Patient Education and Counseling xxx (2015) xxx–xxx

Contents lists available at ScienceDirect

Patient Education and Counseling

journal homepage: www.elsevier.com/locate/pateducou

Tools and resources for preventing childhood obesity in primary care: A method of evaluation and preliminary assessment

Jillian L.S. Avis[a], Angela Komarnicki[b], Anna P. Farmer[b,c], Nicholas L. Holt[d], Arnaldo Perez[a], Nicholas Spence[a], Geoff D.C. Ball[a,b,e,*]

[a] Department of Pediatrics, Faculty of Medicine & Dentistry, University of Alberta, Edmonton, AB, Canada
[b] Department of Agricultural, Food & Nutrition Science, Faculty of Agricultural, Life & Environmental Sciences, University of Alberta, Edmonton, AB, Canada
[c] School of Public Health, University of Alberta, Edmonton, AB, Canada
[d] Faculty of Physical Education & Recreation, University of Alberta, Edmonton, AB, Canada
[e] Pediatric Centre for Weight and Health, Stollery Children's Hospital, University of Alberta, Edmonton, AB, Canada

ARTICLE INFO

Article history:
Received 3 August 2015
Received in revised form 30 November 2015
Accepted 10 December 2015

Keywords:
Children
Lifestyle
Pediatric obesity
Prevention
Primary care
Healthcare providers
Resources
Tools

ABSTRACT

Objectives: To pilot-test a mixed methods approach to evaluate tools and resources (TRs) that healthcare providers (HCPs) use for preventing childhood obesity in primary care, and report a preliminary descriptive assessment of commonly-used TRs.
Methods: This mixed methods study included individual, semi-structured interviews with purposefully-sampled HCPs in Alberta, Canada; interviews were digitally recorded and analyzed thematically (phase I). Two independent reviewers used three assessment checklists to evaluate commonly-used TRs (phase II). HCPs provided feedback on our coding scheme and checklist data (phase III).
Results: Three themes described how HCPs ($n = 19$) used TRs: purpose of use (*e.g.*, clinical support), logistical factors (*e.g.*, accessibility), and decision to use (*e.g.*, suitability). The latter theme overlapped with constructs of suitability on the checklists. Overall, participants used 15 TRs, most of which scored 'average' on the checklists.
Conclusion: Phases I and II provided unique insights on the evaluation of TRs used for preventing childhood obesity. Criteria on the checklists overlapped with HCPs' perceptions of TR suitability, but did not reflect logistical factors that influenced their use of TRs.
Practice implications: Developers of TRs should collaborate with HCPs to ensure that subjective and objective criteria are used to optimize TR suitability in the primary care setting.

1. Introduction

1.1. Tools and resources

Tools and resources (TRs), which for the purpose of this paper included clinical or educational programs and handouts, have been used across a number of disciplines with the goal to improve patients' awareness, knowledge, and health-related outcomes. Specifically, TRs are used to educate patients on various health conditions and concerns, as well as to support healthcare providers (HCPs) across a variety of clinical tasks. Despite the ubiquity of TRs in the world of healthcare, there is a lot of heterogeneity regarding evaluation. Assessment checklists have been developed and utilized to assess the suitability of TRs, but they have yet to be applied to TRs used for childhood obesity prevention, and it is unknown how ratings compare with HCPs' perceptions of suitability.

1.2. Childhood obesity prevention & primary care

Primary care represents most families' first point of contact with the healthcare system, which often includes healthcare delivery from a multi-disciplinary team of professionals. The clinical priorities of primary care are also well-aligned with the prevention of chronic diseases, such as obesity [1], and HCPs play an integral role in preventing childhood obesity in this setting [2]. Although an increasing number of HCPs counsel children and families on obesity prevention [3,4], a number of barriers can impact their clinical work in this area, including a lack of useful patient education materials and clinical tools [5,6]. HCPs have also

* Corresponding author at: Department of Pediatrics, Faculty of Medicine & Dentistry, University of Alberta, 4-515 Edmonton Clinic Health Academy, 11405-87 Avenue, NW, Edmonton AB T6G 1C9, Canada.
E-mail address: gdball@ualberta.ca (G.D.C. Ball).

http://dx.doi.org/10.1016/j.pec.2015.12.006
0738-3991/

reported a need for "better tools" [7], particularly related to screening children's weights, counseling on obesity prevention, and improving coordination and communication with subspecialties for referrals [3,7].

To date, TRs used to prevent childhood obesity in primary care have been used to educate children [8] and parents [9] on obesity-related topics, including making and maintaining healthy lifestyle habits [10]. HCPs also use TRs when counseling families [11], assessing children's lifestyle behaviors [12], and screening children's weight status [13], which include food guides [14], national guidelines for physical activity [15], and body mass index growth charts [16]. Contemporary TRs have been designed to help HCPs in (i) counseling families on obesity management [17], (ii) communicating children's weight status [18], and (iii) screening for childhood obesity using eHealth strategies [19].

Although a variety of TRs are available to educate families and support HCPs in preventing childhood obesity, little is known regarding their use and suitability in clinical practice. Of the studies done to assess the suitability of TRs, foci have been limited to general pediatric educational materials [20] and printed resources related to physical activity [21]. In addition, such studies have evaluated TRs using only assessment checklists; to our knowledge, no studies have employed a mixed methods approach to quantitatively assess suitability, which refers to the extent that materials are understood and accepted by patients [21], and qualitatively explore HCPs' use of TRs, including both cognitive (*e.g.*, perceived need) and contextual (*e.g.*, implementation) factors. Our mixed methods study included a dominant qualitative strand (phase I) that informed data collection in a supplementary quantitative strand (phase II), followed by participant feedback (phase III). Specifically, our objectives were to (i) pilot-test a mixed methods approach to evaluate TRs that HCPs use for preventing childhood obesity in primary care (primary aim), and (ii) report a preliminary descriptive assessment of commonly-used TRs (secondary aim).

