores (both subscales), PS scores, and PPC scores (both subscales). None of the program related factors correlated significantly with change in parenting.

Standard multiple regression was used to test whether PS Total, ECBI Problem and PPC Extent would explain a significant proportion of variation in PS change scores. Together these variables explained 21–23% of the variation in follow-up change scores, $F(3,77) = 6.68–7.69$ (range across multiply imputed data sets), $p < .001$. However, only baseline PS scores were a significant predictor ($B = 0.24$, $SE = 0.10$, $\beta = 0.25–0.27$, $p = .020$). Parents that reported more use of dysfunctional parenting strategies pre-intervention reported more improvements in parenting style at follow-up. ECBI Problem ($B = 0.01$, $SE = 0.008$, $\beta = 0.17–0.18$, $p = .116$) and PPC Extent ($B = 0.005$, $SE = 0.003$, $\beta = 0.15 – 0.22$, $p = .104$) were not significant predictors of improvements in dysfunctional parenting.

Discussion

We aimed to identify significant predictors of program use (as defined by completion of minimum dose) and predictors of treatment outcome in regard to improvements in child behavior and parenting style. The findings indicate that parents of younger children are more likely to complete the minimum recommended dose of the program. This is consistent with Dishion and Patterson's [42] finding that parent training is effective for both younger and older children, but "drop out" from treatment is more likely among families with older children. For the current study, this may be due to the selection of topics and the order in which they were presented. Even though after completion of the introductory module parents were free to complete the modules in whichever order they preferred, the majority of users appeared to complete the intervention in a linear fashion. This means that the module that came next after the introductory module was the module on disobedience, a topic that may be of more concern to parents of younger children.

Interestingly, contrary to a study by Dittman, Farruggia, Palmer, Sanders, and Keown [29], module completion was not significantly correlated with outcome. Again, this may be due to the nature of the intervention. As TPOL Brief is a light touch program for parents with a number of discrete problems, parents are encouraged to complete the specific modules that relate to their behavior concerns, rather than completing a sequential program with a number of modules. All modules are structured similarly to teach parents a sequence of applying the strategies presented in the first module to the different topics in the exemplar modules (e.g., identifying why the problem happens, monitoring behavior, preventing the problem, dealing with misbehavior). Parents are hypothesized to generalize this skillset across behaviors and settings after completing one or two exemplars; so completing additional modules may not have an additive effect, particularly if the topics are not of concern to the family.

Another finding of the study is that higher baseline ECBI scores predicted greater improvement at follow-up. Although the notion that a low-intensity intervention like a self-directed online program could be suitable for families with intensive problems can seem counter-intuitive, these results are in line with several other studies, including

Table 2 Bivariate correlations among predictor and criterion variables

Predictor variables	M (SD) or %	Correlation with completion of minimum dose	Correlation with ECBI intensity change score	Correlation with PS total change score
Parent age	35.74 (5.55)	0.174	0.221*	0.059
Child age	4.57 (1.88)	−0.249*	0.160	0.085
Child gender (male)	52%	0.071	−0.205*	−0.083
ECBI Intensity	148.28 (26.40)	0.009	0.450***	0.254*
ECBI Problem	18.19 (6.72)	−0.008	0.399***	0.291**
PS Total	3.33 (0.56)	0.122	0.151	0.407***
PAI Problem	27.80 (7.73)	−0.031	0.276**	0.196
PAI Extent	115.72 (27.96)	−0.071	0.171	0.194
PPC Problem	6.48 (4.52)	−0.263*	0.330**	0.294**
PPC Extent	38.84 (20.92)	−0.334**	0.272*	0.322**

*$p < .05$; **$p < .01$; ***$p < .001$

meta-analyses by Nowak and Heinrichs [12] and more recently by Baumel and colleagues [22]. Both studies showed that trials (including programs of varying intensity) focusing on children with elevated or clinical range behavior problems at baseline showed higher effect sizes. There could be several reasons for this. Families with highly disruptive children may be more motivated to change and their children's behavior may have more room to move. A child with fewer behavior problems cannot improve to the same degree as a child with more problems. It could also be due to a general tendency of extreme scores to regress towards the mean. Or perhaps parenting interventions in general might be more beneficial for children with more severe deviant and externalizing misbehavior or more distressed families. Similar results have been reported for other parenting programs [e.g., 19, 43]. The same pattern was evident for PS scores, with parents showing higher pre-intervention use of dysfunctional parenting strategies reporting greater improvements in parenting. However, similar to findings reported in the literature, parents that reported the highest levels of dysfunctional parenting and child behavior problems pre-intervention were still in the highest range at follow-up.

The study also revealed that parents who were older reported more improvements in child behavior at follow-up. This is contrary to results reported by Beauchaine, Webster-Stratton and Reid [13] who found more positive treatment outcomes for children of younger mothers. We are unable to offer a conclusive explanation for this finding, but we speculate that age could be confounded with other factors that were not assessed (e.g., parental self-efficacy) that could mediate the effect of parent age on outcome.

An interesting factor that emerged in this study was the influence of parental disagreement over child rearing. Even though parents with higher disagreement over parenting issues were less likely to complete minimum dose, they were more likely to report decreases in child behavior problems at follow-up. One possible interpretation of these findings is that these parents perhaps achieved the change they were hoping for early on in the intervention and therefore did not complete further modules. Conversely, parents that have conflict and disagreement over parenting are perhaps less likely to complete a program together and be supportive of each other when practicing new strategies. Nevertheless, they may also have more room for improvement and benefit from parenting programs in several areas. For example, research suggests that completing an online parenting program can be associated with improved child behavior, less use of ineffective discipline, greater parental confidence, as well as less parental stress, anger and conflict over parenting [5]. Different subsystems within the family are interdependent, and the emotional and behavioral dynamics of one subsystem (e.g., parent–child relationship) may affect the functioning of other subsystems (e.g., inter-parental relationship). A positive aspect of this is that interventions in one area can have positive spill over effects in other areas. For example, Cummings and colleagues [44] were able to show that a brief prevention program for improving marital conflict improved marital satisfaction as well as parenting and child adjustment, with improvements maintained at 2-year follow-up [45]. Similarly, Cowan, Cowan and Barry [46] showed that participation in a couples group before their child's transition to elementary school had long term benefits for both the couple and the child over a period of 10 years.

