



Delivering Group Lifestyle Triple P through digital practice: A case study with Portuguese parents

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The purpose of the current study was to explore the delivery of the Group Lifestyle Triple P (GLTP) parent group programme through digital practice. Eight mothers of obese children aged 6–11 were recruited from a university hospital. Using a mixed-methods approach, the study sought to characterise the perceived changes throughout the intervention and explore the outcome measures on children's BMI z-score, weight-related behaviour problems, parents' self-efficacy, interparental conflict and parenting styles assessed pre- and post-intervention. Participants identified changes in themselves, in positive parenting, and in their ability to manage children's nutrition and physical activity, contributing to improve children's lifestyle behaviours. The clinical results were similar to the findings of studies in which GLTP was delivered in-person. Delivering GLTP through digital practice seems to be a possible way of implementing the intervention, particularly during the COVID-19 pandemic.

Practitioner points

- GLTP sessions' contents and activities were adapted for digital delivery without compromising the programme's implementation fidelity.
- Parents perceived an increase in positive parenting behaviours and their ability to manage children's nutrition and physical activity.
- The clinical results of the GLTP delivered through digital practice were similar to those of studies in which the programme was delivered in-person.

Keywords: Group Lifestyle Triple P; childhood obesity; digital practice; case study

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Portugal has one of the highest rates of childhood overweight (OW) and obesity (OB) in the European Union, with a prevalence of OW (30.7%) and OB (11.7%) in children aged 6 to 8 (Rito *et al.*, 2017), higher than the average prevalence (26.9% of children classified as OW or obese) identified by Börnhorst and colleagues (2015). Childhood OW and OB are major risk factors for children's health conditions and predict adult OB and premature mortality (Engeland *et al.*, 2004). Additionally, these conditions have been related to children's social, behavioural and emotional problems, psychosocial distress, poor academic performance and low quality of life (Gibson *et al.*, 2008; Griffiths *et al.*, 2011; Sahoo *et al.*, 2015).

The aetiology of childhood OW and OB includes endogenous factors such as genetics and exogenous factors such as inappropriate diet and sedentary lifestyle (Sahoo *et al.*, 2015). As such, a comprehensive and early approach to reduce maladaptive eating and improve exercise habits is of significant interest. Since parents have a crucial role in children's diet and physical activity (Papoutsi *et al.*, 2013), interventions should include the family's lifestyle and focus on the parenting practices within these contexts.

Interdisciplinary approaches with family involvement using behaviour and lifestyle strategies to curb OB among schoolchildren are critical (Hamid and Sazlina, 2019). Parent-only interventions were identified in a meta-analysis (Loveman *et al.*, 2015) as an effective treatment option for OW and obese children aged 5 to 11. By targeting parents, the focus shifts from children's weight control issues to parenting issues, increasing parents' responsibility in providing an environment that leads children toward healthy behaviours (West *et al.*, 2010).

Group Lifestyle Triple P (GLTP) is a group format evidence-based parenting intervention (EBPI) that combines components of positive parenting, nutrition and physical activity, to promote a healthier lifestyle in families of OW and obese children, aged 5 to 10 (West *et al.*, 2010). GLTP is part of the Triple P system (Sanders, 2008), an EBPI 5-level system where the intensity of the parenting interventions increases as programs move from universal (level 1) to target (level 5) status.

Although the evidence base for the Triple P system is contested by studies suggesting no convincing evidence that the system's interventions work across the general population (Wilson *et al.*, 2012), other research on the Triple P system identified effects on a broad range of child, parent and family outcomes (e.g. De Graaf *et al.*, 2008; Sanders *et al.*, 2014).

The efficacy of GLTP, a level 5 intervention, has been evaluated in two randomised controlled trials (RCT). Results revealed a significant reduction in child body mass index (BMI) z-score at the end of the intervention and additional improvement at 1-year follow-up (West *et al.*, 2010). Results also revealed a decrease in child weight-related behavioural problems and an increase in parents' confidence in managing such problems and satisfaction with parental practices, with less frequent use of inconsistent or coercive parenting practices (Gerards *et al.*, 2015; West *et al.*, 2010).

Research regarding the efficacy of GLTP is ongoing in a clinical sample of Portuguese parents of obese children, evaluating parents' and children's outcomes until 6-months after the intervention (trial registered at the ISRCTN registry with the reference ISRCTN44687723, Cruz and Canário, 2020). Studying the effects of GLTP is of great relevance these days. The COVID-19 pandemic is changing family life. It is a time of uncertainty; both parents and children are living with increased stress and fear (Cluver *et al.*, 2020). Parents are facing many challenges while working remotely or being unable to work and provide for their families, taking care of children, and trying to keep themselves and their families safe from the virus. Several countries applied lockdown measures to prevent the spread of the virus, taking families and children out of their routines and forcing them to spend more time at home. As a consequence, children's screen time has increased and physical activity decreased (Moore *et al.*, 2020), increasing the risk of weight gain.

