Recruitment and Retention of Children in Behavioral Health Risk Factor Studies: REACH Strategies

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Abstract

Background: Children are a common target group in behavioral health research. Yet their recruitment into community setting studies poses challenges to researchers and little guidance exists on recruitment and retention methods.

Purpose: To present successful strategies for the recruitment and retention of children into behavioral health risk factor studies.

Methods: Firstly, a literature search in various databases was undertaken for papers published 1990-2012, focusing on recruitment and retention methods used in community-based studies with children aged 3-18 years. Secondly, a Delphi study was conducted in 2012 with 27 international experts in the fields of child-related behavioral health risk factors to gather expertise and consensus on successful recruitment and retention strategies applicable in children.

Results: The literature review and Delphi study yielded a set of successful child recruitment and retention strategies, and examples for implementation. These are presented as strategies to Recruit, Engage and retAin Children in behavioral Health risk factor studies (REACH). Recognized strategies for successful recruitment and retention included building trustful relationships between researchers and study partners, parents and children; having project champions; optimizing consent and follow-up procedures; offering incentives to study partners, children, and parents; minimizing participant burden and designing feasible studies with cohesive research teams.

Conclusions: Using multiple REACH strategies is most promising for maximizing response rates and minimizing attrition of children in cross-sectional, longitudinal and behavioral intervention

studies in community settings such as schools, child care centres and other youth-related organizations. Researchers can select the most suitable strategies based on their specific study design and requirements.

Words: 250

Keywords

Recruitment, attrition, children, behavioral research, guidance

Background

Children are a common target group in behavioral health risk factor studies conducted in community settings such as schools, child care centers and other youth-related organizations. Yet recruitment of children into such studies poses great challenges to researchers [1]. Particularly, low response rates are concerning for researchers as additional efforts are necessary to recruit more children over longer periods of time to reach sample sizes representative of the target population and sufficiently powered for conducting appropriate statistical analyses [2]. This usually requires additional resources in the form of research staff, recruitment materials and funding.

In addition, researchers often face the problem of participant attrition. For example, children from socio-economically disadvantaged families, ethnic minorities and those at risk of ill-health tend to drop out of studies [3]. High attrition rates can also compromise statistical power, increase the risk of sampling bias and lack of generalizability, and require additional efforts and resources for participant follow-ups [4].

Recruitment and retention barriers in behavioral health studies are well-known, such as research fatigue, disinterest in the study topic and sensitivity towards health risk factors by study partners and participants; lengthy ethical clearance procedures; excessive study information materials; language barriers; participant burden and lack of supporting project advocates [2, 5]. However, problems in participant recruitment and retention are rarely discussed in primary studies [6], and few papers focus on successful recruitment and retention strategies applied in children [6, 7]. Existing articles mainly present lessons learned from applying selected recruitment and retention strategies in one particular study context, such as using incentives and small group information sessions to recruit adolescent girls into a school-based physical activity

program [5, 8-10]. Generic, comprehensive guidance on various successful recruitment and retention strategies applicable in cross-sectional, longitudinal and behavioral health intervention studies is currently lacking. Recruitment and retention could potentially be improved with the availability of a guiding set of evidence-based strategies from which researchers can select the most suitable strategies for a particular study context, informed by expert consensus on approaches that work in the field. This research aimed to:

- 1) review the literature regarding successful strategies for the recruitment and retention of children into community setting studies related to behavioral health risk factors;
- 2) conduct a Delphi study with international public health experts to gather expertise and consensus on successful recruitment and retention strategies in child health behavioral research; and
- 3) present a set of successful strategies for the recruitment and retention of children into cross-sectional, longitudinal, and behavioral intervention studies focusing on pediatric health risk factors.

Behavioral health risk factors of interest were those that are increasingly prevalent in children and adolescents (i.e. physical inactivity, sedentary behavior, unhealthy dietary habits, overweight and obesity) and are associated with non-communicable diseases now emerging during childhood (e.g. metabolic syndrome, diabetes mellitus) [11-14].

