Occupational Health Science (2024) 8:365–382
https://doi.org/10.1007/s41542-024-00185-z

MAJOR EMPIRICAL CONTRIBUTION

Employer Engagement Strategies to Promote and Add Evidence-Based Chronic Disease Prevention and Management Programs as a Covered Benefit

Sarah D. Levine[1] · David Shapiro[1] · Carol E. Brown[1] · Liliana Tenney[1]

Received: 2 May 2023 / Revised: 13 March 2024 / Accepted: 16 March 2024 /
Published online: 28 March 2024

Abstract

Chronic disease is a serious workforce issue with significant economic impacts on employers and employees. While there are several evidence-based chronic disease prevention and management programs (CDPMPs), they are underutilized in the workplace due to a lack of awareness and understanding by employers. There are few studies to inform how best to engage employers to help support at-risk employees and provide coverage of evidence-based programs. This paper aims to present the gaps and opportunities in how these programs are implemented and promoted by employers to increase the awareness and adoption of evidence-based CDPMPs, specifically the National Diabetes Prevention Program (National DPP) as a covered benefit among employers. We provide detailed information on three organizational engagement strategies used for 349 organizations and provide data on levels of employer and employee engagement for the three organizations that completed uptake. Our paper reflects on the findings of the tested engagement strategies to provide guidance for employer engagement in CDPMPs. These cases show the importance of employer engagement to support and maintain chronic disease prevention and management efforts and key strategies for organizational implementation of evidence-based programs.

Keywords Chronic disease prevention and management · *Total worker health*® · Diabetes prevention · Workplace health · Occupational health

✉ Sarah D. Levine
sarah.levine@cuanschutz.edu

[1] Center for Health, Work & Environment, Colorado School of Public Health, Aurora, CO 80045, USA

Background

Six in 10 adults in the United States have a chronic disease. There are few studies to inform how best to engage employers to help support at-risk employees and provide coverage of evidence-based programs (McGonagle, 2021). Chronic disease continues to significantly drive death and disability in the United States, as well as largely contribute to the nation's healthcare costs (Sedani et al., 2019). Among major chronic diseases, type 2 diabetes is the costliest and leads to numerous negative health impacts. Diabetes and prediabetes impact approximately 130 million Americans, over 38% of whom are working-age individuals ages 18–65 (Centers for Disease Control and Prevention, 2022c). According to the American Diabetes Association (2018), the annual burden of diabetes on the U.S. healthcare system is substantial: $237 billion in direct medical costs and $90 billion in lost productivity. Diabetes has both direct and indirect negative effects on the overall well-being and productivity of working adults, disproportionately impacting industries such as protective services, farming, fishing, and forestry, and community and social services, due to job design and work characteristics, as well as demographics of the workforce (Shockey et al., 2021). Work characteristics that influence the risk for type 2 diabetes include shift work, long hours, sedentary job conditions, and work-related stress (Shockey et al., 2021). Individuals with diabetes spend more money on healthcare and accumulate more missed days of work than those without diabetes (Centers for Disease Control and Prevention, 2022d). Furthermore, these individuals are at a high risk of health complications such as heart disease, nerve damage, hearing and vision loss, and amputation (Centers for Disease Control and Prevention, 2022a), as well as mental health challenges and an increased risk of burnout; all of which affect overall well-being and productivity (McGonagle, 2021).

The COVID-19 pandemic highlighted the importance of diabetes prevention and management. Adults with underlying medical conditions, such as diabetes and chronic heart conditions are more likely than others to experience severe illness and mortality due to COVID-19, and increased complications from diabetes (Upsher et al., 2022). Research also shows that people who have been infected with COVID-19 may have a greater risk of developing type 2 diabetes up to a year later (Xie & Al-Aly, 2022). Additionally, the pandemic interrupted routine diabetes management and led to changes in exercise behavior, diet, weight, and decreased diabetes self-care (Upsher et al., 2022). Along with an aging workforce and changes to the nature of work, chronic disease has become a growing concern for businesses and employers (Sedani et al., 2019). While the health and economic outcomes of diabetes are significant, many of the health risk factors associated with diabetes are preventable and modifiable (Centers for Disease Control and Prevention, 2022c.), and cost reduction is possible with preventive interventions (Zhou et al., 2020). To address the burden of chronic disease prevention and management, employers play a critical role in prevention as well as providing workplace supports to aid in chronic disease management. This requires employers to find effective engagement strategies to deliver and promote chronic disease prevention and management programs (CDPMPs) and cover the cost of CDPMPs for all at-risk employees.

The workplace is a key context for intervention (Centers for Disease Control and Prevention, 2016). It is a highly influential environment for health and has the potential to positively impact both the individual and the organization. Workplace programs are particularly important for high-risk populations, who may not have access to medical care and other resources outside of employment (Mazzucca et al., 2021). The workplace also benefits from offering CDPMPs. Not only can offering CDPMPs help mitigate the rising healthcare and productivity costs attributable to chronic disease experienced by employees (Harris et al., 2008) but it can also yield benefits including increased productivity, improved employee morale, enhanced employee recruitment and retention, and fostered high-level support of programs from leadership (Linnan et al., 1990).