The pandemic has also entailed social and economic challenges for families, increasing the risk for parental stress, abuse and violence against children (Cluver *et al.*, 2020). Delivering EBPI during the COVID-19 pandemic can contribute to promoting families' wellbeing, reducing parental distress and improving child behaviour (Riegler *et al.*, 2020). However, to ensure safety measures and prevent the spread of the virus, EBPI should be delivered remotely, using digital tools.

The use of technology-based delivery methods for parenting interventions have been identified in previous literature as promising (Hall and Bierman, 2015) and having successfully improved parenting variables such as parent knowledge, behaviour and self-efficacy (Corralejo and Rodríguez, 2018). More recently, Riegler and colleagues (2020) identified the effectiveness of a telepsychotherapy parenting skills intervention to promote positive parent-child interactions and family functioning during the COVID-19 pandemic. Nevertheless, EBPI's feasibility, adaptations and fidelity when delivered through technology-based methods need to be further addressed by research.

Even though the use of digital tools in EBPI delivery might pose additional benefits compared with face-to-face methods, such as allowing parents who lack time, transportation or are from remote areas, to attend the intervention and contribute to higher rates of participants' retention, there are also additional risks entailed. Families, particularly low-income ones, may not have access to the internet or technological equipment, and those who do may experience technical difficulties (Hall and Bierman, 2015). Additional risks pertain to aspects of the theory underpinning the programme which may be compromised when adapting an intervention to digital delivery. As acknowledged by Nieuwboer and colleagues (2013), positive evaluations of parent programmes delivered in-person may not guarantee positive outcomes in a digital adaptation.

The GLTP intervention is an EBPI underpinned by cognitive behavioural theory with three core components, which address risk and protective factors for childhood OW and OB and translate into a range of specific parenting strategies (West *et al.*, 2010). When delivering EBPI through digital tools rather than in-person, a special effort must be made to not compromise relevant components of the intervention such as the group dynamic and participants' spontaneous interactions, the exercises targeting behaviour modelling and the opportunities for parents to develop skills by rehearsal, role-playing or practice.

The current study

The purpose of the current study is to explore the delivery of the GLTP intervention through the digital platform Colibri (Zoom), by presenting a case study. Specific purposes are to: (1) understand and characterise according to the parents' perceptions, the helpful aspects of the intervention and the perceived changes throughout the intervention, (2) explore the outcomes of children's BMI *z*-score, parents' perceptions of children's weight-related behavioural problems, self-efficacy in dealing with such behaviours, interparental conflict, parenting styles, feeding and physical activities parenting practices assessed before and after the intervention and (3) explore the feasibility of delivering the intervention through digital practice, by assessing participants' retention, attendance, and satisfaction, the facilitator's fidelity to the GLTP manual, and perceptions regarding the digital delivery of the intervention.

Methods

Participants

A total of eight families agreed to take part in the current study. Mothers were the ones attending the intervention, as all of them were the children's primary caregivers. Their ages ranged from 29 to 52 years old ($M = 41.25$; $SD = 7.36$), and the number of children from 1 to 3 ($M = 2.00$, $SD = 0.76$). Mothers were either married ($n = 5$; 62.50%) or living as a single parent ($n = 3$; 37.50%). All were Caucasian. Regarding education, mothers attended 12 ($n = 5$; 62.50%) or less than 7 ($n = 3$; 37.50%) years of schooling. At the time of data collection, three mothers were unemployed (37.50%) and five were employed (62.50%). Fathers and other primary caregivers living in each child's household were invited to attend the GLTP intervention along with the mothers. One grandmother accepted the invitation and attended the programme together with her daughter, who was one of the mothers enrolled in the study.

Children's ages ranged from 6 to 11 years old ($M = 9.13$; $SD = 1.73$). The majority of the children were male ($n = 7$; 87.50%). The children attended either the first ($n = 5$; 62.50%) or second ($n = 3$; 37.50%) cycle of basic education in public schools. All children were being followed up at the Nutrition Unit of the Paediatric Department (NUPD) of the University Hospital Centre of Porto (Centro Materno-Infantil do Norte, Portugal). All children at the pre-intervention assessment had a BMI z-score higher than 2, ranging from 2.20 to 4.33 ($M = 3.20$; $SD = 0.70$).

Procedure

Recruitment took place at the NUPD of the University Hospital Centre of Porto. Mothers and fathers (or other primary caregiver) of OW or obese children attending the NUPD paediatric appointment were invited to take part in the study. Participants' inclusion and exclusion criteria are described elsewhere (ISRCTN44687723, Cruz and Canário, 2020).