Methods

47 Literature review

48 An overview of the relevant literature was sought to identify successful recruitment and
49 retention strategies and to inform questions used in the subsequent Delphi study. Peer-reviewed
50 literature published between January 1990 and January 2012 was searched across five databases
51 (PubMed, Scopus, CINAHL, SportDiscus, PsychInfo). Search strategies were applied using a
52 combination of thesaurus and free text terms including child, kids, youth, adolescent,
53 adolescence, recruit, retain, attain, retention, intervention, program, research. Additional papers
54 were identified via manual searches and reviewing the reference lists of relevant articles. Papers
55 were included if they explicitly reported on successful recruitment and retention strategies
56 applied in cross-sectional, longitudinal and behavioral community setting intervention studies in
57 children and adolescents aged 3-18 years. Strategies were considered successful if they
58 reportedly promoted response rates and prevented participant attrition. Given the paucity of
59 research on recruitment and retention methods various publications were considered in this
60 review including systematic or narrative reviews, empirical papers/case studies, conceptual/non-
61 empirical or discussion papers and commentaries. Articles were excluded if they were not
62 written in English and did not specifically focus on recruitment and retention strategies in
63 children in title or abstract. Identified successful recruitment and retention strategies, as well as
64 examples for implementation were tabulated according to five themes: (1) recruit, (2) engage, (3)
65 retain, (4) child and family characteristics, and (5) health risk factor studies. The authors chose
66 these themes as they represent key components for which successful strategies could provide
67 useful guidance for researchers. The themes formed an initial set of strategies to Recruit, Engage
68 and Retain Children in behavioral Health risk factor studies (REACH).

69

70 Delphi study

71 The initial set of REACH strategies identified in the literature review was verified and finalized
72 through a three-round Delphi study. Three rounds are commonly used to achieve expert
73 consensus via Delphi method [51]. Ethical clearance for conducting the Delphi study was
74 obtained from the Human Research Ethics Committee at Central Queensland University,
75 Australia.

76

77 *Selection of Delphi study participants*

78 Participants eligible for the Delphi study were internationally recognized public health
79 researchers who conduct research related to children's physical activity, sedentary behavior,
80 dietary habits, and body size. Since these behavioral health risk factors were of main interest
81 solely experts in these fields were consulted in the Delphi study. They were identified through
82 reference lists of the relevant literature (including authors of articles identified in the literature
83 review), international collegial networks, and by asking responding experts to provide names of
84 other experts in their field. International experts were eligible to participate in the Delphi study
85 if they had experience with the recruitment and retention of children into behavioral health risk
86 factor community setting studies. Their experience and expertise had to be reflected through a
87 minimum of two years of post-doctoral research experience and an established scientific track
88 record (i.e. peer-reviewed publications, research grants). Fifty-six international experts, most of
89 them senior academics, were identified and invited by email to participate in the Delphi study.
90 Experts were included in the Delphi study if they replied to the invitation with a response email
91 stating their consent to participate in the project and providing their name and the name of their
92 organization. Overall, 27 respondents agreed to participate in the study.

93

94 *Procedures and analyses*

95 The Delphi study included three rounds of web-based surveys (using Survey Monkey software)
96 conducted between April and July 2012 (see Online Resource 3). The surveys were open for
97 approximately two weeks and took 10-25 minutes to complete. Non-responders received two
98 reminder emails; the first email was sent on the fourth day post initial invitation, and the second
99 email was sent on the seventh day post initial invitation.

100

101 *Round 1*

102 Strategies and implementation examples initially identified in the literature review and classified
103 under the themes (1) recruit, (2) engage, (3) retain, (4) children and family characteristics, and (5)
104 health risk factor studies (REACH) informed the development of the first Delphi survey. Round
105 1 consisted of eleven open-ended questions. For example, a question relating to the theme
106 ‘recruit’ was “What strategies contribute to successful recruitment of children in behavioral
107 health risk factor studies? Please list some examples of successful recruitment strategies and the
108 settings they can be applied to. An example could be ‘Identification of suitable settings for
109 recruitment such as schools’.” Another question relating to the theme ‘recruit’ was “Thinking of
110 these recruitment strategies you just mentioned, how could each of these be implemented?
111 Please list some implementation examples of successful recruitment strategies. An example
112 could be ‘Investigating the geographic, demographic and socio-economic profile of public
113 primary schools through school-related information websites’.” The examples of strategies and
114 implementation measures presented in Round 1 items were previously identified in the literature
115 review. A qualitative content analysis of Round 1 responses was conducted using NVivo

software. This included identifying similar sub-themes, responses, and phrases that were grouped, coded and counted.

