



Reducing the Risk of Type 2 Diabetes Through Workplace Programs

A Position Statement

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About Diabetes Canada: Diabetes Canada is a national health charity representing more than 11.5 million Canadians living with diabetes or prediabetes. Diabetes Canada leads the fight against diabetes by helping those affected by diabetes live healthy lives, preventing the onset and consequences of diabetes, and discovering a cure. It has a heritage of excellence and leadership, and its co-founder, Dr. Charles Best, along with Dr. Frederick Banting, is credited with the co-discovery of insulin. Diabetes Canada is supported in its efforts by a community-based network of volunteers, employees, health care professionals, researchers, and partners. By providing education and services, advocating on behalf of people living with diabetes, supporting research, and translating research into practical applications, Diabetes Canada is delivering on its mission. Diabetes Canada will continue to change the world for those affected by diabetes through healthier communities, exceptional care, and high-impact research.

For more information, please visit: www.diabetes.ca.

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Position Statement

Type 2 diabetes poses a significant burden to the person living with it, their family, the health-care system, and the workforce. Type 2 diabetes costs employers approximately \$412 per employee per year due to reduced productivity (also known as presenteeism) and \$1,042 per employee per year due to missed work (also known as absenteeism) (1). For working-age adults who spend much of their day at work, they have access to pre-existing social support and communication networks—both formal and informal—in the workplace. These aspects of the work environment can be utilized to help employees living with or at risk of developing type 2 diabetes improve their health outcomes.

It is vital for employers to use their time and resources for programs that can improve employee health and, subsequently, reduce costs. Many existing programs do not effectively facilitate healthy behaviour change. The purpose of this position statement is to provide meaningful and specific recommendations to help employers reduce the risk of type 2 diabetes in their employees.

Health and wellness programs offered in the workplace are intended to benefit both the employee and the employer. However, only those that have been evaluated and show benefits should be adopted. A leading, structured healthy behaviour change program is the Diabetes Prevention Program (DPP) (2,3). DPP focusses on positively impacting physical activity, healthy eating, and weight loss through coaching, to help people living with prediabetes reduce their risk of developing type 2 diabetes. Research has also focused on the feasibility, as well as clinical and economic benefits, of delivering DPPs in the workplace setting.

Diabetes Canada recommends that **employers:**

For employees within your organization who are at high risk of developing type 2 diabetes:

- Offer the Diabetes Prevention Program (DPP), or other effective healthy behaviour interventions in the workplace.
- Provide the DPP or other multidisciplinary healthy behaviour modification programs via multiple delivery modes, including in-person and virtual for employees in rural and/or remote areas, or when it is not feasible to hire local experts for program delivery.

For all employees:

- Create opportunities that promote physical activity (e.g., providing time during working hours to engage in physical activity, supplying exercise equipment on-site for employee use, enhancing the work environment with access to walking paths, etc.).
- Provide healthy food choices in the workplace, including in cafeterias, vending machines, meetings, etc., and make the healthy choice the easy choice.
- Promote awareness of the [Canadian Diabetes Risk Questionnaire](#) (CANRISK) so employees can become aware of their own risk of developing type 2 diabetes.
- Offer workplace screening clinics that include screening for type 2 diabetes.
- Include type 2 diabetes prevention and management information in workplace health and wellness communications.

Diabetes Canada recommends that **health-care providers:**

- Encourage their patients to participate in employer-delivered DPPs and adapted healthy behaviour change programs that are offered in the workplace.

- Participate in research and/or delivery of the employer-delivered DPPs and adapted healthy behaviour change programs in the workplace to reinforce progress of well-designed research and program implementation.

Diabetes Canada recommends that **working Canadians** at risk of developing type 2 diabetes:

- Participate in employer-delivered DPPs and adapted healthy behaviour change programs in the workplace if they are currently offered by their employer.
- Encourage employers to provide DPPs and adapted healthy behaviour change programs in the workplace if such programs do not currently exist.

