



Assessing the feasibility, acceptability and potential effectiveness of an integrated approach to smoking cessation for new and expectant fathers: The Dads in Gear study protocol

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ABSTRACT

Background: Evidence related to the effects of tobacco exposure in pregnancy and on infant and child health have focused on women's smoking cessation. Less often addressed is men's smoking, which when continued in fatherhood, reduces the chances of female partners' cessation and can negatively impact children's health as well as men's health. Dads in Gear (DIG) is an innovative program designed specifically for new fathers who want to reduce and quit smoking that includes three components: smoking cessation, fathering, and physical activity. The over-arching purpose of this study is to evaluate the feasibility of the DIG program and provide estimates of program efficacy. The purpose of this article is to describe the rationale and protocol for evaluating the DIG program's feasibility, acceptability and potential effectiveness.

Methods: Using a prospective, non-comparative design, the DIG program will be implemented and evaluated in six communities. The program will be offered by trained facilitators to fathers who currently smoke and want to quit. The RE-AIM framework will guide the evaluation. Open-ended questions in participant surveys, and semi-structured interviews and weekly telephone de-briefs with facilitators will provide data for a process evaluation. Estimates of effectiveness include smoking behavior, fathering and physical activity measures at baseline, end of program, and 3-month follow up.

Conclusion: The DIG program could support positive changes with respect to smoking cessation, physical activity and overall health for men. These effects could also promote family health. The program might also provide an effective model for engaging men in other health behavior change.

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1. Introduction

The prevalence of smoking is higher among men than women in Canada [1] and this pattern is consistent in cross-national studies [2]. Since tobacco smoking is a major risk factor for cardiovascular disease, respiratory disease, lung cancer and several other

types of cancer [3], effective smoking cessation programs specifically for men are needed to reduce the burden of tobacco-related disease.

Although women who smoke have garnered the attention of health professionals and prompted calls for the development of gender-specific approaches and resources [4–5], less attention has been directed to men who smoke or the development of programs to support men's cessation [4]. Men's uptake of healthy lifestyles has been influenced by prevailing gender norms which often position men as disengaged from self-health and health promotion programs [6–8]. In turn, dominant ideals about the incompatibility of masculinity with help-seeking can constrain and restrict some men's choices around health [9–13]. However, health promotion programs for men that take into account the

Abbreviation: DIG, Dads in Gear.

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influence of gender-related factors have demonstrated promising results in relation to increasing physical activity and healthy eating [14–17], and there is emerging literature that strength based approaches hold potential for supporting men's smoking cessation [18,19].

Dads in Gear (DIG) is an innovative smoking cessation program for new fathers that was developed to fill the significant void in cessation resources tailored for this group. Studies examining men's smoking patterns in relation to partner cessation during pregnancy and the birth of their children consistently report that the majority of men make few changes or only light reductions in their smoking [20–23]. In addition to lack of knowledge of the effects of second-hand smoke [20], others report a more complex dynamic supporting men's continued smoking including reliance on smoking to express particular patterns of masculinity (e.g., risk-taking, independence, self-reliance), traditional gendered divisions in parenting responsibilities, and the stresses associated with responsibilities of fatherhood [9]. However, research demonstrates that becoming a father is a significant transition period during which many men's masculine ideals, which connect autonomy and hedonism to smoking, are negotiated alongside emergent protector and provider roles that are difficult to reconcile with being a father who smokes [13,24–26]. The presence of a new baby and fatherhood, therefore, is often associated with a desire to stop smoking and provides a window of opportunity to engage and support fathers in smoking cessation [22, 24].

There is a recognized need for men-centered approaches that mobilize positive aspects of masculinities and gender relations to enhance well-being [26,27]. To that end, we developed a novel program to support smoking reduction and cessation efforts by engaging men in face-to-face interactive, weekly group sessions that address the unique needs of new fathers, and reflect men's values and preferences. A pilot study was conducted in 2013 to test the DIG strategies for engaging men, and the program was refined based on the feedback from fathers and facilitators. A suite of online resources for the program including educational materials, quizzes, videos and other interactive activities were also developed [28].