Round 2

Following the qualitative content analysis of the open-ended questions (Round 1), the authors developed a web-based survey consisting of 115 closed-ended items (Round 2). The survey link was sent to the participants via email. Broad questions from Round 1 were retained but each question included scaled items derived from the responses in the first survey. Participants rated their agreement with each item on a 5-point Likert scale with response categories ranging between 1 (strongly agree) and 5 (strongly disagree). The level of agreement with an item described to what extent an expert considered a strategy or implementation example important for successful recruitment and retention of children. Scaled items were analyzed by calculating median scores of responses to determine the experts' average agreement on the importance of items. Medians of ≤ 2 (1 = strongly agree, 2 = agree) indicated a strategy or implementation example was important for successful recruitment and retention of children. Medians of > 2 (3 = neither agree nor disagree, 4 = disagree, 5 = strongly disagree) indicated little or no importance of strategies or implementation examples. Consensus between experts was reached when at least 80% of the respondents rated an item as either 'strongly agree' or 'agree'. The interquartile range (IQR) was calculated to assess the degree of consensus between the experts on the scored importance of items with smaller values indicating a higher degree of consensus between the experts. An IQR of 2 was considered moderate consensus, an IQR of 1 was considered good consensus, and an IQR of 0 was regarded high consensus [52].

Round 3

In Round 3, the experts who completed Round 2 received an adapted version of the second survey. Specifically, 53 closed-ended items for which consensus was not reached in Round 2 were re-administered in Round 3. Experts re-rated their agreement with these items in light of the summary group response from Round 2. The summary group response was displayed in the form of percentages for each response category (1 = strongly agree to 5 = strongly disagree) at the end of each item. Similar to Round 2, final consensus was reached when at least 80% of the respondents had rated an item with either 'strongly agree' or 'agree'. Items for which experts' agreement was less than 80% were either excluded from the identified set of REACH strategies, or included when three conditions were met: the experts' agreement ranged between 70-80%, strategies or implementation examples were in line with literature findings, and the authors' own research experience had suggested that they were successful. As with Round 2, median scores of responses were calculated to assess the experts' agreement on the importance of these 53 closed-ended items, and IQR was calculated to explore the degree of consensus between the experts regarding the scored importance of items.

Results

Literature review

A total of 407 potentially relevant, non-duplicate articles were identified and screened based on title and abstract (see Online Resource 1). Of these, 43 articles were retrieved for detailed review. After inclusion of another two papers identified via manual searches, 45 articles were included in the review. These included three systematic reviews [6, 15, 16], three narrative reviews [17-19], three conceptual discussion papers [1, 20, 21], and 11 empirical papers/case studies

specifically relating to children and physical activity, nutrition or weight status in community settings [2, 5, 7-10, 22-26]. Additionally, 25 empirical papers/case studies were identified in relation to health areas that were not the specific focus of this paper, such as tobacco use, alcohol and drug consumption, HIV prevention, mental health, and physical chronic diseases [4, 27-50]. Generally, the empirical papers retrospectively described successes and failures of a set of recruitment and retention strategies employed in a particular cross-sectional, longitudinal or behavioral intervention study. The reviews and conceptual discussion papers pooled this information from several such case studies. The synthesis of all articles yielded an initial set of successful recruitment and retention strategies, as well as examples for implementation; these are presented in Online Resource 2.

Delphi study

Twenty seven (48%) out of 56 invited experts from various geographic regions (Australia, New Zealand, Asia, Europe, North America) agreed to participate in the Delphi study. Of these, 24 (89%) experts completed Round 1, 24 (89%) experts responded in Round 2 and 18 (67%) experts completed Round 3 (see Online Resource 4).