Diabetes Canada recommends that **all levels of government** (federal, provincial, and municipal):

- Adopt a leadership role in providing workplace programs to their public service employees.
- Provide a framework of employer-delivered DPPs and adapted healthy behaviour change programs in the workplace that other employers can adopt.
- Support and incentivize the development of proven policies and programs in the workplace to increase access to programs and make workplaces healthier by, for example, promoting access to healthy food choices and opportunities for physical activity, as well as encouraging a reduction in sedentary time.
- Encourage and incentivize research organizations or employers to engage in cost-effectiveness studies to strengthen this area of expertise in Canada.
- Support the follow-up on current studies or the design of longer-term studies to determine the endurance of clinical effectiveness in employer-delivered DPPs or adapted healthy behaviour programs in the workplace.

Diabetes Canada will:

- Advocate for employer-delivered DPPs and proven diabetes programs in the workplace.
- Work with employers and research funders to promote workplace DPP research on the cost effectiveness and long-term clinical effectiveness of such programs.
- Support and promote healthy workplace policies for employees.

Why are Workplace Programs Important to Diabetes Canada?

Diabetes has an enormous impact on individuals, families, employers, communities and the health-care system. Some, but not all, cases of type 2 diabetes can be prevented through changes to an individual's behaviours. Typically, interventions aimed at the prevention of type 2 diabetes or prediabetes occur via support in medical and/or community sites. However, employers can implement programs that benefit both the individual and the employer. Research has estimated that each employee with type 2 diabetes costs their employer approximately \$412 per year due to reduced productivity (presenteeism) and \$1,042 per year due to missed work (absenteeism) (1). Furthermore, adults typically spend much of their day at work and employees have pre-existing social supports and formal as well as informal communication networks (4). Therefore, employer-delivered programs can be an effective opportunity for intervention. With the significant impact of type 2 diabetes on employees' health and the economic impact to the workforce, employer-delivered DPPs and other adapted lifestyle programs offer hope to reduce the risk of prediabetes and type 2 diabetes. This policy position presents research results on the benefits of workplace

prevention interventions and makes recommendations to employees, employers, governments, and for Diabetes Canada.

Methods

A rapid evidence review approach was taken, which is a streamlined alternative to standard systematic reviews to meet the needs of fast-paced evidence-informed decision making and advocacy (5–7). A comprehensive literature review was conducted. Twenty-eight studies were included in the published literature search, and one unique study was identified and included in the grey literature. Please see the appendix for detailed methods and findings.

Based on the synthesized literature, the present position statement and accompanying recommendations were formulated. This position statement was reviewed by experts in the field, including researchers, human resources professionals, private insurance specialists, and policymakers.

Diabetes in Canada

Diabetes and prediabetes are conditions that are estimated to affect 11.7 million people in Canada in 2022. People living with diabetes cost our health-care system \$30 billion each year (8,9). The total number of people living with diabetes and prediabetes is projected to increase steadily to an estimated 13.96 million in Canada by the year 2032 (8).

Diabetes occurs when the pancreas becomes unable to produce sufficient insulin, or when the body does not effectively utilize the insulin it makes (10,11). Type 2 diabetes generally occurs in adults and develops due to environmental factors (e.g. social and built), and individual factors (e.g., behavioural and genetic) (10,11). There are both non-modifiable and modifiable risk factors for type 2 diabetes. Non-modifiable risk factors include: age, family history of diabetes, or member of a high-risk population (e.g., Indigenous, African, Hispanic) (11). Modifiable risk factors include weight, level of physical activity, quality of diet (particularly reducing the consumption of sugar and refined grains and increasing the consumption of fresh fruits, vegetables, and whole grains), and smoking status (11). The risk of developing type 2 diabetes and its associated complications can be significantly mitigated and managed through interventions targeted to the modifiable risk factors. A treatment plan prescribed by a clinician will depend on individual factors, including goals, lifestyle, meal plan, age, and general health (12).

Furthermore, there are individuals with higher-than-normal blood glucose levels that do not meet the cut-off criteria for type 2 diabetes, a condition referred to as prediabetes. These individuals are at particular risk for developing type 2 diabetes, as many people with prediabetes will eventually develop type 2 diabetes (11).

If left untreated or undermanaged, type 2 diabetes can result in the development of numerous life-limiting and life-threatening complications (11). Working-aged adults (aged 20 to 64 years) with diabetes have a life expectancy five to ten years less than adults of the same age without diabetes (13).