Recruitment was in progress at the university hospital in order for the research team to gather enough families to randomly allocate to intervention or control conditions and proceed with the RCT, when COVID-19 hit Portugal. In March, the Portuguese Government declared state of emergency, and lockdown measures were applied to prevent the spread of the virus, reducing non-essential contact with others to the strictest minimum. The medical appointments in which participants were recruited were cancelled, the university was closed and the research

team precluded from continuing the RCT. Despite the constraints, the COVID-19 pandemic also set an opportunity for the research team to develop a case study on the delivery of the GLTP intervention using the digital platform Colibri (Zoom), with eight families that were waiting to be randomly allocated to one of the conditions. The digital platform Colibri (Zoom) is a web video conference and online collaboration tool, available for Portuguese Universities through the unit *Computação Científica Nacional* (FCT/FCCN), which guarantees participants' data protection and cybersecurity.

GLTP is aimed at reducing children's risk of chronic weight problems by increasing parents' skills and confidence in managing children's weight-related behaviour. The programme addresses positive parenting, and aims at helping parents develop strategies for managing their child's weight and weight-related behaviours by introducing changes in the family's lifestyle, mainly through promoting healthy family eating and encouraging physical activity (West *et al.*, 2010). The programme targets parents of OW or obese children aged 5 to 10. It consists of a 14-session intervention delivered in a hybrid format, where parents receive ten 90-minute group sessions (in-person) and four 20-min individual sessions (by phone or video call). Sessions 1 to 10 are delivered weekly, and sessions 11 to 14 biweekly, resulting in a programme duration of 17 weeks.

In the current study, both group and individual sessions were delivered through the digital platform Colibri (Zoom). The families included in the current study were excluded from the RCT, as they were not randomly allocated to the intervention condition. Each family received a copy of the Group Lifestyle Triple P workbook, and the active games booklet.

Minor adjustments were made in the group sessions to adapt to the digital delivery format. A table describing the adjustments made in each group session's exercises or activities is presented as supplementary material. When the session included exercises for parents in pairs or small groups, the option *breakout rooms* in the Colibri (Zoom) tool was used. Other adjustments were also made in the exercises targeting behaviour modelling and role-playing. The GLTP delivery through digital practice did not allow for these activities to be made in-person, and they had to be recorded or performed through camera.

The adaptations to the group sessions were discussed with the research project's Triple P implementation consultant and followed the remote delivery guidelines provided at the Triple P Provider Network. The digital delivery of GLTP group sessions took approximately the

same time as in-person delivery. One facilitator, a GLTP trained and accredited provider, with experience in implementing the intervention in-person, was in charge of the intervention. During the group sessions, the facilitator was assisted by a colleague who did not interfere with the programme implementation but assisted the facilitator and the participants in dealing with technical issues (e.g. assisting participants who experienced problems with the internet connection). The facilitator had weekly meetings with peers, accredited providers of different programmes of the Triple P system, to discuss issues related to the GLTP digital delivery during the COVID-19 pandemic.

Different researchers performed data collection. The facilitator collected some of the pre-intervention data using the questionnaires that parents completed in group session number 1. Post-intervention data, measures and interviews were collected by researchers unacquainted with the GLTP or other programme from the Triple P system.

Instruments

Children's weight and height were evaluated by the paediatricians at the NUPD of the University Hospital Centre of Porto, before and after the GLTP delivery, using an Inbody 270 scale and a SECA stadiometer, respectively. Mothers' provided information: (1) on the family's sociodemographic data; (2) on children's behaviours, on parents' perceptions of children's problematic behaviours related to overweight and obesity, and their confidence in dealing with such behaviours, on parenting feeding and physical practices, on parenting styles, and interparental conflict before and after the intervention; and (3) on client satisfaction after the intervention. The questionnaires were completed using online forms. These outcome measures are summarised in Table 1.

The participants who attended the GLTP intervention also completed questionnaires on the helpful aspects of the intervention and took part in individual interviews held through the digital platform Colibri (Zoom). The Helpful Aspects of the Therapy measure (Elliott, 1993; Llewelyn, 1988; Sales *et al.*, 2007) was administered to assess the participants' perception of the helpful aspects of the intervention. Participants were asked to identify and describe, using their own words, the most useful and the most negative events during the intervention, and to assess how useful the intervention was on a 5-point scale ranging from 1 (slightly helpful/extremely hindering) to 5 (extremely helpful/slightly hindering). The measure was applied at the beginning of