2. Methods

2.1. Phase I: qualitative strand

2.1.1. Data collection

Participants were eligible if they met the following criteria: (i) currently employed as a HCP, (ii) had at least two years clinical experience, (iii) provided clinical care to children and families that included childhood obesity prevention, and (iv) used at least three TRs related to the prevention of childhood obesity in clinical practice. Participants were purposefully sampled to achieve diversity in experience and expertise, which we believed would offer rich, in-depth, and multifaceted perspectives on their use of TRs. Participants were recruited (Fig. 1) through their professional affiliations with Alberta Health Services, the University of Alberta, and the Edmonton Oliver Primary Care Network. Snowball sampling was used to continue recruitment of participants until data saturation was achieved. Participants who identified as eligible for study participation were recruited by telephone or email. One week prior to scheduled interviews, participants were contacted to complete an online survey (SurveyMonkey Inc.) that queried their clinical discipline, years of experience in clinical practice, information about the TRs they used for childhood obesity prevention, and of the TRs they listed, which ones were used for patient education and clinical support purposes.

Our semi-structured interview guide (Supplementary material) included 13 questions with follow-up examples and probes. The guide was developed by (i) identifying and evaluating relevant literature, (ii) organizing questions thematically (*e.g.*, context, likability), and (iii) confirming the inclusion and exclusion of

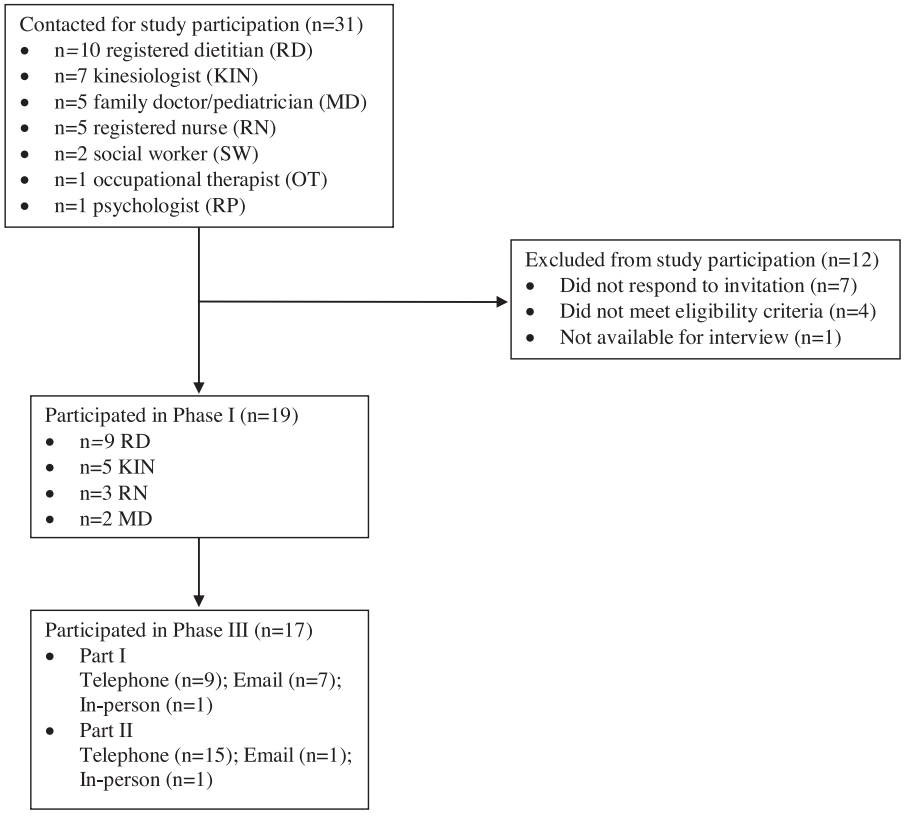

Fig. 1. Flow diagram of participant recruitment (phases I & III).

Please cite this article in press as: J.L.S. Avis, et al., Tools and resources for preventing childhood obesity in primary care: A method of evaluation and preliminary assessment, Patient Educ Couns (2015), http://dx.doi.org/10.1016/j.pec.2015.12.006

concepts and questions with team members (AK, AP). At the end of each interview, participants were asked by interviewers (JA, AK) to self-rate the suitability of each TR on a 10-point Likert scale (1[not suitable]–10[very suitable]), with the option to rate by increments of 0.5. This question was used to quantify participants' perceptions of an intangible concept [22]. As a token of appreciation, participants received a $10CAD gift card upon completion of the interview. Written informed consent was obtained prior to the interviews; ethical approval was obtained from the Health Ethics Board at the University of Alberta.

2.1.2. Data analysis

Interviews were audio-recorded and submitted to *The Comma Police* (www.commapolice.com) for transcription. Interviews were transcribed within 5–7 business days of data collection to facilitate concurrent data collection and analysis. Data saturation was reached when no new information emerged from the interviews. Transcribed data were imported into *NVivo 10* (QSR, Melbourne, Australia) for management, which was followed by inductive thematic data analysis [23]. Once interviews were checked alongside their corresponding audio-recording for accuracy and completeness, each transcript was read to become familiar with the data; a broad-based coding system was then developed. This coding scheme was used to understand the relationships between various groupings and concepts. After each interview was coded, categories were grouped under general themes, and a written description was constructed to explain each theme. To enhance methodological rigor, the coding scheme was reviewed by a colleague (AP) and formally discussed with two additional researchers (NH, GB) to ensure accuracy and completeness.