Workplace Programs

The Diabetes Prevention Program, or DPP, is a well-known, multifaceted, intensive behaviour change initiative. It is an evidence-based program recognized by the Centers for Disease Control and Prevention in the United States. This small-group program, which has been implemented in many locations across the United States, helps participants form healthier eating habits, increase physical activity levels (to 150 minutes a week), and lose 5-7% of their bodyweight to delay or prevent the onset of type 2 diabetes. A critical component of the program is that the changes are facilitated by a lifestyle coach, with 25 one-hour sessions delivered over the course of a year (2). In this program, the development of type 2 diabetes was reduced by 58% after 2.8 years in the DPP intervention group compared with the control group (14). In 2015, a 15-year follow-up study showed the lasting effects of DPPs, with the intervention group having reduced type 2 diabetes incidence rates by 27% compared to the control group (15). These results are notable because participation in the program only lasted one year, but the positive benefits lasted much longer.

Modelled after the U.S. program, the Canadian Diabetes Prevention Program (CDPP) offers a digital health and wellness program with the one-on-one support to make small, incremental changes to improve health and reduce the risk of developing type 2 diabetes (3). Currently, it is offered as a pilot program through a partnership between Diabetes Canada, LMC Healthcare, and the Public Health Agency of Canada. Other programs based on DPP are also offered intermittently across the country.

In the United States, there has been a forward momentum of employers working with health plans to offer DPPs to eligible employees in workplaces. These initiatives have been supported by a variety of stakeholders, including the American Diabetes Association, the American Medical Association, the Centers for Disease Control and Prevention, and the National Business Coalition on Health (16). Similar efforts are also occurring in other countries around the world (16). These global trends, coupled with the focus on the high costs of type 2 diabetes to employers and expanded availability of DPPs, have led to a growing interest in Canada in the potential effectiveness of employer-delivered DPPs. However, there is not one standard program that is administered and measured. Therefore, to inform policy decisions, it is imperative to review the diverse approaches and associated effectiveness in relation to preventing prediabetes and/or type 2 diabetes among adults in the Canadian workforce.

Types of Interventions

Diabetes Prevention Programs (DPPs)

The Diabetes Prevention Program is the most effective intervention for reducing the risk of developing type 2 diabetes. These programs focus specifically on measurable goals related to food and physical activity: aim for 7% weight loss, make healthier food choices, and increase physical activity levels to 150 minutes per week. The intervention also includes the support of a lifestyle coach to assist participants in achieving the goals. Multiple studies have shown that employer-delivered DPPs or lifestyle-adapted programs reduced the risk of type 2 diabetes (14,17-24).

Specifically, five studies found that DPPs in the workplace reduced the number of employees receiving a diagnosis of prediabetes and/or diabetes (25–29). These results included:

- Employees with prediabetes transitioning to “no risk” of diabetes (27);
- A reduction in A1C level for employees living with or at risk of type 2 diabetes (29);
- A reduction in glucose levels for employees with prediabetes or newly diagnosed type 2 diabetes (25). More than half of the participants who completed 24 months of the program had normal glucose tolerance, which represents a 55% reduction in development of type 2 diabetes.
- Overall decreases in employees’ mean diabetes risk score in three variations of a DPP program (26).

Interventions Specific to Diet and/or Exercise

These interventions are classified as adapted DPPs and focused on some or all of the following components: nutrition counselling, weight management programs, removal of sugar-sweetened beverages from the workplace, healthy cafeteria options, physical activity sessions, or use of a pedometer (with or without group challenges). The reviewed studies reported evidence for positive changes to diet and/or physical activity, or reductions in bodyweight and body mass index (BMI), depending on outcomes measured.

Educational Interventions

Educational interventions encompass knowledge transfer to participants through broad or targeted coaching or counseling. Broad interventions include wellness fairs, while targeted interventions comprise one-on-one health coaching or individual counselling. In both cases, education on healthy behaviour change is delivered to the individual, but in the case of one-on-one coaching, the education can be targeted to their specific circumstances. One study found that employees who attended wellness fairs plus one-on-one health coaching for at least three 20-minute sessions and received monetary incentives (reduction in annual premiums) had health benefits (reported as a decrease in A1C and prediabetes) compared with a group who just went to the wellness programs at fairs (28). It should be noted, though, that participants self-selected their group membership in this study, so it is possible that participants in the primary intervention were more motivated to change their behaviour than the other groups. Nevertheless, we can conclude that workplace prevention programs targeted at motivated employees can prove successful.