Among the potential benefits associated with CDPMPs, there are also common barriers to successful implementation of programs in the workplace (McCoy et al., 2014). Organizational barriers include direct and indirect costs, time constraints, and lack of resources, leadership support, participation among at-risk employees (McCoy et al., 2014), understanding about worker characteristics, and management support (Linnan et al., 1990). Organizational factors are important for addressing an organization's ability to successfully implement prevention programs. Previous studies have demonstrated that employers at all organizational levels have a role to play and can address these factors by implementing organizational changes that include formal and informal policies, changes workplace culture, flexible work arrangements, and supportive programs (McGonagle, 2021). While the Centers for Disease Control and Prevention offers evidence-based CDPMPs, they can be hard to find and navigate by employers. Research shows that employers do an inadequate job of covering them as a benefit (Harris et al., 2008). This can be attributed to real and perceived individual and organizational barriers, as well as a lack of understanding from employers, as explained below. On the individual level, barriers include and concerns about confidentiality (Linnan et al., 1990), time commitment, convenience, cost of participation, and lack of awareness and social support (Yoon et al., 2022).

To overcome these barriers to successful implementation, we designed a program aimed at effective employer engagement strategies among organizations in Colorado to increase awareness and adoption of evidence-based CDPMPs, specifically the National Diabetes Prevention Program (National DPP), as a covered benefit. Our program conducted outreach through Health Links®, an established *Total Worker Health*® (TWH) intervention that has engaged organizations for over ten years to provide TWH assessment and advising (Tenney et al., 2019). The focus of engagement strategies was to address barriers to implementation by assisting employers to increase their awareness, coverage, and active promotion of these programs to at-risk employees. We designed activities that would inform and persuade employers across a range of industries to identify the benefits of both promoting and underwriting the costs of CDPMPs. Additionally, engagement strategies aimed to help employers understand each employee's risk of developing type 2 diabetes, recognize and address obstacles to program uptake, and provide guidance on supporting employees with chronic diseases.

This paper explores gaps and opportunities in employer uptake of CDPMPs by presenting findings of a program aimed at engaging employers to provide cover-

age and promote CDPMPs among Colorado businesses. The purpose is to reflect on the findings of an ongoing engagement and evaluation program and provide proven strategies for conducting workplace outreach and intervention delivery, specifically around chronic disease prevention. We provide detailed information on three organizational engagement strategies used for 349 organizations and provide data on levels of employer and employee engagement for three organizations that were successful in uptake. We explore how these organizations overcame barriers to implementation as well as how demographic differences may have affected implementation and employer engagement. We define engagement as employer awareness of CDPMP benefits; understanding the business case of CDPMPs; and taking steps to adopt, implement, and promote coverage of the evidence-based CDPMPs targeted to at-risk employees. This paper emphasizes the key roles and practices within organizations that are most common to successful implementation. Additionally, this paper highlights the importance of employer engagement to support and maintain CDPMP efforts and the significance of utilizing data to guide implementation.

Methods

We designed and implemented three primary engagement strategies specific to chronic disease prevention: (1) training and education, (2) providing evidence-based resources, and (3) advising. We developed these strategies to overcome the barriers to successful adoption and implementation evident in workplace interventions (McCoy et al., 2014; Linnan et al., 1990; Tenney et al., 2019). We identified our target audience by analyzing organizational responses to the Health Links Healthy Workplace Assessment® and recruited participants through a communications campaign, email marketing, and direct outreach. The Logic Model in Fig. 1 shows the dissemination and implementation (D&I) process of our intervention and helps define our intended

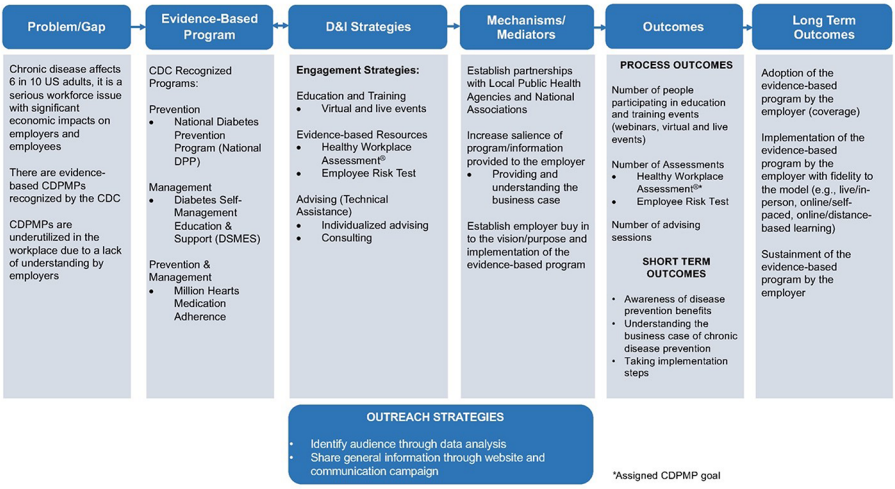

Fig. 1 Logic model showing the D&I process of employer engagement in CDPMP implementation

impact and goals. For example, one strategy was to provide education and training. We accomplished this through working with partners to increase reach. Outcomes included short-term outcomes such as participation, as well as longer-term outcomes (impacts), such as program adoption.