2.2. Phase II: quantitative strand

2.2.1. Data collection

TRs used by at least two HCPs were scored by two independent reviewers (JA, AK) using three checklists (the Tool for Evaluation of Materials in Patient Education [TEMPtEd] [24], the Suitability Assessment of Materials [SAM] [25], and the Patient Education Materials Assessment Tool for Printable Materials [PEMAT] [26]). Each checklist evaluated the suitability of TRs by assessing various constructs (*e.g.*, content, literacy level, layout and typography), although their design varied slightly (Table 1). Each TR was given a numeric (*e.g.*, 65/100) and categorical score (*e.g.*, "adequate").

2.2.2. Data analysis

Descriptive analyses were performed for participants' demographic variables and scoring of TRs using the checklists. Independent sample *t*-tests were used to compare differences in numeric scores of TRs by focus (*i.e.*, activity-, diet-, weight-, or multi-focus) and source (*i.e.*, Alberta Health Services *vs.* other). Cronbach's alpha was used to calculate the inter-rater reliability between independent assessors' numeric scores of TRs on the checklists. To calculate the consistency of numeric and categorical scoring of TRs across the three checklists, Spearman correlations and Cohen's kappa were used, respectively. SPSS 22.0 (SPSS Inc., Chicago, Illinois) was used for data analysis; $p < 0.05$ was considered statistically significant.

2.3. Phase III: follow-up

A member checking protocol [27] was used to facilitate qualitative data analysis and to follow-up with participants regarding their perspectives on the scoring of TRs using the checklists. Participants were invited by email to provide feedback on an initial coding scheme of the qualitative data (part I of follow-up) and a comparison of suitability scores between HCPs and checklists on commonly-used TRs (part II of follow-up) (Supplementary material). To provide context, HCPs were given printed copies of the checklists as well as descriptions of how they were used.

Table 1
Constructs, scoring, and interpretation of three assessment checklists (phase II).

Assessment checklist	Measured constructs	Examples	Scoring scale	Overall interpretation	
				Total score	Clinical translation
PEMAT	a. Understandability (content, word choice, use of numbers, organization, layout, visual aids) b. Actionability	a. Purpose is evident, use of numbers is clear, informative headers, logical sequence, use of visual cues b. Material identifies one action the user can take, action is broken down into explicit steps	(0) Disagree (1) Agree (N/A) Not applicable[a]	Score out of 24 converted to a%	≥70%: understandable & actionable <70%: Poorly understandable and actionable
SAM	a. Content b. Literacy demand[b] c. Graphics d. Layout & typography e. Learning stimulation f. Cultural appropriateness	a. Purpose evident, limited scope b. Active voice, context given c. Relevance of illustrations d. Use of subheadings e. Behaviors specific f. Cultural images and examples	(0) Not suitable (1) Adequate (2) Superior (N/A) Not applicable[a]	Score out of 44 converted to a%	Superior: 70–100% Adequate: 40–69% Not suitable: 0–39%
TEMPtEd	a. Content b. Motivating principles c. Literacy[c] d. Layout & typography e. Graphics	a. Accurate, logical, appropriate for target audience b. Focus on specific client actions c. Simple to read and understand d. Headings to introduce topics, highlight key points e. Simple, realistic and relevant	(0) Criteria not met (1) Criteria met minimally (2) Criteria met adequately (3) Criteria met superiorly	Absolute score out of 63	Excellent: 57–63 Above average: 51–56 Average: 45–50 Not suitable: 0–44

[a] Checklist allowed for measured constructs to be assigned N/A (not applicable), therefore adjusted scores were possible.
[b] Literacy assessed using the Flesch–Kincaid formula.
[c] Literacy assessed using the simple measure of Gobbledygook (SMOG) index.

Please cite this article in press as: J.L.S. Avis, et al., Tools and resources for preventing childhood obesity in primary care: A method of evaluation and preliminary assessment, Patient Educ Couns (2015), http://dx.doi.org/10.1016/j.pec.2015.12.006

3. Results

One-on-one, semi-structured interviews were conducted with a total of 19 participants working in Edmonton ($n = 12$) and Calgary ($n = 7$). Participants represented 10 primary care clinics, which varied in terms of geographic location (*e.g.*, downtown, suburban) and patient's sociodemographic status. Participants varied by clinical discipline (registered dietitian [$n = 9$], kinesiologist [$n = 5$], registered nurse [$n = 3$], medical doctor [$n = 2$]) and experience (9.4 ± 9.9 years). Most participants were female ($n = 16$; 84.2%) and Caucasian ($n = 15$; 78.9%).

3.1. Phase I

Three main themes described HCPs' use of TRs for the prevention of obesity in children in primary care, including: (i) purpose of use, (ii) logistical factors, and (iii) decision to use. Themes are supported with quotes from participants in Table 2.