Importance and consensus

The detailed findings from Rounds 2 and 3 of the Delphi study are presented in the Online Resource 4. In Round 2, experts rated 95 of the 115 closed-ended items as strongly agree or agree ($\text{Median} \leq 2$), indicating the experts considered these items important. Consensus between experts regarding the importance of items was reached on 62 of the 115 scaled items. In Round 3, experts re-rated their agreement for the 53 closed-ended items for which consensus was not

185 reached in Round 2, scoring 39 of the 53 remaining items with strongly agree or agree (Median
186 ≤ 2). Consensus was reached for 27 of the 53 items, with an $IQR \leq 1$. Twenty items did not reach
187 at least 80% consensus between experts after Round 3 or fulfill the other conditions. These were
188 discarded from the REACH strategies.

189 Overall, consensus was achieved among the experts on the importance of various strategies
190 (Median ≤ 2 , $IQR \leq 1$), such as:

- 191 - designing a feasible study with efficient data collection approaches;
- 192 - building trustful relationships between researchers and study partners, parents and children;
- 193 - having project champions who promote the recruitment and implementation of a study;
- 194 - optimizing consent and follow-up procedures;
- 195 - offering incentives/rewards to study partners, children, and parents for participating in a study;
- 196 - creating enthusiasm about a study among children, parents and study partners;
- 197 - including a fun component for children in the study implementation/data collection;
- 198 - using visually appealing and age-appropriate study materials;
- 199 - and minimizing the burden to study partners, children, and parents (see Online Resource 4).

200

201 Strategies to Recruit, Engage and Retain Children in behavioral Health risk factor studies
202 (REACH)

203 **Tables 1-3 present** the final set of evidence-based, successful REACH strategies and
204 implementation examples to maximize the recruitment and retention of children in behavioral
205 health risk factor studies. The strategies and implementation examples were identified via
206 literature review and Delphi study. The REACH strategies represent five interlinking themes:
207 (1) the recruitment of children, parents and study partners into a study (Recruit),

- 208 (2) the engagement of research teams and study partners in a study (Engage),
209 (3) the retention of children and parents in a study (RetAin),
210 (4) the characteristics of children and family populations targeted in a study (Child and family
211 characteristics), and
212 (5) the planning and procedures of a study (behavioral Health risk factors studies).

213 In practice, strategies and implementation examples relating to the themes (1) recruit, (2)
214 engage and (3) retain often overlap; hence they were merged (see Table 1). Since the
215 recruitment and retention of children in research studies usually require parental consent and
216 support, sometimes even parental recruitment, many of the proposed strategies target both
217 children and parents. Key strategies for successful recruitment and retention, recognized in the
218 literature and among international experts, included (see full details in Tables 1-3):

- 219 - identifying suitable settings and tools for recruitment;
- 220 - investing time in developing trustful relationships with study partners, parents and children;
- 221 - creating interest in the study among children, parents and study partners;
- 222 - including a fun component for children in study implementation;
- 223 - having support from key stakeholders and project champions;
- 224 - creating a study identity;
- 225 - using appealing study materials;
- 226 - identifying optimal channels for communicating with children and parents;
- 227 - optimizing consent and follow-up procedures;
- 228 - providing incentives/rewards to children, parents and study partners;
- 229 - minimizing participant burden;
- 230 - designing feasible studies with cohesive research teams;

- 231 - providing feedback about study results to children, parents and study partners;
- 232 - considering child and family characteristics;
- 233 - providing research training and quality control procedures;
- 234 - conducting formative and participatory research, and pilot studies.