The purpose of this article is to describe the rationale and protocol for evaluating the DIG program's feasibility, acceptability and potential effectiveness when delivered by trained community-based facilitators.

2. Methods

2.1. Study design

Using a prospective, non-comparative design, the DIG program will be implemented and evaluated in six sites in British Columbia, Canada through organizations (e.g., family services organizations, men's resource centres, etc.) in both rural and urban communities. This study protocol was approved by the Behavioural Research Ethics Board of University of British Columbia (#H14-02125).

2.2. Identification of community sites

To identify potential community sites for implementation, a call for expressions of interest was distributed to 58 community organizations across British Columbia via email. The email described the program and invited interested agencies to submit a letter indicating their interest in delivering the program and describing their capacity to implement the program. Thirteen expressions of interest were received and sites were selected based on the following criteria: a) expression of need for and/or existing delivery of men's and fathering programs in the community, b) access to skilled male facilitators, c) access to space to deliver

the program, d) existing organizational capacity, and e) regional representation across the province. The research team reviewed each letter and based on the inclusion criteria selected six community organizations to deliver the DIG program. Offer letters were sent to each of the six organizations informing them that they had been selected and that up to \$6500 CDN would be provided in addition to DIG apparel and materials to support program delivery. Teleconferences were held with each organization to outline particular responsibilities concerning the delivery of the program. Organizations were asked to sign and return the letters within three weeks, indicating that they understood these responsibilities and were willing to deliver the DIG program within their communities. Upon receipt of the signed letters, the research coordinator confirmed the dates for facilitator training with participating community organizations.

2.3. Facilitator training

A mandatory two-day facilitator training workshop was held for all community-based facilitators. The purpose of the training was to ensure the facilitators were well-versed with the DIG curriculum, and familiar with the relevant research informing the program. The training also provided an opportunity for facilitators to discuss particulars of program implementation with the research team. During the training, details of the program were outlined and facilitators were led through hands-on interactive activities to prepare them for delivering the DIG program. For example, sessions were conducted with facilitators to demonstrate the integration of program components, men-friendly strategies for engaging fathers, and the use of program resources in the session. Recruitment of fathers was also highlighted and a recruitment plan was discussed with the facilitators. Open dialogue was encouraged concerning additional strategies that facilitators felt would work best for their organization. In addition to the two-day training workshop, facilitators were provided with a DIG program manual that included detailed instructions for each session, a binder of print-ready program materials, and access to all online program resources on the DIG website.

2.4. Participant recruitment and eligibility

Eligible DIG program participants include men of any age who currently smoke, want to quit, and who are either expecting a child and/or have a child five years of age or younger. Each community site was responsible for recruiting 8–12 participants for their program. Participants were recruited through a variety of strategies including word of mouth and face-to-face contact with men who currently access other programs and resources offered by the community organization, contacts at other community organizations with connections to men and fathers, social media announcements, advertisements in local newspapers and online media, and distribution of posters and pamphlets in local community centres. Recruitment materials such as posters and advertisement templates were provided to community sites via the DIG website. Posters directed interested men to the hosting organization and the DIG website for further information about how to register.

2.5. Intervention

The DIG program design is based on three integrated components: smoking cessation, physical activity and fathering. These integrated components are delivered over an eight-week intervention period via weekly 2 hour face-to-face group sessions held at each organization site (Table 1). Programming related to smoking cessation was informed by current research on fathers' smoking patterns and smoking cessation

Table 1
Dads in Gear program: weekly overview and program components.