3.1.1. Purpose of use

Participants used TRs for two main purposes—clinical and family support. First, TRs supported HCPs in their clinical role by (i) facilitating the assessment and monitoring of children's growth and lifestyle behaviors (*e.g.*, diet, physical activity, sedentary activity, sleep) associated with obesity prevention, (ii) promoting dialogue of children's weight status and growth with families, and (iii) enhancing their credibility, confidence, and competency in the area of childhood obesity prevention. Participants discussed using one TR to fulfill multiple needs. For example, body mass index growth charts were used to assess children's height and weight as well as to facilitate the conversation about weight status and plan of action. Second, HCPs perceived the need to use TRs for families. Specifically, TRs were used to educate families on specific topics (*e.g.*, diet, physical activity) and facilitate changes in children's lifestyle behaviors, in which TRs may reinforce and remind families how to initiate and sustain healthy changes following their clinical appointment.

3.1.2. Logistical factors

HCPs' implementation of TRs was influenced by logistical factors, including perceived awareness of and accessibility to TRs. HCPs learned about relevant TRs through top-down and bottom-up processes. Most HCPs received TRs through their connection to the provincial health authority (*i.e.*, Alberta Health Services) although they viewed them, in general, as being limited in scope, pediatric-focus, and aesthetic appeal. As a result, HCPs sought out TRs that suited their clinical needs *via* online searching, consulting with colleagues, and/or attending conferences and workshops. HCPs also said that access to TRs limited implementation, with cost, distribution, and production identified as barriers. Accessibility was particularly relevant for participants who had previously used a suitable TR that increased in cost or was discontinued without notice. Overall, HCPs perceived a general under-availability of 'high quality' TRs, particularly with respect to discipline-specific (*e.g.*,

Table 2
Coding scheme (phase I).

Theme	Category	Description	Examples
Purpose of use	1. Need for clinical support	1a. Assessment & monitoring	[1a] *One of our clinics or locations we do more of a health promotion, so just a quick screening. So . . . plotting the child on the graph . . . to continue to monitor their weight and their height and their growth.* [KIN1]
	2. Need for families	1b. Communication with families	[1b] *So I guess I use tools to support discussions that I might be having with families around nutrition and weight management in the pediatric setting, so yeah primarily to support like in discussion.* [RD8]
		1c. Enhance credibility, confidence & competency	[1c] *It's great to have formal guidelines just to know that you're doing what is recommended, just that reassurance . . . and then also if a parent decides, you know that doesn't seem reasonable at all, then I can pull it up and say well this is what it is, right?* [RD4]
		2a. Education	[2a] *Yeah, I think just to provide more education to the families and to the children. I think it's used as a good reference guide for when people go home.* [RN3]
		2b. Facilitate behavior change	[2b] *People walk out the door and forget what we told them from a practical, physical perspective so those tools are there to support the behaviour when they're not with us.* [KIN3]
Logistical factors	1. Awareness	1a. Top-down process	[1a] *We do have updates from Alberta Health Services so when they do have some new tools or information or journals or articles, they do send it to us.* [RD7]
	2. Accessibility	1b. Bottom-up process	[1b] *Like really if you weren't following all the blogs and reading research, you might not even know about the 5As and that's one of the ones that's most discussed and researched.* [RN1]
		2. Access is impacted by cost, distribution, and production	[1b] *I've looked for my tools, so just searching a lot on the Internet. I've been following a few blogs, which have been helpful* [KIN4]
			[2] *For myself I'd have to purchase a lot of them so that's the biggest thing so we have to look at cost in our clinics as well. If cost is an issue, then we might not have the resources.* [KIN5]
Decision to use	1. Expected suitability	1a. Age of child	[1a] *I think it's clinical judgement right? So if they're teenagers, sometimes they want to read the ones that are not Peds focused, 'cause they don't identify themselves as kids.* [RN1]
	2. Experienced suitability	1b. Culture, language & literacy level	[1b] *So I mean I love them but they're only for certain families, okay? I mean they have to be able to read well, you know definitely not for someone whose English is a second language.* [RD3]
		1c. Motivation & readiness to change	[1c] *So it depends on how engaged the family is in terms of their willingness to change and their willingness to cooperate as a family . . . so, for example, like I won't always pull out the growth chart because I don't want the view to be very skewed on focusing just on weight and he's overweight and stuff like that.* [RD9]
		1d. Specific parental concerns	[1d] *Well, it's very different for every tool right that we use, so depending on the issues that the family may have, like they don't get enough fruits and vegetables in their diet, then you would choose a tool that would help boost their fruits and vegetables and gives them ways how to do it.* [RD5]
		2a. Usability (for self and families)	[2a] *It's easy to get out the rip-off version, the one-page version . . . is very easy to use, and you can scribble on it.* [MD2]
		2b. Usefulness (for self and families)	[2b] *I guess in terms of it [tool], it is a good, little, quick, cheap thing, but not crazy effective because I haven't looked at it in a while and because I feel like I just have that in my back pocket already. But if I had a co-worker that was seeing an overweight patient for weight management, and they were panicking about, "I don't know what to do," I could hand them this and say, this will help you.* [KIN2]

KIN: kinesiologist; MD: medical doctor; RD: registered dietitian; RN: registered nurse (≥70% of participants are represented in the data above).

Please cite this article in press as: J.L.S. Avis, et al., Tools and resources for preventing childhood obesity in primary care: A method of evaluation and preliminary assessment, Patient Educ Couns (2015), http://dx.doi.org/10.1016/j.pec.2015.12.006

positive body image, mental health, physical activity, sedentary activity, sleep habits) and pediatric-targeted TRs (*e.g.*, TRs for children *vs.* parents).

