



## Original Article

# Living Independent From Tobacco reduces cigarette smoking and improves general health status among long-term tobacco users with disabilities



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## ARTICLE INFO

## Article history:

Received 2 August 2019

Received in revised form

12 November 2019

Accepted 9 December 2019

## Keywords:

Living independent from tobacco

People with disabilities

Tobacco reduction

General health status

Long-term tobacco users

## ABSTRACT

**Background:** People with disabilities disproportionately use tobacco and suffer associated negative health consequences. Research is needed to explore tobacco cessation programming for people with disabilities to counter these health disparities.

**Objective:** We evaluated the impact of *Living Independent From Tobacco* on tobacco use, knowledge and attitudes about tobacco use, coping skills, and perceived health status among people with disabilities. We also assessed participants' subjective impressions at post-test.

**Methods:** *Living Independent From Tobacco* was evaluated via train the trainer model at three Midwestern sites serving people with disabilities. Outcomes were assessed at four time points: pre- and post-test ( $n = 30$ ), and again at 1-month ( $n = 26$ ) and 6-months ( $n = 13$ ).

**Results:** Long-term tobacco users with disabilities significantly reduced tobacco use from pre-test to post-test ( $p = 0.003$ ), and, compared to baseline, this reduction continued to be significant 1-month after the intervention ( $p = 0.02$ ). From pre-test to post-test, perceived health status significantly improved ( $p = 0.0001$ ). No significant changes were observed across time points for knowledge and attitudes about tobacco use nor for coping skills. Qualitative data revealed the importance of coping skills to mitigate the negative effects of nicotine withdrawal. Peer accountability was also noted as an important source of motivation for tobacco cessation.

**Conclusions:** Data from the present study provide evidence for the short-term effectiveness of *Living Independent From Tobacco* to reduce tobacco use and improve health status among people with disabilities. Qualitative data revealed the importance of coping skills and peer accountability to support tobacco cessation. Implications for tobacco cessation programming for people with disabilities are discussed.

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## Introduction

Contributing to billions of dollars of medical expenses and poor workplace productivity,<sup>1,2</sup> tobacco use remains the single most preventable cause of death in the United States.<sup>1</sup> Worldwide, tobacco use causes over 7 million deaths each year, and in the United States alone nearly 500,000 deaths are attributed to the health

consequences of cigarette smoking.<sup>1</sup> The health consequences of tobacco use disproportionately impact marginalized populations such as people with disabilities (PWD).<sup>3</sup> PWD are more likely to use tobacco products and suffer associated chronic health conditions than people without disabilities.<sup>3</sup> When PWD seek tobacco cessation programming, they are met with inaccessible resources and interventions designed to teach important coping skills to mitigate the negative effects of nicotine withdrawal.<sup>4</sup> Indeed, researchers have hypothesized that this absence of accessible tobacco cessation programming contributes to tobacco-related health disparities among PWD.<sup>5</sup>

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Pomeranz and colleagues (2014) attempted to address this absence of accessible tobacco cessation programming with the development of *Living Independent From Tobacco* (LIFT). LIFT is an evidence-based tobacco cessation intervention developed for PWD by PWD and disability and health experts.<sup>5</sup> LIFT teaches participants about the negative health impacts of tobacco use and the short-term and long-term benefits of tobacco cessation.<sup>5</sup> The LIFT intervention uses a behavioral counseling approach to teach coping skills to mitigate the negative effects of nicotine withdrawal.<sup>5</sup> Participants learn about the addictive properties of nicotine in tobacco products and are encouraged to supplement the LIFT intervention with nicotine replacement therapy to support the quit process.<sup>5</sup> The creators of LIFT found that coupling the behavioral counseling approach with nicotine replacement therapy was effective in reducing tobacco use or quitting altogether.<sup>5</sup> However, few studies have replicated these findings.