Week	Theme	Smoking cessation	Fathering	Physical activity
1	'Puck in the Net'	Reasons to quit	Personal reflections on being a father	Introduction to core exercises and stretching techniques
2	'Full House'	Smoking triggers and strategies for overcoming cravings	Contemporary fatherhood and family dynamics	Physical activity for strength, flexibility, cardio
3	'Fishing for Answers'	Nicotine addiction and use of cessation aids	Modeling in father-child relationship and health behavior	Physical activities dads can do with their children
4	'Games People Play'	Strategies for high risk situations	Approaches for challenging parenting situations	Games that involve physical activity
5	'Let's Walk...Let's Eat!'	Effects of exercise on smoking reduction/cessation	Preparing healthy meals and snacks for children/family	Introduce pedometer, with fitness walk to grocery store for nutrition tour
6	'Where the Wild Things Are'	Effects of second-hand smoke on children	Reading to children Discipline vs. Punishment and reinforcing positive behavior	Cardio and strength training
7	'Bases are Loaded'	Positive thinking and smoking cessation	Keeping children safe	Physical activity and motivation
8	'Kids are Worth It'	Remaining smoke-free	Being an active and involved dad	Game of participants choosing End of program celebration

[24,29–30]. Discussions and activities related to reducing and quitting smoking are focused on increasing men's cessation self-efficacy, and providing peer and facilitator support. In acknowledgment of men's preferences for autonomous decision making, men are encouraged to make their own decisions about when and how they will reduce and quit. At the end of each weekly session, a smoking cessation challenge is presented (e.g., reduce smoking by eliminating 1 or more cigarettes per day) and men are encouraged to set goals and report back at the next session on their strategies and outcomes.

The DIG program includes a component focused on building competencies for and engagement in fathering, in line with changing social norms wherein men are increasingly engaged fathers. Although most men curtail and re-locate their smoking away from their children and families, research indicates that new fathers become uncomfortable with smoking when a new baby enters their lives, and express strong desires to reduce or quit as a means to being good role models and protectors [13,26]. The fathering component of the DIG program is focused on reinforcing this motivation to reduce and stop smoking by increasing men's self-efficacy and engagement in fathering through a variety of knowledge and skill-building activities, and increasing their awareness about the effects of fathers' smoking on children. There is an emphasis on the importance of father/child relationships and role modeling in supporting healthy child development. Fathers are also provided information and strategies to model healthy eating and prepare healthy snacks and meals for their children.

Finally, a physical activity component is included for several reasons. First, physical activity holds potential as a smoking cessation aid in that it decreases desire to smoke [31,32], reduces cigarette cravings [33], and can facilitate smoking cessation [34,35]. Physical activity is also associated with factors such as improvements in mood, sleep patterns and self-esteem as well as reduced stress which influence ability to reduce and stop smoking [36–38]. Furthermore, there is growing evidence that physical activity provides an important avenue for engaging men in health promotion programs [18] and that fathers are interested in physical activity to stay healthy for their families, to be healthy role models for their children, and to be fit enough to "keep up" with their children [39]. During each session of the DIG program, men participate in a variety of physical activities, and are encouraged to integrate physical activity into their daily routine and include their children in these activities.

Importantly, the DIG program is based on men's health promotion principles including: 1) the use of positive messaging to promote

change without amplifying stigma, guilt, shame and blame; 2) fostering connections between masculine ideals (e.g., strength, decisiveness, resilience, autonomy) and being smoke-free; and; 3) privileging the testimonials of potential end-users (e.g., fathers who smoke and want to quit) [40,41]. The program also draws on established gender-related factors influencing men's health and health promotion [41], and gender-specific promotional and delivery strategies found to be successful in promoting men's health [42]. For example, the program design incorporates the use of activity-led education and discussion, self-monitoring, friendly-competition and social interaction, and positive messaging.

To support program delivery, DIG t-shirts and caps are provided to all men along with other program resources (e.g., quit kits, informative handouts, pedometers) and information about free access to smoking cessation aids (e.g., nicotine replacement therapy). Refreshments are offered at each session and childcare is provided. Brief "exit slips" completed at the end of each session for fathers to provide facilitators with feedback by briefly evaluating the session and recording their favourite and least favourite aspect of the session. An overview of the weekly themes and content is provided in Table 1. Following the program, men are offered optional weekly tips via email or text message for a period of 6 weeks. The weekly tips provide continued encouragement to stay smoke free.