This interdependency presents an opportunity for the benefits of both parenting and couples interventions to be combined to potentially enhance outcomes for the inter-parental relationship as well as the parent–child relationship [47–49]. For example, this could occur by offering advice on dealing with marital conflict before completing a parenting program, to increase the likelihood of completing a sufficient dose of the intervention. Alternatively, strategies that address inter-parental communication and support

Table 3 Predictors of change in child behavior

Predictor	Step 1			Step 2			Step 3		
	B	*SE*	*β*	*B*	*SE*	*β*	*B*	*SE*	*β*
ECBI Intensity	0.44	0.09	0.47–0.48***	0.45	0.13	0.48–0.51***	0.51	0.14	0.54–0.58***
PAI Problem	–	–	–	−0.42	0.46	−0.11 to −0.15	−0.60	0.46	−0.17 to −0.21
PPC Problem	–	–	–	1.29	0.67	0.20–0.23	1.41	0.65	0.22 to 0.25*
Parent age	–	–	–	–	–	–	1.11	0.47	0.21–0.27*
Child gender	–	–	–	–	–	–	1.89	5.25	0.03–0.06
	R^2 = 0.22–0.23			ΔR^2 = 0.04			ΔR^2 = 0.04–0.07		
	F(1,79) = 22.33–23.90			F(2,77) = 1.82–2.26			F(2,75) = 2.31–3.81		
	p < .001			p = .112–0.170			p = .027–0.106		

*p < .05; **p < .01; ***p < .001, where ranges are given they indicate results across all five multiply imputed data sets

can be added to a regular parenting program. One such example is Enhanced Triple P that includes a partner support module and a coping skills module as an adjunct to the Standard Triple P intervention [50].

To summarize the findings of this study, demographic factors did not have a large or straight-forward influence on intervention effects. No specific child or parent factors apart from older parental age emerged as predictors of treatment outcome. While this study was unable to outline demographic characteristics that could describe a 'profile' of the type of family or parent most likely to benefit from TPOL Brief, findings confirm that the intervention could be beneficial for a range of families from different backgrounds. This includes families that may not traditionally have been triaged into brief, self-directed interventions, such as those from disadvantaged socio-demographic background, parents that experience conflict over parenting with their partners, and families that report high levels of dysfunctional parenting and child behavior problems.

A few limitations need to be considered when interpreting these results. Firstly, the low number of fathers limits the generalizability of the findings to both genders, as fathers potentially complete online programs differently and treatment outcome could be predicted by different factors. In this study, the same pattern of results emerged when fathers were excluded from the analyses, so results of the full sample were reported. Also, there was not a sufficiently large spread across the number of completed modules. Perhaps with a larger sample a dosage effect would emerge. Finally, this study only investigated potential predictors. Future studies should carry out moderator and mediator analyses, perhaps using a larger sample size and pooling outcomes across a number of online trials, so a larger range of moderators and mediators could be examined. This may help identify relevant mechanisms of change and elucidate the *when, why, how, for whom*, and *under what conditions* online parenting interventions produce positive outcomes for families.

Summary

The present study investigated a range of family and intervention-related factors as potential predictors of improvements in child behavior and parenting practices after participation in a low-intensity online parenting program, Triple P Online Brief. Results support previous research indicating that families with higher baseline levels of problems benefit at least as much from parenting interventions as families with fewer problems. While the study was unable to provide a detailed profile of families most likely to benefit from a brief online parenting program, it provides initial support for the suitability of Triple P Online Brief for a broad range of families. Family demographics (e.g., parent education, employment), parental adjustment (e.g., parental stress, anger) and program related factors (e.g., number of completed modules) did not significantly predict treatment outcomes. This indicates that low-intensity online parenting interventions could be efficacious for a broad range of users and may make an important contribution to a public health approach to parenting support. They present a valuable and potentially cost-effective addition alongside traditional intensive individual or group-based parenting programs and may increase the accessibility and reach of parenting programs. Brief online interventions may be particularly promising for engaging disadvantaged families who are typically less likely to participate in face-to-face interventions.

Interestingly our research did not confirm dosage to be a significant predictor of improvements in parenting or child outcomes. The lack of an obvious dosage-response relationship is not uncommon for online interventions. However, further research should be carried out to investigate what the crucial components of the intervention are, and if outcomes can be enhanced further by encouraging greater module completion.

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Compliance with Ethical Standards

Conflict of interest The Triple P—Positive Parenting Program is owned by The University of Queensland. The University through its main technology transfer company, UniQuest Pty Ltd, has licensed Triple P International (TPI) Pty Ltd to publish and disseminate the program worldwide. Royalties stemming from published Triple P resources are distributed to the Parenting and Family Support Centre; School of Psychology; Faculty of Health and Behavioural Sciences; and contributory authors. Matthew Sanders is an author on various Triple P resources. TPI is a private company and no author has any share or ownership in it. TPI engages the services of Professor Matthew Sanders as a consultant to ensure program integrity is maintained. Sabine Baker is a PhD candidate and researcher at the Parenting and Family Support Centre.

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