3.1.3. Decision to use

HCPs said their decision to use TRs was influenced by expected suitability. Participants expressed that a 'one size fits all' approach was not suitable for meeting the needs of each family. Rather, the suitability of TRs was gauged according to family-level factors, such as (i) children's age, (ii) parents' concerns, (iii) cultural/language needs, (iv) and motivation and readiness to change. Second, HCPs assessed their use of TRs by reflecting on their own experiences and, on occasion, receiving or soliciting feedback from families at follow-up appointments. Suitability of TRs was informed by usability for themselves (*e.g.*, straightforward and quick to use with families) and for families (*e.g.*, simple to read and understand), and usefulness for themselves (*e.g.*, effective in guiding conversation with families) and families (*e.g.*, facilitated children's positive behavior changes). Perceptions of suitability were influenced by attributes of TRs, which overlapped with criteria on the checklists (*e.g.*, aesthetic appeal, readability, content, organization). HCPs' experience with TRs informed their future use, which included (i) reusing the same TR, (ii) amending the TR, (iii) creating their own TR, or (iv) finding a new TR.

3.2. Phase II

Fifteen unique TRs were used by HCPs (mean: 6 per HCP; min–max: 3–10) (Table 3). There was consistency in terms of TRs that ranked the highest by both HCPs and checklists. TRs varied with respect to purpose (patient education [$n = 12$; 80%] *vs.* clinical support [$n = 3$; 20%]), developing organization (Alberta Health Services [$n = 5$; 33.3%] *vs.* other [$n = 10$; 66.7%]), disciplinary focus (diet- [$n = 6$; 40.0%], weight- [$n = 4$; 26.7%], physical activity- [$n = 3$; 20.0%], and multi-focus [$n = 2$; 13.3%]).

3.2.1. Scoring of tools & resources

Most TRs scored 'understandable and actionable' ($n = 11$; 73.3%) on the PEMAT, and 'superior' ($n = 8$; 53.3%) or 'adequate' ($n = 6$; 40%) on the SAM. On the TEMPtEd, scoring varied ('average' [$n = 6$; 40.0%], 'above average' [$n = 4$; 26.7%], and 'not suitable' [$n = 5$; 33.3%]). Four TRs were top-ranked on the PEMAT and SAM, PEMAT and TEMPtEd, and SAM and TEMPtEd (Table 3). While mean TR scores across the three checklists did not differ by developing organization, weight-focus TRs tended to score lower than their diet-focused counterparts. In addition, TRs for patient education purposes tended to score higher than TRs for clinical support purposes.

3.2.2. Measures of consistency

Inter-rater reliability between assessors was excellent (PEMAT [$\alpha = 0.98$], SAM [$\alpha = 0.94$], and TEMPtEd [$\alpha = 0.91$]). Mean numeric scoring of TRs across the three checklists was positively and strongly correlated (PEMAT × TEMPtEd [$r = 0.85$], PEMAT × SAM [$r = 0.75$], TEMPtEd × SAM [$r = 0.71$]; all $p < 0.001$). However, consistency of categorical scoring of TRs across the three checklists differed (PEMAT × TEMPtEd [$\kappa = 0.46$; $p = 0.004$], TEMPtEd × SAM [$\kappa = 0.41$; $p = 0.01$], PEMAT × SAM [$\kappa = 0.07$; $p > 0.05$]), highlighting

Table 3
Assessment of tools and resources by participants ($n = 19$) and assessment checklists.

	Tool/resource	Used by (n)[a]	Type[b]	Mean HCP score (/10)	Mean checklist score (%)	PEMAT (%)	PEMAT score[c]	SAM (%)	SAM score[d]	TEMPtEd (/63)	TEMPtEd score[e]
Weight-focus	1. Body mass index growth charts	14	CS	7.0 ± 2.1	37.0 ± 13.5	27.0 ± 0.4	PUA	31.7 ± 0.2	NSM	33.0 ± 4.2	NS
	2. 5As of pediatric obesity management	6	CS	6.8 ± 1.4	52.0 ± 7.2	58.5 ± 0.2	PUA	44.2 ± 0.2	AM	33.5 ± 0.7	NS
	3. AHS[f] child's height ahead of weight	5	PE	7.2 ± 1.3	62.0 ± 9.5	65.8 ± 1.2	PUA	51.2 ± 9.5	AM	43.5 ± 0.7	NS
	4. AHS healthy kids, healthy bodies	3	PE	7.0 ± 2.0	75.0 ± 9.3	84.5 ± 1.7	UA	66.0 ± 7.7	AM	47.0 ± 5.7	A
Diet-focus	5. Canada's food guide	13	PE	6.8 ± 1.4	81.2 ± 8.4	86.4 ± 0.0	UA	85.7 ± 0.0*	SM	45.0 ± 0.0	A
	6. Magnetic plate model	7	PE	8.6 ± 1.0*	84.1 ± 4.5*	87.5 ± 3.5	UA	78.9 ± 7.4*	SM	54.0 ± 1.4*	AA
	7. Healthy U cookbook	6	PE	7.8 ± 0.6*	83.2 ± 8.9*	90.7 ± 0.3*	UA	73.3 ± 4.1	SM	54.0 ± 1.4*	AA
	8. AHS healthy drinks	5	PE	6.2 ± 1.9	76.3 ± 5.8	81.1 ± 3.1	UA	69.9 ± 2.1	SM	49.0 ± 4.2	A
	9. AHS healthy food portions	5	PE	7.6 ± 0.9	82.4 ± 10.8	93.1 ± 3.7*	UA	71.5 ± 6.8	SM	52.0 ± 0.0*	AA
	10. AHS snacking tips	4	PE	7.8 ± 0.5*	69.5 ± 6.8	75.6 ± 4.8	UA	62.1 ± 1.4	AM	44.5 ± 3.5	A
Activity-focus	11. Canadian physical activity guidelines	9	PE	6.8 ± 1.3	73.2 ± 4.2	75.0 ± 7.1	UA	68.4 ± 7.4	AM	48.0 ± 1.4	A
	12. Canadian sedentary guidelines	7	PE	7.0 ± 1.6	73.6 ± 5.1	70.0 ± 0.0	UA	71.4 ± 3.3	SM	50.0 ± 2.8	A
	13. ParticipACTION Website	2	PE	7.7 ± 1.2	83.4 ± 6.6*	91.0 ± 0.0*	UA	79.0 ± 4.0*	SM	50.5 ± 0.7	AA
Multi-focus	14. Healthy U & active living	9	PE	6.9 ± 1.0	72.1 ± 2.1	73.9 ± 1.6	UA	72.7 ± 0.0	SM	44.0 ± 0.0	NS
	15. Prescription pad for healthy living	3	CS	6.5 ± 0.7	66.5 ± 1.2	67.0 ± 6.3	PUA	65.2 ± 4.6	AM	42.5 ± 0.7	NS