TABLE 1 Summary of the questionnaires' outcome measures

Questionnaire	References	Purpose	Number of items and rating scale	Selected outcome variables
Strengths and Difficulties Questionnaire (SDQ)	Fleitch .. 2005 Goodman, 2001	Evaluates parents' report on children's psychosocial problems and strengths	25-item; 3-point scale, from 0 (not true) to 2 (very true)	Total difficulties. Higher scores represent more difficulties identified by the parent in children's psychosocial problems
Lifestyle Behaviour Checklist (LBC)	West and Sanders, 2009, 2015	Evaluates parents' perceptions of children's problematic behaviours related to overweight and obesity, and their confidence in dealing with such behaviours	25-item; Problem scale rating: 7-point scale from 1 (not at all) to 7 (very much), Confidence scale rating: 10-point scale from 1 (certain I can't do it) to 10 (certain I can do it)	Problem and confidence scales. Higher scores represent more lifestyle-specific behavioural problems and more parental self-efficacy
Parent Problem Checklist (PPC)	Sanders and Dadds, 1993	Evaluates interparental conflict over childrearing	16-item; Each item is rated first using a yes/no format to identify the item as a problem or not (Problem scale); and, then, using a 7-point scale from 1 (not at all) to 7 (very much) to identify the extent in which each problem negatively affects the couple's relationship (Problem extent scale)	Problem extent scale. Higher scores suggest a greater number of areas in which the parents are experiencing conflict

TABLE 1 (CONTINUED)

Questionnaire	References	Purpose	Number of items and rating scale	Selected outcome variables
Parenting Scale (PS)	Arnold., 1993; Cruz and Abreu-Lima, 2013	Evaluates discipline styles	30-item; 7-point scale (using an anchor system from a more/less effective behaviour to a less/more effective behaviour)	Laxness, over-reactivity, and hostility. High scores point out ineffective parenting styles
Comprehensive Feeding Practices Questionnaire (CFPQ)	Canário., 2020a; Musher-Eizenman and Holub, 2007	Evaluates specific parenting behaviours related to feeding practices	49-item; 5-point scale from 1 (never/disagree) to 5 (always/agree)	Monitoring, modelling, and pressure to eat. Higher scores suggest greater monitoring of children's food intake, more healthy eating modelling behaviours; and more behaviours pressuring the child to eat
Physical Activity Parenting Practices (PAPP)	Canário., 2020b; O'Connor., 2014	Evaluates specific parenting behaviours related to children's physical activity encouragement and discouragement	31-item; 5-point scale from 1 (never) to 5 (always)	Engagement and structure, and promoting screen time, and psychological control. Higher scores point out parental encouragement of children's physical activity, and promotion of children's screen time

TABLE 1 (CONTINUED)

Questionnaire	References	Purpose	Number of items and rating scale	Selected outcome variables
Client Satisfaction Questionnaire revised (CSQ-r)	West and Sanders, 2009	Evaluates parents' satisfaction with the Triple P intervention, including the quality of the service provided, how well the intervention met their needs, and their child's degree of progress	14-item; 7-point scale, from 1 (e.g., poor/ very dissatisfied) to 7 (e.g., excellent/very satisfied)	Satisfaction. Higher scores reveal greater satisfaction with the intervention

session 7 (addressing the intervention's contents from session 1 to 6) and at the beginning of session 14 (addressing the intervention's contents from session 7 to 13).

A semi-structured interview, adapted from the Client Change Interview (Elliott and Rodgers, 2008; Elliott *et al.*, 2001; Sales *et al.*, 2017), was used to obtain information about the participants' perceptions and experiences. Seven mothers and one grandmother participated in the individual interview. The purpose of the interview was to explore the perceived changes after the intervention, and the factors contributing to those changes, including the helpful/unhelpful aspects of the intervention. The interview covered general issues (e.g. 'How did you feel during the intervention?'), changes (e.g. 'What changes, if any, have you noticed in yourself, your child or your family since the intervention started?'), attributions (e.g. 'What do you think might have contributed to these changes?'), positive aspects (e.g. 'What have been the most helpful contributions of the intervention?'), negative aspects (e.g. 'Are there aspects of the intervention that are not working or that did not help you?') and suggestions (e.g. 'Do you have any suggestions for the intervention?').

The facilitator completed the GLTP fidelity checklists at the end of each group and individual session to record what was covered in each session and monitor adherence to each session's contents. The facilitator also monitored participants' attendance to the sessions. Additionally, throughout the GLTP digital delivery and after, information was collected with the facilitator addressing her perception of what went well and what were the difficulties experienced.