2.6. Data collection

The RE-AIM framework will guide the capture of process and outcome data to evaluate the feasibility of the DIG program. RE-AIM has been identified as being particularly appropriate for assessing the fit and relevance of interventions in real-world settings [43–45], and provides estimates of program efficacy. Specifically, RE-AIM encompasses five dimensions that consider the potential for a behavioral health intervention to assist in achieving a population health impact [41]. These dimensions include: 1) *Reach*—the number and proportion of individuals in the target population who are willing to participate in the program or initiative; 2) *Efficacy*—the impact of the intervention on important identified outcomes; 3) *Adoption*—proportion of settings or organizations that are willing to deliver the program; 4) *Implementation*—how closely the program is implemented as intended and any adaptations made, and 5) *Maintenance*—the extent to which a program becomes a part of the routine organizational practices. Multiple sources of data will be collected to address each of these five dimensions and are summarized in Table 2.

Data were collected at baseline, and follow-up data will be collected at program completion (2 months post baseline), and at 3 months

Table 2
RE-AIM evaluation of Dads in Gear.

Dimension and question addressed	Data sources	Methods	Outcome/process measures
Reach To what extent did DIG reach the intended population?	DIG program facilitators Community organization partners Research staff	<ul style="list-style-type: none"> Record of expressions of interest Records kept by delivering organization about outreach and promotion strategies Number of registrants to DIG program Characteristics of DIG participants 	<ul style="list-style-type: none"> Number and characteristics of community organizations applying to offer the DIG program Facilitators and challenges in recruitment of DIG participants Characteristics of DIG participants compared to target population Participant retention (and reasons for drop-out)
Efficacy How effective was the intervention?	DIG participants	<ul style="list-style-type: none"> Questionnaires to assess outcomes at DIG completion Rating scale and open-ended questions in participant questionnaires at DIG completion related to perceptions of program 	<ul style="list-style-type: none"> Individual outcomes (smoking status, fathering engagement/self-efficacy, physical activity and healthy eating) Participant ratings of the usefulness of the DIG program and their satisfaction with its components; and participant views on most valuable aspects of the program (including its gendered dimensions) and areas for improvement
Adoption To what extent was DIG adopted by target organizations?	DIG program facilitators	<ul style="list-style-type: none"> Weekly telephone interviews with facilitators following each DIG session, and at the end of the DIG program 	<ul style="list-style-type: none"> Assessment of barriers and enablers to adoption of program Suggestions for program improvements
Implementation How consistent was implementation? What adaptations were made along the way?	DIG program facilitators	<ul style="list-style-type: none"> Weekly telephone interviews with facilitators following each DIG session 	<ul style="list-style-type: none"> Assessment of program fidelity and tracking of adaptations made Website usage statistics
Maintenance Individual outcomes assessed at 3 months post program Are there plans to include the DIG program as part of organizational programs?	DIG participants Organizations DIG	<ul style="list-style-type: none"> Follow-up questionnaire Feedback from community-based organizations 	<ul style="list-style-type: none"> Individual outcomes (smoking status, fathering engagement/self-efficacy, physical activity and healthy eating) Community-based organization assessment of interest in and capacity to continue to deliver the DIG program in the future

following program completion. Research assistants obtained consent and administered the baseline questionnaire at the first DIG session prior to DIG program initiation.

Baseline measures included questions to describe demographics and smoking patterns. Process data will be collected from participants and facilitators using a variety of approaches. Estimates of program efficacy include number of quit attempts, reduction in smoking (based on cigarettes/day) and smoking cessation (defined as 7 and 30-day self-

reported abstinence), fathering efficacy, and physical activity and sedentary behaviors. Table 3 provides a summary of all measures and data collection points.

2.6.1. Demographic characteristics

Demographic questions included age, marital status, education level, occupation, and ethnicity.