But education on its own is often not enough to change behaviour. Behaviour change models demonstrate the complexity of factors that encourage and hinder behaviour changes. Education alone may not be sufficient motivation or support to make meaningful and sustainable changes to achieve better health.

Interventions with External Support

Whether one-on-one or delivered in a group setting, external support can play a key role in helping employees adopt and maintain new, healthy habits. These interventions included individualized counselling on nutrition and other health behaviours, and support groups including physical activity

challenges (21,30–32). Improvements were reported in the respective components, be it reductions in bodyweight, BMI, A1C, prediabetes, sedentary behaviour, or increases in physical activity.

Metabolic Risk Factors

Metabolic syndrome is a cluster of conditions that occur together, increasing your risk of heart disease, stroke, and type 2 diabetes. These conditions include increased blood pressure, high blood sugar, excess body fat around the waist, reduced “good” or HDL cholesterol, and high triglyceride levels. These programs were implemented in the workplace and varied in the intervention and follow-up period. The results show that workplace programs can be effective in terms of improving physical activity rates through group-based or supported interventions.

Cost Effectiveness of Workplace Programs

There are a lack of cost-effectiveness data available for employer-delivered DPPs or other adapted lifestyle programs in the workplace. The authors of one study concluded that the benefits of employer-delivered DPPs and adapted lifestyle interventions in the workplace could be implemented with a relatively low incremental cost per case, with even lower costs in the non-research settings (24). Authors of another study stated that lifestyle interventions generated cost savings for the employer (33). An additional study concluded that behavioral lifestyle intervention in the workplace is feasible (23). No recent analyses were identified for the Canadian context.

For substantial uptake, employers will want to know the feasibility of implementing DPPs or adapted lifestyle intervention programs in the workplace. Therefore, there is a critical need for this type of evaluation to be undertaken and shared. There may be opportunities for governments to support the development of the knowledge base through grants or other incentive programs to encourage research organizations or employers to engage in cost-effectiveness research in Canada. The benefits that can result from these programs can impact the workforce and health care, and are therefore relevant to public, not-for-profit, and private institutions.

Conclusion

Are employer-delivered DPPs and adapted lifestyle programs effective at reducing the risk of prediabetes and type 2 diabetes? Overall, there was consistent evidence to support the effectiveness of them in the workplace. Most trials reported benefits, including risk reduction of type 2 diabetes, decreases to weight and/or BMI, positive changes to diet and physical activity, cardiovascular outcomes, metabolic outcomes, and metabolic syndrome. For these programs to be successful, the presence of a coach and a focus on weight loss and physical activity are critical. Furthermore, evaluation of the program is essential to ensure the program meets its goals and is a good use of limited resources. No single standardized employer-delivered DPP or adapted lifestyle program in workplace settings was identified as being superior to any other program. Rather, there is evidence to support multidisciplinary approaches to these interventions. One exciting discovery was that these programs can effectively be delivered in person as well as virtually. The virtual platform may

be especially beneficial when employers are in rural and/or remote areas of Canada or when hiring experts on location is not feasible.

Notably, interventions that were group- or team-directed and less intense (e.g., no individual sessions, used broad motivational messages, reduced the experts involved in the program) were less likely to report statistically significant findings. Employers should know that implementing a low-intensity intervention, especially one that targets the groups or teams without enrollment criteria, is the least likely to produce health benefits, and therefore provide the least amount of benefit to the employer.

The rising prevalence and economic burden of diabetes is a major public health concern. Employers and policy makers at all levels should consider implementing and/or supporting workplace programs to address the growing diabetes prevalence amongst working-aged Canadians. These types of programs can facilitate efforts by Canadians with busy schedules, family responsibilities, and limited resources to reduce their risk of developing prediabetes and type 2 diabetes.

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Appendix – Detailed Methods and Findings

Evidence Synthesis

The search strategy was developed by combining terms related to the research question (e.g., diabetes, prevention, workplace intervention) with methodological terms (e.g., clinical trial, systematic review). Two health sciences librarians with expertise in evidence-based practice constructed and peer-reviewed comprehensive searches of the relevant English-language, published, peer-reviewed literature using validated search strategies of the following electronic databases: MEDLINE, EMBASE, CINAHL, the Cochrane Central Register of Trials, and PsycINFO. A grey literature search was run on McMaster University Social System Evidence, McMaster University Health Evidence, Centre for Disease Control and Prevention, IC/ES Reports and Public Health Ontario – Health Promotion Publications. A search was then completed using the Canadian Agency for Drugs and Technologies in Health (CADTH) Grey Matters tool. Search terms used were “diabetes prevention”, “workplace” and “adults”. Additional studies were identified through a review of the references of included studies.