235

236 **Discussion**

237 The REACH strategies pooled evidence from the peer-reviewed published literature and
238 experience from 27 international experts identified within the behavioral health research
239 community. The experts' consensus on successful child recruitment and retention strategies
240 verified the peer-reviewed literature evidence (see Online Resources 2 and 4). The expert
241 informed REACH strategies and implementation examples reflect and add to established
242 literature evidence. For instance, strategies such as building trustful relationships between
243 researchers and study partners; offering incentives to study partners, children, and parents; using
244 participatory approaches in the study planning and optimizing follow-up procedures have shown
245 to improve child recruitment and retention in many included studies [5, 7-10, 16, 22, 27, 32, 35,
246 37-40, 43, 45]. For example, Trapp et al [7] found that in a cross-sectional study conducted in
247 Australian school children response rates of 80-90% could be achieved by building positive
248 relationships with key school personnel, applying child-centered approaches to survey
249 development and implementing extensive follow-up procedures for collecting surveys. Booker
250 et al's systematic review [16] of successful retention methods used in population-based cohort
251 studies, including those targeted to children, showed that incentives, multiple reminders, and
252 follow-up visits at recruitment sites resulted in retention rates between 68-92%. However,
253 limited evidence exists on comparative effectiveness of recruitment and retention strategies [5, 9,

24, 26, 45, 46]. Most studies retrospectively describe success of a set of strategies used in a particular study and rarely compare the effect of single strategies, probably because such information is difficult to detect retrospectively. A prospective investigation of the usability, effectiveness and cost-effectiveness of child recruitment and retention strategies including a comparison group (e.g. recruitment via social networking-websites versus community settings) could show which strategy is most efficient.

Overall, the findings demonstrated that successful participant recruitment and retention requires thorough and efficient planning, budgeting, and implementation. Timeframes, efforts and costs of recruitment should not be underestimated, as well as the need for extensive and persistent follow-up procedures to gain complete and high-quality data. Unexpected recruitment and attrition issues can lead to delays in accomplishing study milestones and completion, and can impair study quality if they cause insufficient statistical power and sampling bias. The REACH strategies provide guidance for researchers on how to prevent recruitment and retention issues in behavioral health risk factor studies conducted in children.

There are limitations of the REACH strategies presented in this paper. Despite the authors' efforts to develop a set of strategies applicable to diverse settings for recruitment (e.g. schools, child care centres, sports clubs, other community-based youth organizations) many of the identified strategies and implementation examples related to the school setting only. This is not surprising given that schools are a major setting for recruiting children into behavioral health risk factor studies [1, 26] and the Delphi study participants undertook most of their research in the school environment. Therefore, REACH strategies used in non-school settings rely on less literature and expert-based evidence than those applied in the school setting, a limitation future research could address. Furthermore, the utilization of strategies and implementation examples

277 will likely depend on study objectives, study type (intervention versus observational) and target
278 group (representative sample of the general young population versus specific population groups).
279 In practice, not all strategies and implementation examples will be relevant, applicable or
280 feasible within a specific study context. Expertise and consensus was gathered from a small
281 sample of targeted international experts (only 27 out of 56 invited experts agreed to participate
282 in the Delphi study). Therefore, it is possible that some expert views may not have been
283 captured. However, to the authors' knowledge this was the first systematic, evidence-based
284 approach to developing a set of guiding strategies to foster successful recruitment and retention
285 of children into behavioral health risk factor studies. The strength of the presented set of
286 REACH strategies is that it offers a range of evidence-based strategies and implementation
287 examples to maximize response rates and minimize attrition rates. Researchers can select the
288 most suitable strategies for a particular study objective, study type and target group. Hence, this
289 paper can provide a starting point for researchers to plan participant recruitment and retention
290 within their own study requirements and institutional contexts. We suggest that study
291 investigators identify and select appropriate strategies during the study conception. Research
292 teams should pilot and adopt diverse REACH strategies and implementation examples
293 depending on feasibility and applicability to a particular study. Using strategies that cover all
294 five REACH themes may increase chances of successful recruitment and retention of children in
295 behavioral research. Finally, the focus of this paper was limited to recruitment and retention
296 strategies in relation to selected behavioral health risk factors (i.e. physical inactivity, sedentary
297 behavior, unhealthy dietary habits, overweight and obesity) which pose an increasing public
298 health issue among children worldwide [11-14]. However, the identified strategies may be
299 adopted in the recruitment and retention of children for other health-related research.