Analytic plan

The current study used a mixed-methods approach, combining qualitative and quantitative data analyses. Qualitative data were analysed using the thematic analysis framework proposed by Braun and Clarke (2006), a method for identifying, analysing and reporting patterns within data. In the current study, themes within data were identified in two ways: deductive, identifying themes driven from the GLTP intervention's contents; and inductive, identifying themes strongly related to the data provided by the interviews. In line with Braun and Clarke (2006), the interviews' transcripts were analysed, and the data extracts coded for different themes. Two researchers analysed the interviews' transcripts. The inter-rater agreement on the themes identified in the data extracts was

higher than 77%, suggesting an adequate level of agreement (Saldaña, 2009). The inter-rater agreement was estimated according to Miles and Huberman (1994), by the ratio of the number of agreements to the sum of agreements plus disagreements.

Quantitative analyses were performed using the software IBM SPSS v.25 (IBM Corp. Released 2017) and included computing children's BMI z-scores using the WHO reference macro package (de Onis *et al.*, 2007), as well as obtaining the frequencies and descriptive statistics of the variables in the current study.

Results

GLTP participants' perceptions on the helpful aspects of the intervention and perceived changes throughout the intervention

According to the participants' perceptions, the most helpful aspects of the intervention were the contents of session 4 on modifying recipes ($n = 2$), session 5 on reading food labels ($n = 8$), session 6 on playing active games ($n = 2$) and session 8 on managing problem behaviour ($n = 2$). These aspects of the intervention were rated by the participants either as very or extremely helpful.

The results of the thematic analysis on the participants' perceived changes after the intervention and the factors contributing to those changes produced four themes: (1.1) changes perceived since the beginning of the GLTP intervention, (1.2) factors contributing to change, (1.3) significant aspects of the intervention and (1.4) difficulties experienced.

Changes perceived since the beginning of the GLTP intervention in the caregiver and the child. The caregivers perceived changes since the beginning of the GLTP intervention that were maintained over time regarding positive parenting ($n = 7$), nutrition ($n = 8$), physical activity ($n = 5$) and weight loss ($n = 2$). Regarding positive parenting, participants stated that throughout the intervention they learned to not overreact to the child behaviour (e.g. P7: *I would get very upset and scold a lot, but now instead of scolding, I talk to him and he listens*). Participants also referred to the use of praise (e.g. P2: *I now praise him when we end a meal and he does not ask for more food*), and quality time with the child (P3: *Before the intervention, we would get home and each would do different things. But not now. I think that if we have been apart all day, we should do something together, even just talk*).

Regarding nutrition, participants stated that it was very important to learn how to read the food labels (e.g. P5: *Before I wouldn't even look at the labels, but now I look at each and every one of them*), and that they now cook food in healthier ways (e.g. P2: *I learned to pay attention to the ingredients in the recipes, and I now replace some for healthier ones (...) the whole family eats better now*). Also, participants state that they were able to set boundaries in their child's food intake (e.g. P4: *For instance, if he wants a snack before dinner, we compromise. I say ok, you can have an apple now, but then you won't have it for dessert*).

Regarding physical activity, participants stated that they now encourage active play (e.g. P2: *During the lockdown, we would play, skip rope, and do some yoga exercises*) and physical activity in everyday activities (e.g. P2: *We walk to school, now*). As for other positive changes, two participants noted that they had lost weight during the intervention (e.g. P1: *Since I started attending the intervention, I lost 10 kg*).

The caregivers also perceived changes regarding their children's lifestyle behaviour ($n = 7$) and weight control ($n = 1$). The participants identified their children as regulating their food intake (e.g. P1: *He now has a smaller portion of milk for breakfast either with corn flakes or with one slice of toast*), their physical activity (P3: *He is much more active nowadays, he would always play in his room, but now he goes out and plays outside*) and, also, being aware of the problem (e.g. P7: *He knows that his health is important and tries to improve*). Other positive changes include one child's weight control (e.g. P1: *We went to the paediatric appointment and the doctor praised my grandson, because he lost volume, fat mass, and had good results*).

Factors contributing to change. The factors perceived by the participants as contributing to the changes were specific to the intervention ($n = 8$). Participants felt that they learned from the intervention's contents (e.g. P4: *I now have more information and can help my son better*) and from the group experience (e.g. P6: *I feel that talking to the other parents was helpful*). Other factors identified by the participants were explaining to the child the intervention's contents (e.g. P7: *I explained him what we discussed in the sessions and what the workbook was about, and sometimes he would read the workbook*), and the implementation of behaviour charts (e.g. P4: *The behaviour charts were very helpful (...) also to eat slowly*).

Significant aspects of the intervention. The significant aspects of the intervention identified by the participants relate to the support ($n = 8$), the intervention's contents and structure ($n = 5$), the facilitator's characteristics ($n = 4$) and the impact of the intervention ($n = 8$).