Havercamp and colleagues (2019) implemented a pilot study of the LIFT intervention to dyads of PWD and their care providers to determine whether LIFT could be offered with fidelity to dyads and if the intervention was effective in reducing tobacco use.<sup>6</sup> Preliminary data revealed that participants reduced tobacco use by approximately 35% at post-test, and these effects strengthened 6-months after the intervention with a 50% reduction in tobacco use from baseline.<sup>6</sup> An increase in coping skills to mitigate the negative effects of nicotine withdrawal was found at post-test; however, these effects were mixed at 1-month and 6-month follow-up.<sup>6</sup> In a similar vein, King and colleagues (2016) evaluated the feasibility, acceptability, and potential effectiveness of LIFT in a small sample of tobacco users with disabilities, identifying a high degree of satisfaction with the intervention and preliminary evidence of an association between LIFT and tobacco cessation among PWD (four participants self-reported abstinence from tobacco products 6-months after the intervention). Similar to the findings of Havercamp and colleagues, participants identified social support as an important component underlying success with the LIFT intervention.<sup>7</sup> These pilot studies were important and innovative but limited by small sample sizes, which prevented robust statistical analyses.<sup>6,7</sup> Research is needed to establish the effectiveness of LIFT in real world conditions and with larger samples.

### *The present study*

This study was designed to assess the impact of the LIFT curriculum in real-world settings. We used a train-the-trainer model where educators received LIFT training and subsequently offered LIFT to PWD. This study evaluated participants on the following four outcomes: 1) tobacco use; 2) knowledge and attitudes about tobacco use; 3) coping skills to manage nicotine withdrawal; and 4) perceived health status. Based on preliminary research on LIFT with PWD,<sup>5-7</sup> we hypothesized that participants would significantly reduce tobacco use and show improved knowledge and attitudes about tobacco use, coping skills, and perceived health status immediately after LIFT. What was less clear from previous research was the long term impact of the LIFT intervention. To expand on this research, we measured outcomes at pre-test, post-test, 1-month, and 6-month time points.

## Methods

### *Participants*

Participants were recruited online and through disability service provider networks in three medium-sized cities in Ohio. Participants met the following eight inclusion criteria: 1) 18 years of age or older; 2) have a disability; 3) able to speak and understand

English; 4) current tobacco users; 5) able to read and write; 6) willing and able to provide informed consent; 7) willing and able to participate in the LIFT intervention twice weekly for four weeks, and in 1-month and 6-month follow-up evaluations; and 8) able to breathe into a CO monitor. For the present study, disability was defined as a state of impairment(s), physical limitation(s), and/or participation limitation(s) that consist of physical, mental, and/or behavioral health limitations.<sup>8</sup> All participants agreed to limit their involvement in tobacco cessation interventions to LIFT for the duration of the study.

### *Measures*

***Living Independent From Tobacco (LIFT) Survey.*** LIFT surveys were conducted at pre-test, post-test, 1-month, and 6-month follow-up time points to assess improvement in tobacco use behaviors, knowledge and attitudes, coping skills, perceived health status, and barriers related to tobacco cessation.<sup>5</sup> At each time point, 54 items were administered to participants: 9 demographic items, 20 items assessing general health status and general history of tobacco use, 5 items assessing awareness of the harms of tobacco use (e.g., "How much do you think people harm themselves when they smoke cigarettes some days but not every day?"), 10 items assessing attitudes and beliefs about tobacco use (e.g., "Does smoking help you reduce stress?"), and 10 items assessing coping strategies related to managing nicotine withdrawal (e.g., "How comfortable are you using a healthy substitute to cope with a nicotine craving?").<sup>5</sup> At post-test, 1-month, and 6-month time points, 11 items were added to further assess barriers related to smoking cessation. These items were rated on a 1-to-5 Likert scale. Depending on the nature of the item, decreased or increased scores could have been indicative of improvement.

***Semi-Structured Interview.*** At post-test, a semi-structured interview was administered, including a series of open-ended questions to assess the overall impressions of the LIFT intervention such as satisfaction and helpfulness of the program to reduce/quit tobacco use and strengths and weaknesses of the intervention. A trained researcher followed a semi-structured interview guide, allowing for rephrasing and use of accessible language to accommodate participants' knowledge basis and to allow the researcher to follow the participants' lead throughout the interview.

***Carbon Monoxide (CO) Breath Tests.*** CO breath tests assessed tobacco use at pre-test, post-test, 1-month, and 6-month follow-up. The CO breath test is a validated, biochemical measure of CO in the blood, establishing a link between smoking behavior and the body.<sup>9-12</sup> The CO breath test is a tool used to verify self-reported tobacco use and abstinence.<sup>9-12</sup> A trained researcher instructed each participant to inhale and exhale into the CO monitor.