300

301 **Conclusions**

302 Using multiple strategies and implementation examples is recommended for successful
303 recruitment and retention of children in behavioral health risk factor studies. The identified set
304 of REACH strategies provide guidance for future studies by offering diverse evidence-based
305 recruitment and retention measures researchers can select based on their specific study design
306 and requirements.

307

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Tables

Table 1 Strategies to recruit, engage and retain children, parents and study partners into studies

Table 2 Strategies to address characteristics of children and family populations targeted in studies

Table 3 Strategies to plan behavioral health risk factors studies

Online Resources

Online Resource 1 Identification of primary studies and systematic reviews published between January 1990 and January 2012

Online Resource 2 Summary findings from the literature review of successful strategies for the recruitment and retention of children in behavioral health risk factor studies

Online Resource 3 Delphi study procedure (adapted from Vandelandotte et al. 2010)

Online Resource 4 Results of the Round 2 and Round 3 Delphi study

To be published in the manuscript

Table 1 Strategies to recruit, engage and retain children, parents and study partners^a into studies

Themes	Strategies	Implementation examples
Recruit Engage Retain	Identify suitable settings for recruitment	<ul style="list-style-type: none"> Consider public and private schools, child care centers, sports clubs, other community-based organizations, community events, study-tailored internet websites Investigate the geographic, demographic and socio-economic profile of targeted recruitment sites Ensure that the data collection site is safe, convenient to reach participants and appropriate in appearance for children, parents and the research team Consider any site-specific guidelines related to data collection (e.g. Government policies related to public schools; internal policies in schools, child care centers, sports clubs and other youth organizations)
	Identify suitable recruitment tools	<ul style="list-style-type: none"> Posters and flyers in community settings or neighborhoods Advertisements in various media (e.g. television, radio, newspapers, weekly publications, newsletters) Direct mail, telephone screening, social networking websites, snowballing method
	Invest time in developing relationships with study partners, parents and children	<ul style="list-style-type: none"> Collaborate with study partners early in the study process Devote time to personal, face-to-face contacts with study partners Maintain open, transparent and flexible relationships with study partners and liaison contact persons Address all questions and concerns regarding the project Organize multiple site visits when recruiting children in community-based organizations Maintain regular contact with participants during data collection (e.g. through regular visits to recruitment sites; emails and postcards; a study website or regular newsletters reporting on study progress) Fulfil promises relating to the study process (e.g. handing out incentives/rewards, collecting potentially sensitive data such as children's weight discretely, providing summary reports about study findings) Use project staff who are known and connected to the community in which the study takes place
	Explain the purpose, requirements, and benefits of study participation to children, parents and study partners	<ul style="list-style-type: none"> Hold information sessions prior to and during data collection at convenient locations and times Describe benefits from study participation (e.g. fun, educational effects, improved health) Provide clear and simple information ('key messages') about the study Circulate informative, and linguistically and visually appealing handouts about the study Use videos and slide shows about the study for presentation at information sessions
	Create interest in the study among children, parents and study partners	<ul style="list-style-type: none"> Show enthusiasm and use simple language when explaining the purpose and benefits of the study Demonstrate equipment/gadgets to be used in the study (if any) such as accelerometers, pedometers, global positioning system/GPS units, disposable cameras
	Have support from key stakeholders/project champions	<ul style="list-style-type: none"> Identify key stakeholders relevant for study recruitment and implementation, such as parents, school staff, sports coaches, sports club presidents, Government department/ministry officers, etc Identify suitable local advocates or nominated liaison contact persons such as physical education/lead teachers, sports club coaches, social workers, general practitioners, community leaders or celebrities.