Participants identified as a significant aspect the social support from the group experience (e.g. *P2: There was a lot of sharing; P4: There was mutual help between all in the group*). Regarding the intervention's contents and structure, participants identified as significant aspects the materials provided (i.e., workbook and active games booklet), the organisation of the sessions and its contents (e.g. *P3: The way the sessions were organised, and the contents addressed. I think it was very appropriate*). Regarding the facilitator, the participants identified positive characteristics such as being available and friendly (e.g. *P4: She was always available to help us; P8: (...) was friendly*). As for the impact of the intervention, participants identified obtaining tailored information, combining information and counselling (e.g. *P5: I learned a lot, and the advice was very helpful*), being alert (e.g. *P2: I would never think of changing the recipes, for instance*), developing skills and being motivated for change (e.g. *P6: I can handle my son better; P2: I feel more confident to deal with the obstacles*), and the usefulness of the intervention for the whole family (e.g. *P1: This started as something for the boy, and ended up helping everyone at home; P5: I implement what I learned with my three daughters and myself*).

Difficulties experienced. The difficulties experienced by the participants included the child's unresponsiveness or resistance to change ($n = 6$; e.g. *P4: They prefer to be on their tablets, it is a bit hard to push them to be more active*), lack of support ($n = 2$; e.g. *P6: There were times when I was at work, my husband was at work, and our child was at home by himself*), the lockdown situation in consequence of the COVID-19 pandemic ($n = 5$; e.g. *P5: With the lockdown everything closed, and they had to adapt to being always at home*) and difficulties related to the lack of awareness of extended family members ($n = 2$; e.g. *P4: For some of our relatives, it is like they cannot understand that my son 'cannot eat' certain foods*). The participants did not highlight any other aspects of the intervention that could have worked better for them.

Pre- and post-intervention outcomes

Single case data for the outcome variables assessed before and after the intervention are presented in Tables 2 and 3. Clinically significant reductions were found in one child's BMI z -score and on three children's psychosocial problems. The perceptions of children's weight-related behavioural problems decreased for four mothers, and the self-efficacy in managing the same problems increased for five mothers. Interparental conflict decreased for three mothers. Ineffective parenting styles also

TABLE 2 Single case data and descriptive statistics for children's BMI z-score and psychosocial problems, parents' perceptions of children's problematic behaviours related to OW and OB, self-efficacy in dealing with such behaviours, interparental conflict, and parenting styles: pre- and post-intervention

Participants	BMI z-score		Total difficulties		Lifestyle behaviour problems		Lifestyle behaviour confidence		Interparental conflict		Hostility		Laxness		Over-reactivity		
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	
P2	2.70	2.83	7.00	10.00	42.00	32.00	175.00	250.00	16.00	16.00	1.00	1.00	1.20	2.20	1.60	1.80	
P3	3.05	2.74	16.00	10.00	50.00	34.00	191.00	233.00	19.00	16.00	3.67	1.00	2.00	1.80	5.20	3.20	
P4	4.33	4.99	12.00	13.00	66.00	43.00	213.00	240.00	16.00	16.00	2.33	2.00	2.00	1.40	4.40	3.20	
P5	2.85	2.98	11.00	7.00	38.00	48.00	233.00	223.00	19.00	16.00	1.67	1.67	2.80	2.80	4.20	3.80	
P6	2.92	2.96	17.00	21.00	40.00	91.00	228.00	143.00	19.00	22.00	1.00	1.33	2.20	2.00	4.80	4.40	
P7	3.79	3.90	20.00	16.00	42.00	43.00	76.00	109.00	73.00	56.00	2.33	2.33	3.40	2.60	4.80	5.80	
P8	3.79	4.00	17.00	19.00	146.00	139.00	86.00	132.00	48.00	52.00	1.00	1.00	1.00	3.80	3.40	3.20	
P9	2.20	0.00	0.00	0.00	27.00	0.00	250.00	0.00	16.00	0.00	1.00	1.00	4.00	1.80	0.00	0.00	
M(SD) n = 7	3.35 (0.62)	3.49 (0.84)	14.29 (4.46)	13.71 (5.15)	60.57 (38.86)	61.42 (39.52)	171.71 (65.22)	190.00 (59.40)	30.22 (22.09)	27.71 (18.13)	1.86 (1.00)	1.48 (0.54)	2.09 (0.84)	2.37 (0.79)	4.06 (1.23)	3.63 (1.24)	0.00 (0.00)
Cronbach's α			.83	.74	.98	.98	.98	.99	.93	.95	.71	.60	.83	.61	.69	.79	

Note. Participant 9 dropped out after attending the first session of the GLTP intervention

TABLE 3 Single case data and descriptive statistics for feeding and physical activities parenting practices assessed pre- and post-intervention