Engagement Strategy 1: Education and Training

Our education and training strategies were designed to raise awareness about the impact of chronic disease in the workplace, present the business case for covering the National DPP, and encourage further engagement with Health Links around CDPMPs. Education and training consisted of virtual and live events for representatives in organizations responsible for employee health and safety. Virtual events (i.e., webinars) were administered over Zoom and live events took place at the University of Colorado Anschutz Medical Campus in Aurora, Colorado. Both included presentations by local and national subject matter experts and professionals in the field. Topics included managing the risk and cost of prediabetes, chronic disease prevention and management in the workplace, the business case for chronic disease prevention, supporting employees with chronic disease, and Diabetes Self-Management and Education. Webinars were advertised to over 8,000 individuals within the Health Links network through email campaigns and social media (i.e., LinkedIn, Facebook, Twitter). Events were targeted to specific audiences who were invited to participate based on their roles within their organizations (i.e., human resources, wellness, safety), Health Links enrollment status, assigned Healthy Workplace Action Plan goals, information from past advising sessions, participation in webinars, and expressed interest through surveys. Virtual and live events were promoted through email campaigns, social media, and direct outreach. We offered continuing education credits for webinar attendees. Webinars, trainings, and events took place starting in June 2020 and occurred multiple times through August 2022.

Engagement Strategy 2: Evidence-Based Resources

Our evidence-based resources provided employers with data and guidance to help them overcome barriers to program implementation. We provided employers with an organizational assessment, the Healthy Workplace Assessment® and an online Employee Risk Test. The Healthy Workplace Assessment was developed by researchers at the Center for Health, Work & Environment at the Colorado School of Public Health as an evidence-based tool that benchmarks and tracks how organizations implement TWH across six benchmarks (Tenney et al., 2019). Questions focus on organizational support, assessments, health programs and policies, safety programs and policies, engagement, and evaluation. Specific questions about CDPMPs and organizational policies are contained within the health programs and policies section. Based on responses to these questions, organizations are assigned a CDPMP-specific goal on their Healthy Workplace Action Plan during advising, as an "indicator" for identifying organizations that received follow-up.

The Employee Risk Test was co-developed by Health Links and incentaHEALTH as a tool to gain a better understanding of the risk of type 2 diabetes among work-

ing adults (incentaHEALTH & Health Links, 2021). The screening questions for the test were derived from evidence-based diabetes risk tools from the American Diabetes Association (n.d) and the Centers for Disease Control and Prevention (n.d). Recruitment for users of this tool took place during advising sessions and through general outreach. Upon completion of the Employee Risk Test, employers were able to access data on the number of employees who screened at high risk for developing type 2 diabetes and the risk profile of their workforce. Employers who completed the Employee Risk Test were also provided with data about their specific worksite, and guidance on National DPP benefit design. Additional detail about the Employee Risk Test is provided in the following Results: Employee Engagement section. Furthermore, Health Links developed evidence-based chronic disease prevention and management resources (i.e., Blood Pressure Self-Monitoring, National DPP FAQ, Medication Adherence Guide for Employers). These resources were disseminated through email campaigns, social media, and during in-person events, and remain available to the public for free in the Health Links Resource Center.

Engagement Strategy 3: Advising

We developed a tailored advising model to provide employers with specific guidance about effective implementation of CDPMPs. The goals of advising were to assess the current landscape of CDPMPs with the employer, build the business case for covering National DPP, and work with the employer to choose the best National DPP option and pay for coverage of the program. Advising was conducted over Zoom with a Health Links advisor and representatives from participating organizations in attendance. Representatives included primarily included human resource professionals, and health, safety, and wellness specialists. The sessions ranged from 30 to 45 min and focused on providing guidance on the adoption and implementation of the National DPP as a covered health benefit for employees. During these sessions, participants reviewed their organization's goals for employee health and chronic disease prevention. They were counseled on different program options for CDPMPs and went through a process to build an action plan to set S.M.A.R.T. (Specific, Measurable, Achievable, Relevant, and Time-Bound) goals. Advising sessions with employers generally began with helping the organization better understand the risk profile of their organization, the barriers to implementation, and the potential costs associated with neglecting to address type 2 diabetes prevention among employees. Additionally, we assessed the medical plan coverage of the employer to determine if National DPP was already a covered benefit or if the organization would need to provide additional funds to cover the cost of the program. For organizations with medical plans that already covered the program, we worked with them to better understand how to communicate about the program to employees and encourage at-risk employees to enroll in the existing benefit. For organizations without coverage, we continued to discuss the risk profile of employees by working to distribute the Employee Risk Test and analyze and present results. We also discussed program delivery options (i.e., in-person, distance-based learning, virtual) and the benefits, constraints, and potential costs associated with each model.

Results

Results: Employer Engagement

We measured employer engagement activities across a range of process outcomes, as reflected in Table 1.

Engagement Strategy 1: Education and Training

Between 2018 and 2022 we held nine education and training events focused on diabetes awareness and chronic disease prevention and management in the workplace. There were 984 participants across all events with a steady increase in participation in virtual events over the years 2020–2022. Evaluations were only provided for three out of nine of the events and showed a high level of satisfaction in terms of relevance, organization, and content. Two out of three of the evaluations asked about overall quality and presented a mean rating of 4.7/5.0. Furthermore, these evaluations also asked about intent to change after attending the events and showed that 60% of respondents expressed an intent to change. Respondents expressed that they intended to make changes by sharing information with other members of the team, talking with leadership, and evaluating current policies and programs. Participants cited that they faced barriers including lack of authority to make change, low employee participation/engagement, and lack of time and financial resources. The third evaluation demonstrated similar results in terms of satisfaction but did not include any other information.