Table 3
Summary of measures and data collection points.

Measures	Collection points
Demographics	0 (baseline only)
Smoking behavior	0 (baseline only)
– Current smoking (smoking status, days smoked in last 30 days, cigarettes per day on days smoked) (self-report)	0, DIG completion, 3 month follow-up
– Nicotine dependence	0 (baseline only)
– Smoking environment	0
– Quit attempts (for at least 24 h) in last 2 months/3 months, and longest period of time smoke free (days/weeks/months)	DIG completion, 3 month follow-up
– Quit intentions (smokers)	0, DIG completion, 3 month follow-up
– Quit confidence (smokers)	0, DIG completion, 3 month follow-up
– Importance of quitting	0, DIG completion 3 month follow-up
– Confidence to stay smokefree (quitters)	DIG completion, 3 month follow-up
– Resources used to aid cessation	DIG completion, 3 month follow-up
Fathering	
– Father involvement as frequency of contact	0, DIG completion, 3 month follow-up
– Fathering self-efficacy (positive engagement and direct care)	0, DIG completion, 3 month follow-up
Physical activity and sedentary behavior	
– Physical activity (self-report)	0, DIG completion, 3 month follow-up
– Sedentary behavior (self-report)	0, DIG completion, 3 month follow-up
Healthy eating behavior	
Perceived helpfulness of DIG program (cessation, fathering, physical activity)	0, DIG completion, 3 month follow-up DIG completion, 3 month follow-up
Process evaluation	
Telephone interviews with facilitators and DIG participant exit slips following each DIG session	During program delivery (0–8 weeks)
Post program survey questions on overall perceptions of DIG program (participants)	DIG completion
Perceptions of DIG email/text message tips (participants)	3 month follow-up

2.6.2. Smoking behavior

Smoking behaviors and attitudes will be assessed using standardized questions drawn from the *Data Standards for Smoke-Free Ontario Smoking Cessation Service Providers* report created by the Ontario Tobacco Research Unit [46].

- a) *Current smoking pattern*: Participants will be asked i) smoking status, ii) how many days they smoked in the last 30 days, and iii) how many cigarettes smoked on days that they smoke.
- b) *Nicotine dependence*: The Fagerstrom Test for Nicotine Dependence [47] will be used to assess level of addiction to nicotine.
- c) *Quit attempts*: Questions include how many times participants have stopped smoking for at least 24 h (during past 2 months/3 months), and the longest period of time they have been smoke free (days/weeks/months)
- d) *Quit intentions*: If participant is smoking, they will be asked if they are planning to quit: within the month, within 6 months, sometime in the future beyond 6 months, or not at all.
- e) *Quitting confidence (smokers only)*: This variable is measured using a single question that asks participants to indicate how confident they are that they can quit smoking on a scale of 1 to 10, where 1 is not at all confident and 10 is extremely confident.
- f) *Importance of quitting (smokers only)*: If participants are smoking, they will be asked how important it is for them to quit smoking on a scale of 1 to 10, where 1 is not at all important and 10 is very important.
- g) *Confidence to stay smokefree (quitters)*: This variable is measured with a single question that asks participants to indicate how confident they are that they remain smokefree on a scale of 1 to 10, where 1 is not at all confident and 10 is extremely confident.
- h) *Smoking environment and social influences*: Questions to assess influences on smoking and cessation efforts include questions asking whether participants have at least one person they can count on to help them quit or remain smokefree (Yes/No), a question that asks participants how many people in their household smoke, and a question that asks participants how many of their close friends smoke.

2.6.3. Fathering

Changes in fathering will be assessed in relation to involvement in child care and fathering self-efficacy as well as healthy eating.