Participants	Monitoring food intake		Modeling healthy eating		Pressure to eat		Encouragement of physical activity		Promotion of screen time	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
P2	5.00	4.00	4.00	5.00	1.00	1.75	4.40	4.00	1.00	2.00
P3	4.00	5.00	3.75	4.00	2.00	1.50	2.87	3.67	2.67	1.67
P4	3.75	5.00	2.50	3.75	3.00	2.75	2.53	3.00	4.00	3.67
P5	4.75	4.25	3.00	3.50	3.50	3.00	3.40	3.47	3.00	2.33
P6	5.00	5.00	5.00	4.50	2.50	2.25	3.53	3.53	2.00	4.33
P7	5.00	5.00	5.00	5.00	2.50	2.00	3.00	3.20	2.33	2.33
P8	5.00	4.50	5.00	4.75	1.00	1.00	3.73	3.60	3.67	4.00
P9	4.00		5.00		3.00		3.20		3.00	
<i>M(SD) n = 7</i>	4.64 (0.54)	4.68 (0.43)	4.04 (1.02)	4.36 (0.61)	2.21 (0.95)	2.04 (0.70)	3.35 (0.62)	3.50 (0.32)	2.90 (1.07)	2.67 (1.02)
<i>Cronbach's α</i>	.94	.90	.81	.51	.76	.64	.87	.73	.90	.92

Note. Participant 9 dropped out after attending the first session of the GLTP intervention

presented clinically significant reductions, hostility decreased for two mothers, laxness for four mothers and over-reactivity for five mothers. Feeding parenting practices regarding monitoring food intake and modelling healthy eating increased for two and four mothers, respectively, and pressing the child to eat decreased for five mothers. Physical activity parenting practices regarding physical activity encouragement increased for four mothers, and screen time promotion decreased for three mothers.

Feasibility of delivering GLTP through digital practice

A high rate of participant retention (87.50%) and attendance (92.86%) was identified in the current case study. One mother attended one session and dropped out for reasons related to her work schedule. Seven mothers and one grandmother attended 13 or more sessions.

The participants reported high levels of satisfaction with the intervention, not only on the satisfaction questionnaires (range: 5.14–7.00, $M = 6.25$, $SD = 0.76$), but also on the interviews, showing high satisfaction with the intervention and its impact on parenting practices, child's outcomes and overall family lifestyle.

Regarding the facilitator's fidelity to the GLTP manual, the analysis of the fidelity checklists completed for group and individual sessions confirmed that the facilitator covered all items of the content checklist for each session. Minor adjustments made to adapt the exercises and activities to digital delivery were reported in each checklist and are described in the table presented as supplementary material.

According to the facilitator's perceptions, the implementation of the intervention through digital practice was a positive experience, with parents engaged in the sessions and committed to the intervention. A positive feature highlighted by the facilitator was that on session 11, regarding the family survival tips content, the parents decided to create a group on WhatsApp to foster each family's social support network. The facilitator was enrolled in the group, where the parents offered each other support, shared healthy recipes, small videos of dance choreographies together with their children, challenging other families to do the same and promoting physical activity. Additionally, the facilitator felt that delivering the intervention through digital practice did not interfere with the families' routines and can be a good option for families who struggle with lack of transportation or have to travel for long periods to attend face-to-face interventions.

The difficulties identified by the facilitator were that, sometimes, the parents' internet connection was unstable, some parents had limited

access to equipment (e.g. only had one smartphone to attend the session) and some families received the intervention's materials after the beginning of the intervention due to post office delays. Other difficulties identified by the facilitator were similar to those experienced when delivering the intervention in-person, and regarded difficulties in delivering some sessions' contents without exceeding the timeframe and dealing with talkative parents. The major barrier that was not possible to overcome during the digital delivery of the intervention was that the parents were not able to do the role-plays in interaction with each other. Even though an adaptation was made, allowing parents to practise the role-play in their households, an important aspect of the group dynamics could not be recreated.

Discussion

The purpose of the current case study was to explore the digital delivery of the GLTP intervention. Participants identified positive changes throughout the intervention in themselves, their parenting skills and ability to improve their children's nutrition and physical activity, and its contribution to their children's and family's lifestyle behaviour. Accordingly, the most helpful aspects of the intervention identified by the participants were the management of children's food intake and behaviour.

Participants also identified specific aspects of the intervention as contributing to the perceived changes in themselves and their children. The changes perceived by the participants accomplished the purposes of GLTP, a parenting intervention that combines components of positive parenting, nutrition and physical activity, to promote a healthier lifestyle in families of obese children (West *et al.*, 2010). These results also strengthen the body of literature supporting that interventions should address the family's lifestyle and focus on the parenting practices within these contexts, particularly by increasing the parents' responsibility in providing an environment that leads children to healthy behaviours (Papoutsi *et al.*, 2013; West *et al.*, 2010).