Engagement Strategy 2: Evidence-Based Resources

A total of 349 organizations completed the Healthy Workplace Assessment during this period. These organizations represented 160,813 employees across a range of industries. The Assessment identified areas of opportunity for employers to enhance their health promotion and workplace well-being initiatives including those around

Table 1 Employer engagement (2018–2023) table

Engagement Strategy	Process Outcomes			
	Number of Events	Number of participant (Individuals)	Number of organization (Employers)	Number of employees (from participating organizations)
Education and training (e.g., webinars, virtual and live events)	9	984	-	-
Healthy Workplace Assessment	-	-	349	160,813
National DPP Advising sessions with organizations	51	-	36	149,466
CDPMP Goal assigned on Healthy Workplace Action Plan	-	-	83	63,289
Employee Risk Test	-	1,071	33	-
National DPP Paid Coverage	-	-	3	3,370

CDPMPs. A total of 83 employers were assigned the CDPMP goal on their Healthy Workplace Action Plans. In addition, 1,071 individuals took the Employee Risk Test representing 33 unique employers and indicated that employees are interested in knowing their health status and willing to anonymously participate in individual risk assessments. Out of the 1,071 individuals, 252 were at high risk for prediabetes.

Engagement Strategy 3: Advising

We completed 51 advising sessions with 36 unique organizations representing 149,466 employees during this engagement period. The most common recommendations made during advising were: (1) review medical plan benefits (health insurance policy) to understand existing coverage or lack of coverage; (2) understand the risk profile of employees by reviewing existing healthcare claims data and disseminating the Employee Risk Test; (3) present findings of medical plan review and Employee Risk Test to executive leadership and benefits decision-makers; and (4) review National DPP options (in-person, distance-based learning, virtual). More information about the demographics of the participating businesses is included in the "Employee Engagement" section.

Our efforts resulted in three employers representing 3,370 employees providing paid coverage of the National DPP.

Finally, we examined the implementation trajectory for Organizations 1, 2, and 3. Figure 2 shows the specific pathways to National DPP coverage for Organizations 1, 2, and 3. All three organizations engaged in a similar trajectory. Education and training and completion of the Healthy Workplace Assessment were consistently the first steps, demonstrating that these two strategies are common starting places and should be prioritized at the beginning of the process. Education and training are effective for raising awareness and initiating interest in the topic as well as building knowledge and skills among professionals. Additionally, the Healthy Workplace Assessment is an effective tool for identifying areas of opportunity for employers to enhance their health promotion and workplace well-being initiatives including those around CDPMPs, and is a foundational step before advising and goal setting. Individualized engagement included participating in advising session(s) and having an organizational goal of preventing and managing chronic disease among employees on the Healthy Workplace Action Plan. Follow-up advising session(s) included analysis of the variety of National DPP options (in-person, distance-based learning, virtual) to determine the best fit for the organizations. The variety of National DPP options allowed the three employers to deploy programs that worked best for their populations depending on factors such as employee engagement and access to technology.

Results: Employee Engagement

Organization Characteristics: Demographics and Employee Risk Test

The three employers that elected to cover the cost of the National DPP express differences in employee demographics, industry, and modes of the National DPP delivery as reflected in Table 2. Organization 1 and Organization 3 are both in the health

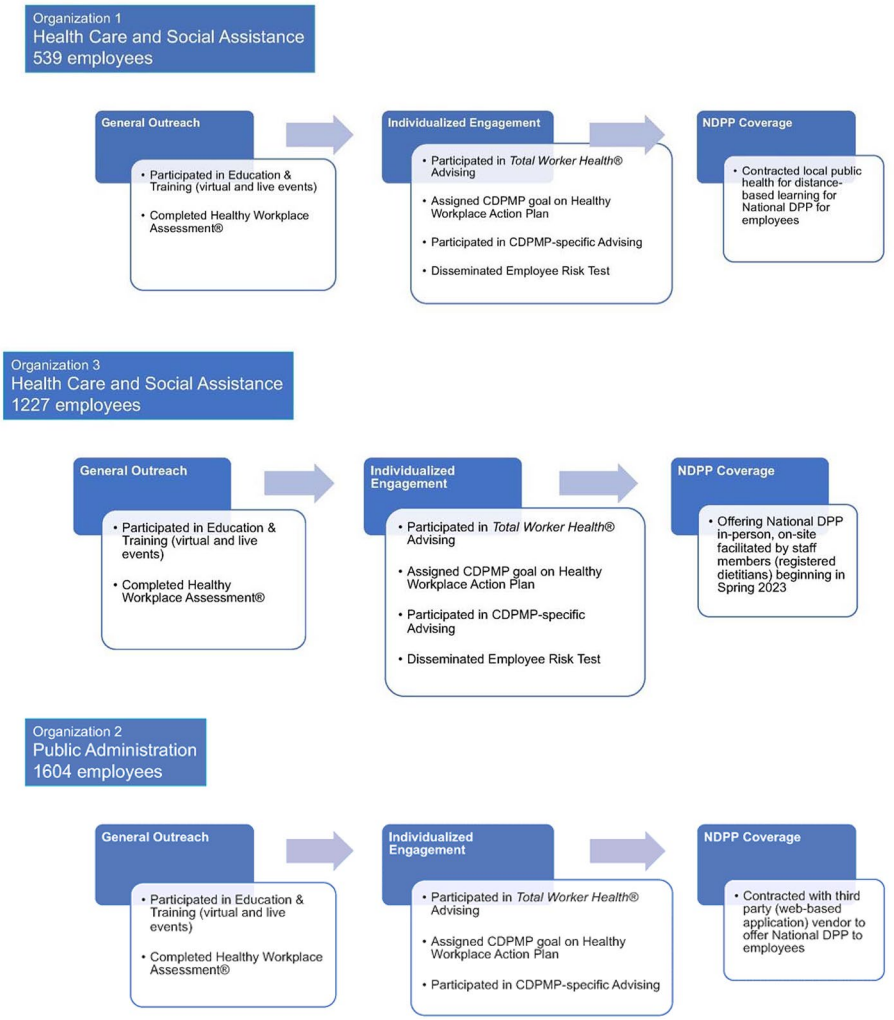

Fig. 2 Organizational engagement flow charts showing the specific pathway for organizations 1, 2 & 3 in achieving national DPP coverage; arrows indicating the direction of the pathway