### *Procedure*

This study was approved by our university's Institutional Review Board, and written informed consent was obtained from all participants. Certified LIFT instructors taught each of the LIFT classes. Instructors were trained through LIFT Train the Trainer workshops conducted by study personnel who was a LIFT master trainer. One instructor received one-on-one instruction from the LIFT master trainer for scheduling reasons. Once certified, LIFT instructors taught classes in three different cities in Ohio. Participants were compensated \$30 for completing the LIFT program and pre-post evaluation, \$10 for completing the 1-month evaluation, and \$10 for completing the 6-month evaluation.

***Living Independent From Tobacco Intervention.*** LIFT is a tobacco cessation program adapted for PWD. The LIFT curriculum is an 8-session program offered over 4 weeks (2 sessions per week).<sup>5</sup>

The curriculum embodies a behavioral counseling approach of offering peer and community support and health education on the benefits of tobacco cessation and methods of managing cravings and lifestyles changes. Support is provided by LIFT trainers and peers in the class. Classes consist of 10–12 participants, and addresses participants' knowledge regarding the harmful effects of smoking, attitudes and self-efficacy for cessation, and identification of strategies for achieving and maintaining cessation. Nicotine replacement therapy (NRT) is discussed with and provided to participants.

### Data analysis

Quantitative data were analyzed using IBM SPSS Statistics 25. Descriptive statistics were calculated for variables as applicable, including mean, standard deviations, and ranges. Paired sample t-tests were used to test significance and the significance level was set as 0.05. Effect size was calculated using Cohen's *d* to determine the size of the difference between the mean scores at baseline and other time points. The customary threshold values for small, medium, and large effect sizes was used, 0.20, 0.50, and 0.80, respectively. Interview data were recorded and transcribed. Transcriptions were reviewed by the evaluator and summarized to provide additional insights to supplement the quantitative findings.

### Results

A total of 30 PWD were recruited and retained through pre-test, LIFT intervention, and post-test. Although no participants dropped out during the LIFT intervention, 13 participants were lost between recruitment and pre-test, 4 participants were lost at the 1-month follow-up, and an additional 13 were lost at the 6-month time point. Reasons for participant attrition were not related to the study nor LIFT intervention, rather included moving out of the area, health issues, and issues with the criminal justice system. Participants ranged in age from 33 to 82 years (average 54.13 years) and had smoked for an average of 33.5 years. See Table 1 for participant demographics, disability status, and total years as tobacco users.

**Tobacco Use.** After the LIFT intervention, mean CO levels significantly decreased by nearly 50% ( $p = 0.003$ ). This difference represented a moderate effect size ( $d = 0.74$ ). A significant reduction from baseline was also observed at 1-month follow-up ( $p = 0.02$ ) with a moderate effect size ( $d = 0.58$ ). Though the mean CO level increased from post-test to 1-month follow-up, the 1-month mean CO level was still significantly lower than baseline. Although 4 participants were lost at the 1-month follow-up, the remaining 26 participants had a baseline mean CO level similar to the entire sample of 30 ppm. Fifty-seven percent of participants (17 out of 30) were not able to be reached at 6-month follow-up. The remaining group of 13 participants did not evidence significant difference ( $p = 0.718$ ;  $d = 0.12$ ) between their baseline and 6-month follow-up CO levels. See Table 2 for a summary of CO level findings.

**Knowledge and Attitudes About Tobacco Use.** Participants were surveyed about their knowledge and attitudes about tobacco use at pre-, post-test, 1-month, and 6-month time points. Overall, limited significant differences were observed between baseline and post-test on these variables. The only significant finding that indicated a small change in participant attitudes towards smoking after the LIFT intervention was that participant attitudes shifted from "not sure" if smoking helps reduce stress at baseline to "disagreeing" that smoking helps reduce stress at post-test ( $p = 0.014$ ), with a small effect size ( $d = 0.41$ ). Because of null findings, significance and effect sizes are not reported for 1-month or 6-month time

**Table 1**  
Participant demographics, disability status, and total years as tobacco users.

Variable	n	Range	Mean	Standard Deviation
Age (years)	30	33–82	54.13	11.69
Total Years Smoked (years)	28	1.67–74	33.5	17.22
Variable	n	Frequency	Percent	
<u>Gender</u>	30			
Male		15		50%
Female		15		50%
<u>Race</u>	29			
Caucasian		19		65.5%
African American		7		24.1%
More than one race		3		10.3%
<u>Ethnicity</u>	26			
Hispanic		4		15.4%
Non-Hispanic		22		84.6%
<u>Disability Status</u>	30			
Vision		3		10%
Hearing		4		13.3%
Mobility		6		20%
Intellectual		2		6.7%
Speech		2		6.7%
Seizure disorder		4		13.3%
Other <sup>a</sup>		19		63.3%
Does not have a disability <sup>b</sup>		1		3.3%

<sup>a</sup> Other includes: COPD/heart disease, physical, mental disorder, bipolar disorder, PTSD, anxiety, panic attacks, major depressive disorder.