Themes	Strategies	Implementation examples
		<p>This person may act as a project champion who explains the benefits from study participation and reassures children and parents that this is an important project.</p> <ul style="list-style-type: none"> Minimise burden to staff at the recruitment sites Gain strong support from school principals when conducting a study in schools
	Create study identity	<ul style="list-style-type: none"> Create an easily-recognised branding of the project Use study or organizational logos in written communications, flyers, posters, information sheets, etc Develop a study website Circulate visually appealing posters and flyers in the recruitment settings Circulate pens with study logo/branding to participants when completing consent forms Have research staff wear clothing with study or organizational logos on
	Ensure a correct and optimal consent process	<ul style="list-style-type: none"> Gain informed signed child assent and informed signed parent consent Gain signed consent from study partners, if required (e.g. school principal, child care center director) Use sufficiently informative, linguistically and visually appealing consent and assent forms Set up optimal, convenient ways of returning consent forms, such as through collection boxes and personnel support (e.g. teachers, community workers, administrative staff) Consider an online consent process (e.g. school newsletters including study information and a link to an online consent form) Ensure that parents can be contacted for reminders to return consent forms Consider a passive consent process (opt-out option)
	Include a fun component for children in the study implementation/data collection	<ul style="list-style-type: none"> Use gadgets such as GPS, accelerometers, pedometers, disposable cameras, pens Ensure interventions are enjoyable for children Offer children the opportunity to complete some data collection tasks or intervention components as a team (e.g. with class mates, friends) Collect data at interesting venues such as museums or sports centers Make children feel like they own the research and are being part of a research team Create positive experiences for children, such as by providing positive reinforcement and ensuring that children feel safe and comfortable (e.g. during body size assessments)
	Provide incentives/rewards to children and parents for participating in the study	<ul style="list-style-type: none"> Offer incentives to children and parents for returning completed consent forms (e.g. monetary incentives/rewards, gift vouchers, price draws) Provide incentives or rewards to children at each measurement session or completion of all measurement sessions (e.g. fun, joint project tasks with classmates/friends, class competitions water bottles, lunch boxes, monetary rewards, vouchers)
	Provide incentives/rewards to study partners for supporting participant recruitment and project implementation	<ul style="list-style-type: none"> Offer gift vouchers, school/sports equipment, teaching materials, monetary compensations Feed into/guide the school curriculum with data collection and study results
	Minimise participant burden	<ul style="list-style-type: none"> Limit the number of measures

Themes	Strategies	Implementation examples
		<ul style="list-style-type: none"> ▪ Use brief and age-appropriate self-report measure (e.g. questionnaires, travel diaries, time use diaries) ▪ Carefully consider total time, days of the week or time of the day children and/or parents are required to devote to study participation. This may avoid collisions of data collection/intervention implementation with other activities, such as children's social activities, school events and parent's daily schedules. ▪ Collect data at sites near to where children and parents are located or can easily travel to ▪ Use pre-stamped envelopes or pick up questionnaires/equipment from the recruitment sites
	Provide feedback about study results to children, parents, and study partners	<ul style="list-style-type: none"> ▪ Offer individual and/or group feedback on preliminary study results in the form of summary reports or presentations at recruitment sites or public places
	Use appealing study materials for children, parents and study partners	<ul style="list-style-type: none"> ▪ Use easy to read, visually appealing, professional-looking information and consent materials ▪ Translate study materials if eligible participants are from culturally and linguistically diverse groups
	Find optimal ways to communicate with children, parents and study partners	<ul style="list-style-type: none"> ▪ Establish suitable communication channels at recruitment sites (e.g. school microphones, notice boards, teachers, youth workers, in-class visits) for gathering or reminding participants to return forms/equipment ▪ Use simple, non-academic language
	Use extensive follow-up procedures	<ul style="list-style-type: none"> ▪ Send multiple reminders to eligible participants who did not return signed consent forms, complete measurements, intervention steps, or return equipment (e.g. via email, mail, telephone, teachers, sport coaches, and other liaison contact persons) ▪ Explore reasons for non-participation and drop outs, for example, by talking to the children, parents or study partners. If possible, address identified recruitment and retention barriers. ▪ Record contact details of parents for reminders to return equipment or follow-up measurements

^aStudy partners include staff based in schools, child care centers, sports clubs, health care centers and other youth-related organizations

Table 2 Strategies to address characteristics of children and family populations targeted in studies