care and social assistance industry, while Organization 2 is in the public administration (government sector) industry. All three organizations chose to implement the National DPP in different ways. Organization 1 offered a virtual, distance-based learning model through a local public health organization, while Organization 2 used a third-party for-profit vendor to deliver asynchronous, virtual content. Organization 3 used in-house subject matter experts (registered dietitians) to offer the program in person, on-site at the workplace. Data on the number of employees who completed the individual Employee Risk Test is only available for Organizations 1 and 3. Organization 1 had 16% of their employees complete the Employee Risk Test, while Organization 3 had a much higher completion rate of 73.5%.

Table 2 Organization demographic table

Industry	Organization 1	Organization 2	Organization 3
	Health Care and Social Assistance	Public Administration	Health Care and Social Assistance
Number of Employees	539	1604	1227
<21 years of age	1 (<1%)	228 (14%)	25 (2%)
21–29 years of age	123 (23%)	215 (13%)	258 (21%)
30–49 years of age	311 (58%)	627 (39%)	577 (47%)
50–65 years of age	86 (16%)	426 (27%)	306 (25%)
>65 years of age	17 (3%)	108 (7%)	61 (5%)
Female	417 (77%)	722 (45%)	920 (75%)
Male	122 (23%)	873 (54%)	307 (25%)
Non-Binary	0	9 (1%)	0
Number of Employees who completed the Employee Risk Test	87 (16%)	-	902 (73.5%)
National DPP Delivery Method	Virtual (Local Public Health)	Virtual (Third-Party Vendor)	In Person (In-House)

Data from the Employee Risk Test for two of the three organizations, both in the health care and social assistance industry is described in Table 3. Organizations 1 and 3 shared similar demographics. Both employed a majority of female employees (Organization 1 with 89%, Organization 3 with 73%), employees under 50 years of age (Organization 1 with 84%, Organization 3 with 68%), and a have similar family history of diabetes (Organization 1 with 24%, and Organization 3 with 26%). Additionally, both share a fairly similar BMI distribution among employees. High risk of developing type 2 diabetes is defined by a score of five or higher on the Employee Risk Test. Results show that Organization 1 had 17% of respondents classified as high-risk and Organization 3 had 23% of respondents classified as high-risk.

Discussion

There are common barriers to successful implementation of CDPMPs in workplaces among employers. Engagement strategies to overcome these barriers require effective education, data to justify the business case, and designing customized implementation for delivering programs that meet the needs of individual at-risk individuals. We demonstrated proven strategies for increasing awareness and adoption of evidence-based CDPMPs, specifically the National DPP as a covered benefit. Understanding barriers to implementation and focusing strategies on addressing specific barriers is crucial for successful implementation. Engagement strategies (education and

Table 3 Employee risk test demographic table by company

	Organization 1	Organization 3
Industry	Health Care and Social Assistance	Health Care and Social Assistance
Number of Employees who completed the Employee Risk Test	87	902
Age		
< 40 years of age	49 (56%)	381 (42%)
40–49 years of age	24 (28%)	235 (26%)
50–59 years of age	10 (11%)	173 (19%)
> 59 years of age	4 (5%)	113 (13%)
Sex Assigned at Birth		
Female	77 (89%)	654 (73%)
Male	10 (11%)	248 (27%)
Family History of Diabetes		
Yes	21 (24%)	239 (26%)
No	66 (76%)	663 (74%)
History of High Blood Pressure		
Yes	9 (10%)	147 (16%)
No	78 (90%)	755 (84%)
Physically Active		
Yes	23 (26%)	131 (15%)
No	64 (74%)	771 (85%)
BMI Distribution		
Underweight (BMI ≤ 18.5%)	4 (5%)	0 (0%)
Healthy Weight (BMI 18.5-24.9%)	33 (38%)	200 (22%)
Overweight (BMI 25-29.9%)	31 (36%)	401 (44%)
Obese I (BMI 30-34.9%)	6 (7%)	223 (25%)
Obese II (BMI 35-39.9%)	4 (5%)	0 (0%)
Obese III (BMI ≥ 40%)	9 (10%)	77 (9%)
Employee Risk Test Score		
0	14 (16%)	67 (7%)
1	20 (23%)	138 (15%)
2	23 (26%)	157 (17%)
3	10 (11%)	171 (19%)
4	5 (6%)	161 (18%)
5	10 (11%)	108 (12%)
6	0 (0%)	62 (7%)
7	4 (5%)	30 (3%)
8	1 (1%)	6 (1%)
9	0 (0%)	9 (1%)
10	0 (0%)	10 (1%)
Number of Employees who screened at High Risk	15 (17%)	208 (23%)

training, evidence-based resources, and advising) were all shown to help employers understand each employee's risk of developing diabetes, recognize associated costs, build the business case, increase awareness, and identify obstacles to employee engagement. Through advising, we identified that employers lack awareness of benefits, knowledge and skills to implement, resources, and awareness of risk. Education and training were effective in setting the stage and encouraging employers to take further action surrounding CDPMPs, by scheduling advising and utilizing evidence-based resources. Advising was not only effective in identifying barriers, but also in addressing lack of knowledge and skills to implement and lack of resources. Through advising, we assisted employers in reviewing medical plan benefits and health insurance policies, understanding existing coverage or lack of coverage, evaluating program options, and presenting outreach and communications strategies. Additionally, advising was useful in identifying necessary resources, connecting employers to vendors and local resources, and making appropriate referrals. To address lack of awareness of risk, dissemination, and analysis of the Employee Risk Test was a useful tool. Other barriers such as time commitment and employee participation and engagement were also addressed through advising but we have found are more challenging and time-consuming since they are dependent on individual factors that are often beyond the control of the employer.