- a) *Father involvement based on frequency of contact*: Drawing from recommendations of experts in fathering [48], 5 items to measure the frequency with which fathers spend time in direct parenting activities including meals, personal care, play, reading or telling stories, and one-to-one social interaction were developed. Participants are asked to indicate how frequently they are involved in each activity using the following indicators: not at all, less than once a week, about once a week, several times a week, and every day.
- b) *Fathering self-efficacy*. This variable will be assessed using the Fathering Self Efficacy Scale [49], a 20-item tool used to assess fathering efficacy across three domains: positive engagement, direct care, and financial responsibility. For the purposes of this study only positive engagement (12 items) and direct care (4 items) subscales are included. Using a Likert scale where 1 is completely disagree and 10 is completely agree, participants are asked to respond to questions such as: "I am able to make time to spend with my child". Results yield two subscale scores. Scores are the average responses to scale items in each subscale. Psychometric testing with healthy, middle class fathers, the majority (80%) living with their child at least some of the time has demonstrated adequate internal consistency ($\alpha = 0.90$ and $\alpha = 0.68$ for the two sub-scales respectively) as well as validity [40].
- c) *Healthy eating behavior*: A single item is used to ask participants how many servings of vegetables and fruit are usually consumed in a day.

A serving is defined as 1/2 cup of vegetables or juice or 1 medium size fruit or vegetable [50].

2.6.4. Physical activity and sedentary behavior

- a) *Self-reported physical activity*: A modified version of the Godin Leisure Time Exercise Questionnaire (GLTEQ) [51], will be used to collect self-report data on frequency of a minimum of 10 minute bouts of activity and type of intensity (mild, moderate, strenuous) of physical activity sessions and the duration (minutes) of these sessions. Physical activity levels will be calculated using the Met-min method [52]. A cut-off point of ≥ 600 Met-min will be used to dichotomize participants as "adequately active for health benefit" or "inadequately active" [52,53].
- b) *Sedentary Behavior*: The sitting item from the International Physical Activity Questionnaire (IPAQ) [54] will be used. Participants were asked: During the last 7 days, how much time did you usually spend sitting on a weekday? Data will be used to create an estimate of total number of minutes of sitting time per day. Low to moderate estimates of correlations with accelerometer derived data are comparable to self-reported physical activity [55].

2.7. Data analysis

Data from baseline and post questionnaires will be analyzed using descriptive statistics (means, standard deviations, frequencies, etc.) and general linear models. The level of significance will be set at 0.05. SPSS for Windows (V.22) will be used to conduct all analyses. Since this is a feasibility study, a power calculation was not performed.

Process data gathered from facilitators during session de-briefs and participant responses to open-ended questions regarding the DIG program on follow-up questionnaires will be content analyzed. Facilitator data will be analyzed to evaluate program fidelity, adaptations, factors that facilitated and challenged program delivery, and recommendations for improvement. Participant feedback on the program will be used to describe participant perceptions of the program, and areas for improvement. Participant attendance will also be described.

3. Conclusion

The unique design of the DIG program integrates gender-specific factors to offer a tailored approach to support fathers' smoking cessation efforts. This program fills an important gap in health promotion efforts targeting family health by acknowledging and addressing existing limitations in conventional approaches to engaging men in their health. By promoting autonomy and incorporating a variety of men-friendly hands-on activities, the DIG program strives to encourage fathers to invest in their health on their own terms. The 8-week face-to-face program also provides fathers with the opportunity to provide meaningful support to each other as they reduce and stop smoking, and strengthen their involvement in fathering roles and responsibilities.

The potential health benefits of the Dads in Gear program include: 1) positive changes with respect to smoking cessation, physical activity and overall health for men, 2) enhanced engagement of fathers in their children's health and lives, 3) stronger support for women's cessation efforts and the provision of smoke free homes for children when fathers quit smoking, and 4) community benefits through improved family health and prevention of chronic disease related to tobacco and other lifestyle behaviors. Given its comprehensiveness, breadth and sensitivity to multiple program components the RE-AIM framework is an appropriate and rich evaluation tool for programs addressing complex health behaviors such as smoking cessation among fathers. The findings of this feasibility study will guide enhancements to the program and study protocol for a community-based clinical trial.

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