Two reviewers systematically reviewed all relevant titles and abstracts to identify studies that met the inclusion criteria for full-text evaluation. Full-text evaluation was done by two reviewers; all disagreement was resolved through discussion. Articles selected for this review were any study that included a workplace prevention intervention.

Twenty-eight studies were identified that assessed the effectiveness of employer-delivered DPPs or an adapted health behaviour program in a workplace setting. Primary studies refer to research delivered as randomized controlled trials (RCTs), while secondary studies refer to other types of interventions, including cohort and case studies, as well as review articles. Some results reported in this statement indicate that the results were “statistically significant.” Statistical significance is a determination by the researchers that the results in the data are not explainable by chance alone but are in fact attributable to the intervention in question. Where results indicate a change without mentioning statistical significance, the strength of the intervention was not as robust in a clinical setting. However, the intervention and results are still relevant in a real-world setting.

All five of the primary studies and three of the four secondary studies provided evidence for positive changes to diet and/or physical activity (21,23,25,26,34–37). The identified literature provides evidence to support that employer-delivered DPPs and adapted lifestyle interventions programs can make positive changes to diet and physical activity. There were fifteen primary studies included that evaluated change in weight and/or BMI as a primary or key clinical outcome (25,34,26,38,39,35,40,22–24,41,42,36,43,44), and three secondary studies (16,45,46). Most of the trials that assessed employer-delivered DPPs or lifestyle programs adapted for the workforce consistently reported a statistically significant beneficial change in weight and/or BMI from baseline measurement. The authors of the secondary studies made similar conclusions.

Eight of the publications found that the lifestyle program administered at a worksite for employees resulted in statistically significantly reduced weight and/or BMI when compared with the control group (34,35,23,24,41,42,36,44). All but one of these studies used a multicomponent lifestyle

intervention program that focussed on at least two aspects, such as changing diet and increasing physical activity. Interestingly, two studies focussed on technology to deliver the program: Limaye et al. adapted the DPPs to a virtual platform with the use of mobile phone messages, emails, social media platform (Facebook), and web-based applications, while Woo et al. delivered a social network-based multidisciplinary lifestyle intervention (47,48). Fang et al. focussed on moderate physical activity for 60 minutes, three times a week (35).

The six remaining studies were categorized as secondary studies (25,26,38–40,22). Five of the six studies found improvement in weight or BMI. The studies implemented a multi-component lifestyle program, a web-based weight loss program, and a physical activity-focussed program.

In one study that delivered intensive one-on-one counselling, results showed a significantly greater reduction in mean diabetes risk score, and significantly greater reduction in mean bodyweight and BMI than the support group and passive intervention groups (30). Giese et al. implemented a group program and reported a statistically significant improvement to weight when compared with baseline values (31). And Raymond et al recorded a statistically significant decrease in A1C and prediabetes in participants who attended a wellness fair and received one-on-one health coaching, compared to those employees who only attended the wellness fair (32). Freak-Poli et al. reported an increase of 6.5% of participants meeting recommended physical activity guidelines and a decrease in sitting time for employees utilizing pedometers in a team-style competition (40).

Three primary studies included in the rapid review reported metabolic risk factors as a key outcome (35,38,49). Each study reported statistically significant positive results. Two of the studies also reported a statistically significant decrease in participants categorized as having metabolic syndrome and the third study showed numerical improvement but did not report on the statistical significance of the decrease.

The follow-up periods for the studies ranged between 12 weeks and 5 years. Table 1 provides details on the key outcomes of the studies.

Table 1. Summary of studies

Abbreviations: DPP = Diabetes Prevention Program; PA = physical activity; SSB = sugar sweetened beverages; LDL = low-density lipoprotein.