Our findings indicate that larger organizations might be better equipped to cover the National DPP as a covered benefit. However, based on data from the Healthy Workplace Assessment and advising sessions, we have seen that organizations of all sizes have employees who are at risk of developing type 2 diabetes and are interested in implementation, but face different barriers. We found that smaller organizations struggled more with lack of employee engagement and time commitment, suggesting that these organizations may not have policies conducive to chronic disease prevention and management. We also found that smaller businesses struggled more with low perceived risk and relatability, indicating that they felt that their employees were all relatively healthy and did not need these types of programs. This emphasizes the benefit of providing both education and training on supporting employees with chronic disease, as well as utilizing the Employee Risk Test to inform employers of the number of employees in their organization who are at risk for developing type 2 diabetes. Additionally, we found that organizations in the health care and social assistance, and public administration industries may be best suited to cover the cost of the diabetes prevention program for employees. This may be directly related to the fact that these organizations list the health and well-being of customers or the community as part of their organizational core values. Employer engagement strategies assist organizations in deciding to offer, promote, and cover the cost of CDPMPs and we have seen that the more engagement strategies used by the employer, the more likely it is for them to cover the cost of CDPMPs.

This study also clarified the key roles and practices within an organization that are most common to successful implementation. We found that it was necessary to have employer representatives who are dedicated to achieving TWH in their organizations. Organizations 1, 2, and 3 had all participated in Health Links for multiple years, working towards National DPP implementation. These employer representatives attended multiple advising sessions per year and consistently participated in educa-

tion and training events, increasing their dose of technical assistance and guidance for successful implementation. This shows that both engagement and implementation can take years and that dedication, persistence, and continuous outreach are keys to engaging employers. The type of representative's role in their organization can also make a difference in leadership buy-in and program implementation. Some roles such as human resources have been shown to have more influence when it comes to implementing prevention programs and policies (Harris et al., 2008) than other roles such as safety professionals, who often have limited decision-making authority (Madigan et al., 2022). Additionally, some organizations require higher levels of leadership support in implementing prevention programs and policies because of how authority and workplace health and safety operate. We also found that when there are dedicated health and wellness staff members who are National DPP certified trainers, such as dieticians or registered nurses, adoption and implementation are more straightforward than when an organization must outsource the program. Practices that we found to be common to implementation were capacity (e.g. dedicated staff, committees, budgets), leadership commitment, resources, assessment, employee participation, communication, and education and training.

The employee engagement results highlight the importance of using data to guide successful implementation of the National DPP as a covered benefit and implement organizational policies and programs that focus on chronic disease prevention and management. The organizational results from utilizing Health Links' evidence-based resources (Healthy Workplace Assessment, Employee Risk Test) helped with setting goals on improving current programs and practices around chronic disease prevention and management, addressing barriers to implementation, and providing crucial data to make the business case for investing resources into National DPP coverage. Costs of the National DPP range from $475-$725 per employee/per year while the cost of an employee with type 2 diabetes averages $16,750 per year (Centers for Disease Control and Prevention, 2022d). With this information, organizations were able to have deeper insight and assess the potential costs and benefits of implementing a diabetes prevention program. It is also important to note that uptake of engagement strategies may differ among organizations. For example, there was a significant difference in utilization of the Employee Risk Test between Organization 1 (16% completion) and Organization 3 (73.5% completion). This difference may be related to how the engagement strategy was utilized, in this instance through the delivery of the Employee Risk Test. Organization 1 used digital communication (e.g. email) to disseminate the Employee Risk Test to employees through a website link and promoted taking the online test over the course of a few weeks. Organization 3 delivered the Employee Risk Test in person and on paper during a two-day employee health fair, where free health screenings were being conducted. As part of the free health screening process, employees were provided with their results. Organization 1 used a less intentional and more passive communication strategy by solely sharing the test electronically and asking employees to complete it on their own time.

Employers face additional considerations based on the demographics of their employees, including age and gender. Understanding age demographics is important when developing diabetes prevention programs, as different age groups have different risk factors and require different interventions, and women have different risk

factors and health needs compared to men (Choi & Shi, 2001). By utilizing demographic data, employers can make data-driven decisions while discussing program delivery options. Examining the demographic factors of who is at risk of developing type 2 diabetes is also critical to the promotion and uptake of diabetes prevention programs along with determining the effectiveness of engagement strategies and identifying areas for improvement. Other information from the Employee Risk Test, such as the level of physical activity presents an opportunity for further guidance and recommendations on improving job design to promote physical activity during the workday. Organizations with a predominately overweight and non-physically active workforce, like the ones he have studied, will likely have more at-risk employees. Having a predominately non-physically active workforce indicates that workplace sedentary behavior is likely present, considering the amount of time an individual spends at work. Understanding Employee Risk Test demographics is necessary for building awareness of risk factors. Future research is needed to understand how to better target workplace interventions to reach and engage those in greatest need.