[a] TRs were only included if used by ≥2 participants.
[b] CS: clinical support use, PE: patient education use.
[c] PEMAT scores: [UA] understandable & actionable material (≥70%), [PUA] poorly understandable & actionable (<70%).
[d] SAM scores: [SM] superior material (70–100%), [AM] adequate material (40–69%), [NSM] not suitable material (0–39%).
[e] TEMPtEd scores: [E] excellent (57–63), [AA] above average (51–56), [A] average (45–50), [NS] not suitable (0–44).
[f] AHS: Alberta Health Services.
* Top-ranked TRs.

Please cite this article in press as: J.L.S. Avis, et al., Tools and resources for preventing childhood obesity in primary care: A method of evaluation and preliminary assessment, Patient Educ Couns (2015), http://dx.doi.org/10.1016/j.pec.2015.12.006

similarities in numeric scoring across the checklists, but a discrepancy between categorical interpretations.

3.3. Phase III

Out of 19 participants that were interviewed, 17 participated in the follow-up (parts I [$n = 9$ telephone; $n = 7$ email; $n = 1$ in-person] and II [$n = 15$ telephone; $n = 1$ email; $n = 1$ in-person]). In part I, participants reported that the visual representation and description of qualitative analysis was logical, reflected their views, and led to minor terminology/wording changes (*e.g.*, "tools for clinical support *vs.* "tools for self"). In part II, participants preferred to discuss categorical over numerical scores of the TRs. Most were (i) interested in learning about TRs that received high scores (*e.g.*, 'above average'), but that they still wanted to examine them for suitability and (ii) clear that they would not discontinue their use of TRs that were rated as 'not suitable' since contextual factors and clinical acumen superseded objective suitability scores.

4. Discussion & conclusions

4.1. Discussion

Our mixed methods study revealed several relevant findings. First, HCPs discussed using TRs to meet several aims, and they gauged the suitability of TRs based on factors similar to scoring criteria on the checklists, such as cultural appropriateness, presence of motivational principles, and level of readability. Although elements of suitability overlapped between HCPs' preferences and objective ratings, there were insights unique to our qualitative findings (*e.g.*, logistical factors) that were not captured by objective scoring. Second, a total of 15 TRs were commonly-used by HCPs, with most rating 'average' in suitability according to the checklists. When data were shared with participants in the last phase of our research, most said they were unlikely to change their practices, even if their preferred TRs scored 'not suitable' based on ratings using the checklists.

Scoring of commonly-used TRs using the checklists demonstrated that objective scoring did not account for the contextual (*e.g.*, need for clinical support) and logistical (*e.g.*, accessibility) factors that HCPs discussed in our interviews. Similarly, select constructs that were scored using the checklists (*e.g.*, use of the active voice, visual cues, numbers) were not constructs of suitability that HCPs prioritized. However, some elements of suitability, such as the presence of motivational principles, cultural appropriateness, and literacy level overlapped between HCPs' input and objective scoring using the checklists. Specifically, participants in our study discussed poor readability as a common limitation of most TRs, and scoring on the checklists reflected reading levels that surpassed recommendations. These corresponding results have been echoed by others, with both researchers [28] and families [29] reporting inadequate readability of educational handouts. Given these findings, a mixed methods approach might be helpful to prioritize major issues across commonly-used TRs.

Although HCPs identified a small number of weight-focused TRs for use with families in primary care, most scored 'inadequate' or 'not suitable' across the three checklists we applied. Further, these objective ratings differed from the perceptions of HCPs, highlighting several issues. First, general assessments of TRs may not accurately reflect the suitability of TRs designed for specific uses such as preventing childhood obesity. Given that obesity in children is a complex, chronic condition requiring lifelong management [30], other factors (*e.g.*, terminology) appear to be relevant considerations regarding TR suitability. Second, given that two of the checklists assessed the suitability of materials for patient education, most TRs used by participants for clinical support scored 'not suitable'. It is noteworthy that a previous report [31] showed parents had difficulty comprehending children's weight status when that information was presented on a growth chart, a TR that was rated 'not suitable' by all three checklists. Although growth charts rated low in suitability for patient education use, participants in our study had more favorable perceptions, which may reflect the fact that HCPs use growth charts often in their day-to-day practice [32]. Lastly, HCPs said they would not change their use of TRs, even for ones that scored as unsuitable because contextual factors and clinical judgement were viewed as more important deciding factors. Our qualitative data supported this finding as the suitability of TRs represented just one of many components that influenced HCPs' use of TRs. Taken together, it is important to consider the suitability of TRs based on checklists with the knowledge that objective ratings may not accurately reflect clinicians' perceptions of real-world suitability.