Author, Reference	Length of Trial	Intervention	Key Outcomes
Randomized Controlled Trials			
Weinhold (36)	16 weeks of sessions plus 3-month follow-up	Adapted DPP	<ul style="list-style-type: none"> Greater weight loss in intervention group than control group: 32.4% vs 2.9% met the goal of achieving 7% or more weight loss post-intervention. Weight loss sustained at 3-month follow-up. Mean reductions in fasting glucose were greater in the intervention than the control group. Both groups had significant glucose reductions at 3-month follow-up. In the intervention group, the intake of total energy and the percentage of energy from all fats, saturated fats, and trans fats decreased, and the intake of dietary fiber increased post-intervention.

Author, Reference	Length of Trial	Intervention	Key Outcomes
Barham (34)	12 months	Adapted DPP	<ul style="list-style-type: none"> Statistically significant increases in PA. Statistically significantly lower dietary fat intake, uncontrolled eating, & emotional eating. Intervention group lost statistically significantly more weight compared to the weight control group over the first 3 months and recorded a decrease in BMI.
Fang (35)	12 weeks	PA: moderate intensity for 60 min/session, 3 sessions/week	<ul style="list-style-type: none"> Statistically significant improvements in physical fitness (e.g., flexibility, muscular strength, cardiorespiratory endurance) from baseline and compared to the control group. Weight and BMI decreased statistically significantly in the intervention group from baseline to 12 weeks, and statistically significantly more than the control group.
Kramer (23)	6 months and 12 months	Adapted DPP	<ul style="list-style-type: none"> At 6 months, the intervention group had greater improvements in activity & greater mean weight loss than the control group. At 12 months, the control group experienced similar improvements to the first intervention group, after completing the intervention program.
Limaye (24)	1 year	Virtual assistance-based lifestyle intervention (called LIMIT)	<ul style="list-style-type: none"> Prevalence of overweight/obesity reduced by 6.0% in the intervention group and increased by 6.8% in the control group.
Shrivastava (42)	6 months	Multicomponent lifestyle interventions	<ul style="list-style-type: none"> Greater than 5.0% weight loss in 12.0% of intervention group vs 4.0% in the control group. Intervention group lost a statistically significant amount of weight from baseline to the end of the intervention and lost statistically significantly more weight than the control group when compared at the end of the intervention.
Miller (41)	16 weeks of sessions plus 3-month follow-up	Adapted DPP	<ul style="list-style-type: none"> Most of the participants who succeeded in achieving the 7.0% weight loss goal had achieved at least a 2.5% weight loss during month one. Significant difference occurred between groups for the change in consumption of nuts/legumes and red/processed meats postintervention and for fruits at 3-month follow-up. Intervention statistically significantly increased intake of fruits at 3-month follow-up. Intervention fostered changes in action planning, action self-efficacy, and coping self-efficacy at 3-month follow-up.
Wilson (43)	12 months	Adapted DPP (called FUEL your life)	<ul style="list-style-type: none"> Intervention group lost a mean 1.6 pounds/0.1 BMI, control participants gained mean 3.1 lbs/0.3 BMI, both non-significant differences.
Woo (44)	12 weeks	Social network-based multidisciplinary lifestyle	<ul style="list-style-type: none"> Significant improvements in waist circumference, BMI, total cholesterol, LDL cholesterol, health promotion behaviors, and self-efficacy.