Theme	Strategies	Implementation examples
Child and family characteristics	Consider children's individual characteristics	<ul style="list-style-type: none"> Consider children's age, developmental level, health status, literacy, language skills, ethnicity Use a sampling framework that includes children with various levels of health risk factors Offer interviewer-administered questionnaire completion to address children's age, developmental level, literacy and language skills
	Take family-related characteristics into account	<ul style="list-style-type: none"> Consider parental socio-economic status and literacy levels, and families' geographic location (rural, urban, deprived neighborhoods) Collect information about the recruitment sites to review age, sex, and ethnic, linguistic, socio-economic and geographic characteristics of eligible children and parents Have face-to-face meetings with children and parents to gain support from peers/parents for study participation Employ suitable recruitment staff who can deal with diverse characteristics of children and parents Support study participation for low-income families (e.g. reimburse transport costs to study sites) Consider the school-parent relationship

Table 3 Strategies to plan behavioral health risk factors studies

Theme	Strategies	Implementation examples
Health risk factor studies	Review recruitment and retention strategies used in children	<ul style="list-style-type: none"> Conduct literature searches in various databases Review reference lists of relevant articles Gather expertise and experience from researchers in the field
	Design a feasible study with efficient recruitment and data collection procedures	<ul style="list-style-type: none"> Calculate the costs and in-kind resources needed for the recruitment and retention procedures prior to commencement of the study (e.g. in grant and ethical clearance applications) Ensure sufficient funding for recruitment Ensure sufficient numbers of project staff (e.g. doctoral students, project managers, research assistants) Allocate sufficient time to project staff to devote to recruitment and retention efforts Allow for additional timeframes and costs due to unexpected recruitment issues
	Provide research training and quality control procedures	<ul style="list-style-type: none"> Develop and follow a study protocol/manual for data collection procedures Have a trained team of researchers with a sense of humour and ability to deal with issues arising during the data collection and intervention implementation
	Have good research leadership and cohesive research teams	<ul style="list-style-type: none"> Develop a strong team culture among the researchers who implement data collection or an intervention Determine clear responsibilities to research staff regarding data collection tasks Employ researchers with a suitable cultural/linguistic background for the recruitment of culturally and linguistically diverse groups Ensure that researchers are not overworked with recruitment and data collection tasks Ensure that researchers remain employed on the study to promote program stability

	<ul style="list-style-type: none"> ▪ Have consistent contact persons for participants to enable relationship building, stability and continuity
Gain ethical clearance	<ul style="list-style-type: none"> ▪ Secure ethical approval prior to commencing the study ▪ Address sensitive issues around the research with children in ethics applications
Conduct formative research	<ul style="list-style-type: none"> ▪ Conduct formative research as part of grant writing, ethical clearance processes or study implementation. This may include focus groups or interviews with targeted children, parents and study partners to ask questions regarding best ways to recruit and retain targeted children in planned studies.
Learn from a pilot study	<ul style="list-style-type: none"> ▪ Conduct a pilot study in the target population to test recruitment strategies, study materials, measures and data collection procedures
Use participatory approaches in the study planning and implementation	<ul style="list-style-type: none"> ▪ Consult study partners on potential issues regarding recruitment and data collection at recruitment sites ▪ Engage children, parents and study partners in the recruitment, data collection or program implementation ▪ Integrate the study in school curricula or child care programs, if applicable
Consider incentives early in the study planning	<ul style="list-style-type: none"> ▪ Budget for incentives for children, parents, and study partners in grant applications ▪ Seek donations from appropriate bodies to fund incentives ▪ Describe the provision of incentives in ethics applications
Implement flexible data collection procedures while adhering to study protocols	<ul style="list-style-type: none"> ▪ Schedule data collection dates/times convenient for children, parents and study partners ▪ Ensure that project staff can act flexibly regarding data collection dates, time points and sites (e.g. consider assessments in the home environment or nearby location) ▪ Conduct measurements at parallel “work stations” when dealing with many children at once so children are not waiting during measurement sessions ▪ When recruitment occurs in schools, collect data during lunch breaks or class-time depending on the preference of the school principal and teachers at each participating school

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