Prior to implementation of TRs in clinical practice, HCPs' decision to use TRs was guided by logistical factors (*e.g.*, awareness, accessibility) and suitability. Overall, HCPs' cited a lack of accessibility to topic-specific (*e.g.*, positive body image, mental health, physical activity, sedentary activity, sleep hygiene) and pediatric-oriented TRs. Consistent with this point, none of the participants reported using TRs directly related to mental health and well-being, sedentary behaviors, or sleep hygiene. Given recent reports [33,34] regarding the link between these topics and childhood obesity, there is rationale for enhancing HCPs' awareness of and accessibility to existing TRs on these issues and to develop new TRs related to mental health and sedentary activities. HCPs also reported a surplus of mediocre-quality TRs, largely due to poor aesthetic quality and reading comprehension level. To compensate, many HCPs described developing their own TRs to fulfill specific clinical needs. Together, our findings reinforce the need to have TR creators and users work collaboratively to identify clinical needs as well as develop and refine new TRs to optimize suitability and application.

4.1.1. Strengths & limitations

There are several strengths in this study. In phase I, preliminary analysis was peer-reviewed by fellow researchers to ensure accuracy and completeness of assigned codes; in phase II, two reviewers independently assessed TRs using three unique checklists to mitigate risk of bias, and in phase III, a member checking protocol was employed to gain participants' feedback on qualitative and quantitative findings. This study also has limitations. Given the design of our mixed methods study, in which the number of TRs evaluated in phase II was directly informed by HCPs' use of TRs in phase I, our sample size of TRs ($n = 15$) was limited. Therefore, suitability scores derived from the checklists were underpowered. In addition, because most participants were female and Caucasian, a more demographically diverse group of HCPs may have offered different perspectives in our study.

4.2. Conclusion

This study pilot-tested a mixed methods approach to evaluate TRs that HCPs use for preventing childhood obesity in primary care. Our findings demonstrated that HCPs' subjective perspectives and the objective checklist ratings provided unique insights on the evaluation of commonly-used TRs. While HCPs' use of TRs was influenced subjectively by various purposes and logistical issues, such concepts did not emerge from the quantitative phase of our study. Although contextual issues were unique to HCPs' perspectives, participants in our study gauged the suitability of TRs based

Please cite this article in press as: J.L.S. Avis, et al., Tools and resources for preventing childhood obesity in primary care: A method of evaluation and preliminary assessment, Patient Educ Couns (2015), http://dx.doi.org/10.1016/j.pec.2015.12.006

on factors similar to scoring criteria on the checklists. Of the TRs that were used by HCPs, most scored 'average' or 'suitable' for use with families on the checklists. HCPs expressed a general under-availability of high-quality TRs, particularly with respect to discipline-specific and pediatric-targeted TRs, and an oversupply of mediocre-quality TRs with poor readability and low aesthetic appeal, which was consistent with objective scoring on the checklists.

4.3. Practice implications

Overall, our findings highlighted the value in using a mixed methods approach to evaluate TRs that HCPs use for obesity prevention in primary care. While our results demonstrated the usefulness of obtaining input from HCPs and objective scoring using checklists, in isolation, such information may be limited. To assess overall suitability and assist those developing TRs for childhood obesity prevention, suitability scores using checklists should be considered along with contextual factors and front line providers' perceptions of suitability.

Conflicting of interests

The authors declare no potential conflicts of interest.

Funding

The authors disclose receipt of the following financial support for research purposes: Graduate studentships from the Canadian Institutes of Health Research (JA), Alberta Innovates—Health Solutions (JA, AP), and the Women and Children's Health Research Institute (JA, AP). AK, AF, NLH, NS, and GB did not receive funding for their contributions to this manuscript.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.pec.2015.12.006.