<sup>b</sup> One participant reported having a disability at recruitment but denied disability at baseline. This individual was receiving state disability services.

points. The lack of significant change may be partially attributed to relatively high knowledge and attitudes at baseline (see Discussion). Items for knowledge and attitudes about tobacco use are presented in Table 3.

**Coping Strategies.** Participants reported strategies that can be used to resist using tobacco and their level of comfort in using the strategies. Participants ranked each strategy on a Likert scale ranging from 1 (not at all comfortable) to 5 (extremely comfortable). No significant differences were observed from pre- to post-test. On average at both pre- and post-test, participants reported feeling moderately comfortable to very comfortable with each coping strategy. Significance and effect size testing was not conducted at 1-month or 6-month time points due to lack of significance at post-test and thus any new significant findings at these time points could not be attributed to the LIFT intervention. See Table 4 for a summary of coping strategy findings from pre to post.

**Perceived Health Status.** Participants rated their perceived overall health status on a 5-item Likert scale ranging from poor to excellent. In comparison to baseline, participants significantly increased ( $p = 0.0001$ ) their perceived health status from "fair" to "good" on average immediately after the LIFT intervention. No significant difference from baseline were observed at 1-month or 6-month follow-up.

Participants also rated their perceived mental health status on a 5-item Likert scale ranging from poor to excellent. No significant differences from baseline were observed at post, 1-month, or 6 months after the LIFT intervention. However, when analyzing the subgroup of eight participants who identified as having a mental health disorder, these participants significantly increased ( $p = 0.010$ ) their perceived mental health status from "fair" to "very good" on average in comparison to baseline after the LIFT intervention.

**Interview Feedback.** Participants shared their insights about the LIFT program during semi-structured interviews immediately after the intervention. All participants indicated that they had either reduced or had quit smoking since the LIFT program ended. Two individuals specifically commented that the LIFT program gave

**Table 2**  
Carbon monoxide levels at baseline, post-test, 1-month, and 6-month time points.

	Baseline (n = 30)	Post-test (n = 30)	1-month (n = 26)	6-month (n = 13)
<b>Mean (ppm)</b>	35.47	17.77	21.19 <sup>a</sup>	29.15 <sup>b</sup>
<b>Standard Deviation</b>	30.28	15.11	15.89	23.26
<b>Range (ppm)</b>	0–121	1–64	0–57	0–84
<b>p-value</b>	n/a	0.003	0.02	0.718
<b>Cohen's d</b>	n/a	0.74	0.58	0.12

<sup>a</sup> Baseline mean (pre-test) CO ppm for these 26 participants: 35.08.

<sup>b</sup> Baseline mean (pre-test) CO ppm for these 13 participants: 31.77.

them confidence to quit smoking. At the time of the interview, five participants reported that they had quit smoking without relapse since the LIFT program ended. All these participants reported quitting for a least one week with one participant stating they had not smoked in 10 days as of the interview. Participants shared beneficial aspects of the LIFT program. Coping strategies were mentioned most frequently. Participants specifically mentioned meditation and breathing exercises as helping them resist the urge to smoke. Participants also spoke about the importance of peer support and accountability. One participant stated:

"I liked that everybody together here has gotten in the right area to quit smoking, cus when I first went in there I didn't want to quit smoking but I really just wanted the money. But since I seen people that are quitting, I wanna quit too."

Some participants were motivated by taking the CO breath tests as part of each class. One participant commented:

"When we blew the thing and what my number was and as I slowly quit smoking, how my number went down. That influenced me because I wanted to see that number go down."