When comparing the current study's single case data for the outcome variables assessed pre- and post-intervention with data from the studies where the intervention was delivered in-person (Gerards *et al.*, 2015; West *et al.*, 2010), the clinical findings appear to be similar. As in the studies where the intervention was delivered in-person (Gerards *et al.*, 2015; West *et al.*, 2010), the current study describes a clinically

significant increase in participants' confidence in managing children's weight-related behaviour problems and decrease in the use of ineffective parenting strategies.

In line with the work by Gerards and colleagues (2015), no clinically significant reductions were found for children's BMI *z*-score, except for one child. Additionally, in the current study, the parents' perceptions of children's weight-related behaviour problems only decreased for four mothers, which is a less favourable outcome than those reported by previous studies in which the intervention was delivered in-person (Gerards *et al.*, 2015; West *et al.*, 2010). Beyond the intervention, the current study single case data regarding the children's BMI *z*-score and the parents' perceptions of children's weight-related behavioural problems can also be explained by the changes in the children's lifestyles imposed by the Portuguese COVID-19 lockdown. Recent studies describe significant weight gain (Baysun and Akar, 2020), lower physical activity levels and higher sedentary behaviours (Moore *et al.*, 2020) in children during the COVID-19 quarantine periods, which can explain the less favourable findings of the current study.

Participants revealed high rates of attendance and retention throughout the GLTP intervention delivery. The rate of retention was higher than those reported in previous studies in which the GLTP intervention was delivered in-person (Gerards *et al.*, 2015; West *et al.*, 2010), suggesting that online delivery may be a solution for those participants who refer being too busy or having lack of time.

Participants also revealed high levels of satisfaction with the intervention, not only from the questionnaires, but also through the interviews. These findings are in line with participants' retention rates and suggest that, throughout the intervention, the participants were highly motivated to learn and implement a range of specific parenting strategies related to the management of child nutrition and physical activity, and positive parenting.

According to the facilitator's perspectives, delivering the GLTP intervention was an overall positive experience, with the participants revealing engagement to the intervention, high levels of satisfaction and positive outcomes achieved for themselves, their children and their families. Such outcomes corroborate previous studies' findings suggesting that digitally delivered interventions contribute to improved parenting variables (Corralejo and Rodríguez, 2018), also during the COVID-19 pandemic (Riegler *et al.*, 2020).

Minor adjustments were made to adapt the intervention to digital delivery format, without compromising the programme's fidelity. The

sessions' fidelity checklists completed by the facilitator indicated that all items of the content checklist for each session were covered by the facilitator, suggesting that the intervention was delivered according to the manual. The minor adjustments did not change the sessions' contents or activities, simply the way they were delivered to participants. Considering all the efforts to deliver the intervention with fidelity, the facilitator acknowledged some benefits and difficulties in her experience of digital delivery similar to those identified by previous research (Hall and Bierman, 2015). The main barrier acknowledged by the facilitator was that the parents were not able to do the role-plays in interaction with each other. Even though an adaptation was made, this important aspect of the group dynamics could not be completely addressed through digital delivery. But this does not mean that group dynamics were not facilitated throughout the intervention in the group sessions' activities and exercises. In fact, the facilitator highlighted the group dynamics as a positive feature, particularly the contributions of the group to foster each family's social support network, and the parents acknowledged the social support from the group experience as a significant aspect of the intervention.

The current case study, being a small-scale pilot study, was the first to address the feasibility of delivering the GLTP through digital practice. The results regarding the rates of retention, satisfaction, the fidelity of the implementation and the facilitator's perspectives on the digital delivery suggest that the delivery of GLTP through digital practice might be a feasible way of implementing the intervention, particularly during the COVID-19 pandemic. However, it should be acknowledged that the current study has limitations. The study has a small sample size, and a single provider delivered the intervention. The study regards a small-scale pilot study, presenting an exploratory approach and describing the digital delivery of GLTP in a small group of participants during the COVID-19 pandemic. As such, results should be interpreted with caution and cannot be generalised.

The COVID-19 pandemic set an opportunity to explore the feasibility of delivering the GLTP intervention through digital practice, something that has not been addressed by previous research. Future studies should evaluate the effectiveness of the GLTP comparing digital and in-person delivery, selecting the appropriate study design and sample sizes. Additionally, future studies should determine which core components of the intervention are more effective according to how the intervention is delivered (in-person versus digitally).

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Conflict of interests

The authors declare no conflict of interest with regard to the submitted work.

Ethics approval

The research project from which the current study stems from received ethical approval from the Ethics Committee of the Faculty of Psychology and Education Science at the University of Porto (approved 06/10/2016, ref: 13-10/2016), from the Board of the University Hospital Centre of Porto (approved 25/09/2019, ref: 2019.020(017-DEFI/018-CE)), and also approval from the Data Protection Unit of the University of Porto (approved 06/02/2019, ref: 2018091915006258).

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