References

[1] E.M. Perrin, C. Sheldrick, J.M. McMenamy, B.S. Henson, A.S. Carter, Improving parenting skills for families of young children in pediatric settings, JAMA Pediatr. 168 (2014) 16–24.
[2] S.R. Daniels, S.G. Hassink, The role of the pediatrician in primary prevention of obesity, Pediatrics 136 (2015) e275–e292.
[3] J.M. Nelson, M.B. Vos, S.M. Walsh, L.A. O'Brien, J.A. Welsh, Weight management-related assessment and counselling by primary care providers in an area of high childhood obesity prevalence: current practices and areas of opportunity, Child Obes. 11 (2015) 1–8.
[4] D.A. Galuska, J.E. Futon, K.E. Powell, C.R. Burgeson, M. Pratt, A. Elster, et al., Pediatrician counselling about preventive health topics: results from the physicians' practices survey, 1998–1999, Pediatrics 109 (2002) e83–e88.
[5] K.B. Flower, E.M. Perrin, C.I. Viadro, A.S. Ammerman, Using body mass index to identify overweight children: Barriers and facilitators in primary care, Ambul. Pediatr. 7 (2007) 38–44.
[6] E.M. Perrin, K.B. Flower, J. Garrett, A.S. Ammerman, Preventing and treating obesity: pediatrician's self-efficacy, barriers, resources, and advocacy, Ambul. Pediatr. 5 (2005) 150–156.
[7] F.V. Teixeira, J.L. Pais-Ribeiro, A. Maia, A qualitative study of GPs' views towards obesity: are they fighting or giving up, Public Health 129 (2015) 218–225.
[8] E.M. Long, U. Reischl, B.B. Abo, The healthy food slide rule (HFSR): a nutrition educational tool for children, J. Nutr. Educ. Behav. 42 (2010) 63–65.
[9] L. Rysdale, Evaluation of a nutrition education component nested in the NutriSTEPTM project, Can. J. Diet Pract. Res. 69 (2008) 38–42.
[10] J.R. Shapiro, S. Bauer, R.M. Hamer, H. Kordy, D. Ward, C.M. Bulik, Use of text messaging for monitoring sugar-sweetened beverages, physical activity, and screen time in children: a pilot study, J. Nutr. Educ. Behav. 40 (2008) 385–391.
[11] S.J. Woolford, S.J. Clark, S. Ahmed, M.M. Davis, Feasibility and acceptability of a 1-page tool to help physicians assess and discuss obesity with parents of preschoolers, Clin. Pediatr. 48 (2009) 954–959.
[12] L.K. Bell, R.K. Golley, A.M. Magarey, Short tools to assess young children's dietary intake: a systematic review focusing on application to dietary index research, J. Obes. 2013 (2013) .
[13] M. Santos, A. Cadieux, J. Gray, W. Ward, Pediatric obesity in early childhood: a physician screening tool, Clin. Pediatr. (2015) Epub ahead of print.
[14] B.R. Totapally, A. Raszynski, The new dietary guidelines: MyPyramid, Int. Pediatr. 22 (2007) 32–35.
[15] S. Vale, S. Trost, J.J. Ruiz, C. Regi, P. Moreira, J. Mota, Physical activity guidelines and preschooler's obesity status, Int. J. Obes. 37 (2013) 1352–1355.
[16] R.J. Kuczmarski, C.L. Ogden, L.M. Grummer-Strawn, K.M. Flegal, S.S. Guo, R. Wei, et al., CDC growth charts: United States, Adv. Data 8 (2000) 1–27.
[17] A.M. Sharma, The 5A model for the management of obesity, CMAJ 184 (2012) 1603.
[18] M.M. Cloutier, P. Lucuara-Revelo, D.C. Wakefield, A.A. Gorin, My weight ruler: a simple and effective tool to enhance parental understanding of child weight status, Prev. Med. 57 (2013) 550–554.
[19] J.L.S. Avis, A.L. Cave, S. Donaldson, C. Ellendt, N.L. Holt, S. Jelinski, et al., Working with parents to prevent childhood obesity: protocol for a primary care-based eHealth study, JMIR Res. Protoc. 4 (2015) e35.
[20] D.M. D'Alessandro, P. Kingsley, J. Johnson-West, The readability of pediatric patient education materials on the World Wide Web, JAMA Pediatr. 155 (2001) 807–812.
[21] J.K. Vallance, L.M. Taylor, C. Lavallee, Suitability and readability assessment of educational print resources related to physical activity: implications and recommendations for practice, Patient Educ. Couns. 72 (2008) 342–349.
[22] N. Britten, Qualitative interview in medical research, BMJ 311 (1995) 251–253.
[23] J.M. Morse, Critical Issues in Qualitative Research Methods, Sage Publications, Salt Lake City, UT, 1993.
[24] L.H. Clayton, TEMPtEd: development and psychometric properties of a tool to evaluate materials used in patient education, J. Adv. Nurs. 65 (2009) 2229–2237.
[25] C. Doak, L. Doak, J. Root, Teaching Patients With Low Literacy Levels, 2nd ed., Lippincott, Philadelphia, PA, 1996.
[26] S.J. Shoemaker, M.S. Wolf, C. Brach, Development of the patient education materials assessment tool (PEMAT): a new measure of understandability and actionability for print and audiovisual patient information, Patient Educ. Couns. 96 (2014) 395–403.
[27] J.W. Creswell, D.L. Miller, Determining validity in qualitative inquiry, Theory Into Pract. 39 (2000) 124–130.
[28] K. Brownson, Education handouts: are we wasting our time, J. Nurs. Staff Dev. 14 (1998) 176–182.
[29] E.N. Swartz, The readability of paediatric patient information materials: are families satisfied with our handouts and brochures, Paediatr. Child Health 15 (2010) 509–513.
[30] J.L.S. Avis, T. Bridger, A. Buchholz, J.P. Chanoine, S. Hadjiyannakis, J. Hamilton, et al., It's like rocket science . . . only more complex: challenges and experiences related to managing pediatric obesity in Canada, Expert Rev. Endocrin. Metab. 9 (2014) 223–229.
[31] E.P. Ben-Joseph, S.A. Downshen, N. Izenberg, Do parents understand growth charts? A national, internet-based survey, Pediatrics 124 (2009) 1100–1109.
[32] Dietitians of Canada, Promoting Optimal Monitoring of Child Growth in Canada: Using the New WHO Growth Charts, Collaborative Public Policy Statement, 2010.
[33] A.G. LeBlanc, S.T. Broyles, J.P. Chaput, G. Leduc, C. Bower, M.M. Borghese, et al., Correlates of objectively measured sedentary time and self-reported screen time in Canadian children, Int. J. Behav. Nutr. Phys. Act. 12 (2015) 38.
[34] A.L. Miller, J.C. Lumeng, M.K. Lebourgeois, Sleep patterns and obesity in childhood, Curr. Opin. Endocrinol. Diabetes Obes. 22 (2015) 41–47.