Author, Reference	Length of Trial	Intervention	Key Outcomes
		intervention vs education vs control	
Non-Randomized Controlled Trials			
Aldana (25)	12 months & 2-year follow-up	DPP: Physical activity, dietary education, behavior change activities. Group and individual settings	<ul style="list-style-type: none"> Weight, body mass index, waist circumference, oral glucose tolerance testing, fasting insulin, blood lipids, and aerobic fitness had improved significantly after 6 months. Weight, BMI and aerobic fitness improvements maintained at 12 months. At baseline, 22 participants had impaired glucose tolerance (diabetes). At 24 months, more than half had normal results on glucose tolerance testing, representing a 55% reduction in diabetes.
Burton (50)	12 months	Education and information around diabetes management & self-care.	<ul style="list-style-type: none"> No statistically significant differences of mean A1C at baseline, 6 months, and 12 months.
Clark (27)	12 to 16 weeks	Nutrition counseling & participation in PA of at least 150 min/week	<ul style="list-style-type: none"> Prevalence of prediabetes was reduced by 31% by fasting blood glucose or A1C levels.
Dallam (26)*	26 weeks	Three variations of DPP: 1) intensive one-on-one counseling approach, 2) support group meeting approach 3) passive transfer of information approach	<ul style="list-style-type: none"> One-on-one group showed a significantly greater reduction in mean diabetes risk score than the support group & passive intervention groups. One-on-one group had significantly greater reduction in mean bodyweight & BMI than the support & passive intervention groups. One-on-one approach resulted in significantly greater mean increase in reported PA level.
Freak-Poli (40)*	4 months	PA, pedometer-based team-style competition	<ul style="list-style-type: none"> Increase of 6.5% participants meeting recommended PA guidelines & decrease in sitting time. Increase of 4.0% in fruit intake. & 2.0% vegetable intake. No statistically significant change to weight from baseline.
Raymond (28)	5 years	Wellness fairs for Group A & B. Group A also had 1:1 health coaching & monetary incentives	<ul style="list-style-type: none"> Group A: Significant decrease in A1C & decrease in prediabetes. Group B: Significant increase in A1C & prediabetes.
Tarride (29)	6 months	Motivaction, a voluntary diabetes screening and	<ul style="list-style-type: none"> Statistically significant reductions in A1C from baseline to 6 months in those with prediabetes or diabetes.

Author, Reference	Length of Trial	Intervention	Key Outcomes
		education pilot program.	
Giese (22)	16 weeks	Diabetes Prevention Core Curriculum group-based intervention with monetary incentive	<ul style="list-style-type: none"> • Statistically significant changes in bodyweight and BMI from baseline. • Median weight change = 2.5% loss.
Epel (39)	12 months	Stopped selling SSBs; half randomized to receive brief motivational intervention	<ul style="list-style-type: none"> • No statistically significant change to weight compared to those who did not receive motivational intervention.

*Studies did not include diabetes-specific criteria for enrollment.

Secondary Studies

Four studies evaluated other studies—these included systematic reviews, meta-analyses, and narrative reviews (4,16,45,46). Brown et al. published a systematic review in 2018 of the effects of employer-delivered, adapted DPP interventions and the degree to which they improved diabetes-related outcomes, including A1C levels and changes in weight/BMI, in employees diagnosed with type 2 diabetes, prediabetes, or at risk for type 2 diabetes (45). Of the ten studies included in the systematic review that measured A1C reduction, six reported statistically significant reductions. Fifteen of the 20 studies measuring change in weight and/or BMI found statistically significant intervention effects. The interventions included healthy eating behaviors, physical activity, and/or monitoring and self-managing diabetes and cardiovascular risk factors. Designs tended to deliver intervention in group sessions of fewer than 20 employees. Programs typically involved one-hour weekly sessions held during lunch hour or at other times during the workday for 12 to 24 weeks.

Shrestha et al. published a meta-analysis in 2018 to summarize the evidence of the effectiveness of dietary interventions on lowering blood sugar levels (4). The authors found that employer-delivered dietary interventions improved A1C. However, while fasting glucose was lowered by 2.60 mg/dl, it was not a statistically significant change. The authors concluded that if the A1C benefit was sustained over time, the development of diabetes could be prevented or delayed.

Inolopú et al. published a systematic review in 2019 and included 10 studies (46). Interventions based on structured lifestyle programs previously evaluated and integrated into the workplace had a favorable impact on the reduction of bodyweight. Interventions based on structured programs for the prevention of type 2 diabetes showed wide effectiveness, which was linked to the degree of similarity with the base DPP program. Three of the primary studies included in this review were included in the rapid review and have been assessed previously as primary studies: Limaye et al. (24), Kramer et al. (23), and Weinhold et al. (36), all of which showed statistically significant benefits. Of the remaining seven studies, six reported on weight and/or BMI: four reported statistically significant benefit, one reported no statistically significant benefit, and one reported a statistically significant benefit in BMI but not in weight loss.

Hafez et al. conducted a narrative review published in 2017 (16). This review described studies with the DPP intervention (10 studies) and other intervention approaches (3 studies) in employees at risk of developing type 2 diabetes (16). Weight reduction was achieved in the DPP workplace interventions, with greatest weight loss reported among intensive lifestyle interventions that were at least 4 months in duration and that implemented the structured DPP curriculum.