Strengths & Limitations

A strength of our approach is that we utilized Health Links, our program that operates as a trusted "business influencer" in engaging employers. While some organizations may be wary about working with local/state/federal governments or commercial vendors, Health Links has a proven track record in navigating this concern and establishing strong trust among the business community, thus leading to more successful engagement with employers. Another major strength of this study is the active participation of employers in ongoing advising sessions, through which we could collect information about facilitators and barriers, the specific needs of the organization, and any changes over time. Additionally, all three organizations have been members of Health Links since the program began in 2018, which has given us an advantage in knowing the challenges and barriers these organizations have faced in implementing workplace policies and programs.

Our case study presents several limitations related to incomplete evaluation data due to the nature of our programming. Only three out of nine events had a post-evaluation survey, allowing us to only use limited data in evaluating the effectiveness of education and training. Due to the size and nature of some events, post-evaluations were not available to participants. Based on the positive feedback from the evaluations conducted, along with education and training consistently acting as a first step in implementing the National DPP, we can say that it is an effective strategy for employer engagement and will continue to be promoted as an engagement strategy. Data was self-reported for the Healthy Workplace Assessment and Employee Risk Test presenting another limitation to the data analyzed in this report. We cannot link individuals who completed the Employee Risk Test to participation in the National DPP meaning that once the program is implemented and begins, we may or may not receive employee participation results. Furthermore, while we were able to evaluate the effectiveness of engagement strategies based on employer engagement and National DPP implementation, we have less information about how certain aspects

of organizational change, such as flexible work arrangements and workplace culture impact employee engagement. A final limitation of this work is that we are unable to differentiate between what specific factors and characteristics led the three organizations to engage while the others that participated in education and training, advising sessions, and utilized evidence-based resources did not.

Future Directions

Future directions include the need to design and implement engagement strategies for employers that assist in chronic disease prevention and management. In the first five years of this project, we cast a wide net to all organizations in every industry to better understand employer engagement in CDPMPs. In the future, we aim to more narrowly define the types of organizations to target with our engagement strategy based on organizational readiness for addressing chronic disease prevention and employee demographics. We have also translated resources into Spanish and aim to provide education and training to Spanish-speaking workers and business owners. Helping organizations understand, adopt, implement, and promote CDPMPs as a covered benefit is ongoing work that will continue. Gaining a deeper understanding of barriers in small businesses (under 500 employees) and modifying engagement strategies and recomendations is a next step in furthering our work in reaching employers in Colorado. Furthermore, future evaluation of engagement strategies should conduct a cost-benefit analysis to understand the cost/benefit ratio and return on investment of these engagement strategies to evaluate which are most cost-effective.

Conclusion

This paper highlights the importance of designing engagement strategies for successful implementation of CDPMPs, specifically the National DPP, among employers. A summary of key recommendations that we found most valuable for successful CDPMP uptake are listed in Table 4. Addressing individual and organizational barriers is crucial to successfully implementing and promoting these programs, and effective and persistent outreach and engagement can lead to employer engagement and successful program implementation.

Table 4 Key recommendations

Engagement Strategy	Recommendation	Desired Outcome
Education and training	• Conduct direct outreach to a focused audience of employers. • Use clear and consistent messaging.	Build relationships with employers based on trust.
Evidence-based resources	• Disseminate the Employee Risk Test in-person, on paper at an annual event that offers free health screenings for all employees. • Analyze data to present the business case for the National DPP to decision-makers.	Increase employee awareness of risk and direct them to program options, including evidence-based CDPMPs, such as the National DPP. Successful adoption and implementation of the National DPP.
Advising	• Utilize the Healthy Workplace Assessment® to determine organizational commitment to chronic disease prevention and management. • Assist employers to review medical plan benefits with a specific focus on coverage for CDPMPs.	Increase understanding of how CDPMPs contribute to worker health, safety, and well-being applying a *Total Worker Health*® approach. Increase utilization of covered CDPMPs.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s41542-024-00185-z.

Acknowledgements We would like to thank our partners from Colorado Department of Public Health & Environment and National Association of Chronic Disease Directors who supported funding, data collection, and interpretation and implementation of findings; specifically, Becky DiOrio, Monica Thompson, and Sara Hanlon.

Author Contribution **SD.L**: Methodology, Writing- original draft preparation, Project administration, Investigation, Resources, Visualization; **DS**: Conceptualization, Methodology, Writing-original draft preparation, Investigation, Project administration, Funding acquisition; **CE.B**: Methodology, Writing- review & editing; **LT**: Conceptualization, Writing- review & editing, Funding acquisition, Supervision.

Funding This program is supported by the Grant or Cooperative Agreement Number, U19OH011227, funded by the Centers for Disease Control and Prevention. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement by CDC/HHS, or the U.S. Government.

Funders
Centers for Disease Control and Prevention.
Colorado Department of Public Health & Environment.
National Association of Chronic Disease Directors.

Declarations

Competing Interests The authors have no relevant financial or non-financial interests to disclose.

References

American Diabetes Association (n.d.). *Diabetes Risk Test*. Retrieved April 28 from https://diabetes.org/diabetes-risk-test.

American Diabetes Association. (2018). Economic costs of diabetes in the U.S. in 2017. *Diabetes Care*, *41*(5), 917–928. https://doi.org/10.2337/dci18-0007

Centers for Disease Control and Prevention (n.d.). *Risk Test*. Retrieved April 28 from https://www.cdc.gov/prediabetes/takethetest/.

Centers for Disease Control and Prevention (2022d). December 27). *How Type 2 Diabetes Affects Your Workforce*. Retrieved April 27 from https://www.cdc.gov/diabetes/prevention/how-type2-affects-workforce.htm#print.

Centers for Disease Control and Prevention (2022c). June 29). *National Diabetes Statistics Report*. Retrieved February 22, 2023 from https://www.cdc.gov/diabetes/data/statistics-report/index.html.

Centers for Disease Control and Prevention (2022a). *Prevent Diabetes Complications*. Retrieved December 17, 2022 from https://www.cdc.gov/diabetes/managing/problems.html.

Centers for Disease Control and Prevention (2016). *Workplace Health Model*. Retrieved February 8, 2023 from https://www.cdc.gov/workplacehealthpromotion/model/index.html.

Choi, B. C. K., & Shi, F. (2001). Risk factors for diabetes mellitus by age and sex: Results of the National Population Health Survey. *Diabetologia*, *44*(10), 1221–1231. https://doi.org/10.1007/s001250100648.

Harris, J. R., Cross, J., Hannon, P. A., Mahoney, E., & Ross-Viles, S. (2008). Employer adoption of evidence-based chronic disease prevention practices: A pilot study. *Preventing Chronic Disease*, *5*(3), A92. http://www.cdc.gov/pcd/issues/2008/jul/07_0070.htm.

incentaHEALTH, & Links, H. (2021). *Employee Risk Test*. incentaHEALTH. Retrieved April 28 from https://healthlinks.incentahealth.com/RiskTest.html.

Linnan, L. A., Harden, E. A., Bucknam, L., & Carleton, R. A. (1990). Marketing cardiovascular disease risk reduction programs at the workplace. The Pawtucket Heart Health Program Experience. *American Association of Occupational Health Nurses*, *38*(9), 409–418. https://www.ncbi.nlm.nih.gov/pubmed/2397012.

Madigan, C., Way, K. A., Johnstone, K., & Capra, M. (2022). Differences between managers' and safety professionals' perceptions of upwards influence attempts within safety practice. *Journal of Safety Research*, *81*, 203–215. https://doi.org/10.1016/j.jsr.2022.02.012.

Mazzucca, S., Arredondo, E. M., Hoelscher, D. M., Haire-Joshu, D., Tabak, R. G., Kumanyika, S. K., & Brownson, R. C. (2021). Expanding implementation research to Prevent Chronic diseases in Community settings. *Annual Review of Public Health*, *42*(1), 135–158. https://doi.org/10.1146/annurev-publhealth-090419-102547.

McCoy, K., Stinson, K., Scott, K., Tenney, L., & Newman, L. S. (2014). Health Promotion in Small Business: A systematic review of factors influencing adoption and effectiveness of Worksite Wellness Programs. *Journal of Occupational and Environmental Medicine*, *56*(6), 579–587. https://doi.org/10.1097/JOM.0000000000000171.

McGonagle, A. (2021, January 19). *How Organizations Can Support Employees with Chronic Health Conditions*. Harvard Business Review. Retrieved August 17, 2022 from https://hbr.org/2021/01/how-organizations-can-support-employees-with-chronic-health-conditions.

Sedani, A., Stover, D., Coyle, B., & Wani, R. J. (2019). Assessing Workplace Health and Safety Strategies, Trends, and barriers through a Statewide Worksite Survey. *International Journal of Environmental Research and Public Health*, *16*(14), 2475. https://doi.org/10.3390/ijerph16142475.

Shockey, T. M., Tsai, R. J., & Cho, P. (2021). Prevalence of diagnosed diabetes among employed us adults by demographic characteristics and occupation, 36 states, 2014 to 2018. *Journal of Occupational and Environmental Medicine*, *63*(4), 302–310. https://doi.org/10.1097/JOM.0000000000002117.

Tenney, L., Fan, W., Dally, M., Scott, J., Haan, M., Rivera, K., Newman, M., & Newman, L. S. (2019). Health Links™ Assessment of Total Worker Health® practices as indicators of Organizational Behavior in Small Business. *Journal of Occupational and Environmental Medicine*, *61*(8), 623–634. https://doi.org/10.1097/JOM.0000000000001623.

Upsher, R., Noori, Y., Kuriakose, L., Vassiliadou, I., Winkley, K., & Ismail, K. (2022). Needs, concerns and self-management experiences of people with type 2 diabetes during the COVID-19 pandemic: A qualitative study. *Diabetic Medicine*, *39*(8), e14883. https://doi.org/10.1111/dme.14883. -n/a.

Xie, Y., & Al-Aly, Z. (2022). Risks and burdens of incident diabetes in long COVID: A cohort study. *The Lancet Diabetes & Endocrinology*, *10*(5), 311–321. https://doi.org/10.1016/S2213-8587(22)00044-4.

Yoon, S., Wee, S., Loh, D. H. F., Bee, Y. M., & Thumboo, J. (2022). Facilitators and barriers to uptake of community-based diabetes prevention program among multi-ethnic Asian patients with pre-diabetes. *Frontiers in Endocrinology (Lausanne)*, *13*, 816385–816385. https://doi.org/10.3389/fendo.2022.816385.

Zhou, X., Siegel, K. R., Ng, B. P., Jawanda, S., Proia, K. K., Zhang, X., Albright, A. L., & Zhang, P. (2020). Cost-effectiveness of diabetes prevention interventions targeting high-risk individuals and whole populations: A systematic review. *Diabetes Care*, *43*(7), 1593–1616. https://doi.org/10.2337/dci20-0018.