Participants voiced concern about their ability to maintain their smoking reduction. Several participants noted that it is difficult to resist cigarettes when surrounded by many smokers and few non-smokers. Some participants worried about gaining weight due to replacing smoking with eating junk food. Despite these concerns about their ability to maintain their cessation gains, all participants

found the LIFT program to be beneficial and would recommend the program to other smokers with disabilities. One participant made the following comment about how the LIFT program compares to other methods they have tried in the past to quit smoking:

"See I've tried [a prescription treatment] a number of years ago and it didn't work. I took I don't know how many. I think it was a month and a half and it didn't work for me and I've tried other things and it didn't work. So I said the heck with it, if they're not gonna work for me why should I even bother. Then I called this quitline and they didn't help me too much either. I mean they just talk to you on the phone and that doesn't help. I felt like this [LIFT Program] was much easier."

## Discussion

People with disabilities have disparate rates of tobacco use and are disadvantaged by a lack of accessible tobacco cessation programming.<sup>3–5</sup> *Living Independent From Tobacco*, a tobacco cessation intervention developed for PWD, was implemented with a sample of PWD to explore its potential to reduce tobacco use, increase knowledge and attitudes about tobacco use, increase coping skills, and improve perceived health status. We also assessed the subjective impressions of participants at post-test to better understand the strengths and weaknesses of LIFT. We found partial support for our hypotheses. First, compared to baseline, participants at post-test reported significantly improved health status (from "fair" to "good"). Adding to preliminary data on LIFT,<sup>5–7</sup> tobacco use was

**Table 3**  
Knowledge and attitudes about tobacco use at baseline and post-test time points.

Knowledge and Attitude Item	Likert Scale Response Options	n	Baseline mean score (SD)	Post-test mean score (SD)	p-value	Cohen's d
Addiction is defined as a strong and harmful need to regularly have something (such as a drug) or do something (such as gamble). Overall, would you say that cigarette smoking is:	Not at all addictive (1) to Very addictive (3)	29	3.0 (0.2)	2.9 (0.4)	0.184	0.31
How long do you think someone has to smoke before it harms their health? Would you say ...	Less than a year (1) to 20 years or more (5)	29	1.2 (0.6)	1.2 (0.8)	1.000	0.00
How much do you think people harm themselves when they smoke cigarettes some days but not everyday?	No harm (1) to A lot of harm (4)	28	3.5 (0.6)	3.5 (0.8)	1.000	0.00
Do you think that breathing smoke from other people's cigarettes or other tobacco products causes ...	No harm (1) to A lot of harm (4)	29	3.3 (0.8)	3.5 (0.6)	0.169	0.25
If you had to do it over again, would you have started using tobacco? Would you say ...	Definitely not (1) to Definitely yes (4)	30	1.2 (0.4)	1.4 (0.9)	0.165	0.33
Smoking helps reduce stress?	Strongly disagree (1) to Strongly Agree (5)	30	3.8 (1.2)	3.3 (1.3)	0.014	0.41
Smoking helps people in social situations?	Strongly disagree (1) to Strongly Agree (5)	27	3.1 (1.2)	2.8 (1.3)	0.115	0.30
Smoking helps people keep their weight down?	Strongly disagree (1) to Strongly Agree (5)	30	2.7 (1.3)	2.5 (1.3)	0.433	0.13
To become (or stay) a non-smoker.	Not at all confident (1) to Extremely confident (5)	29	3.3 (1.1)	3.6 (1.0)	0.200	0.27
To be able to refuse a cigarette if offered.	Not at all confident (1) to Extremely confident (5)	28	3.0 (0.9)	3.4 (1.2)	0.110	0.37

**Table 4**  
Increased comfort with coping strategies at baseline and post-test time points.

Coping Strategy Item	n	Baseline mean score (SD)	Post-test mean score (SD)	p-value	Cohen's d
When you experience anxiety, practice breathing and/or stretching exercises	30	3.4 (0.9)	3.5 (1.0)	0.610	0.10
When you feel stressed creating peaceful times, identify and avoid stressful situations, or try relaxation methods	29	3.6 (0.8)	3.7 (1.1)	0.730	0.07
When you feel a craving reminding yourself it will pass/use a substitute (chewing on carrots, celery, gum, candy)	30	3.5 (1.0)	3.7 (1.0)	0.265	0.26
Being around other smokers, asking them to help you, excuse yourself	30	3.2 (1.0)	3.5 (1.2)	0.125	0.30
Feeling irritability/frustration: going outside, using stress reduction tips	30	3.5 (0.9)	3.6 (1.1)	0.682	0.10
Dealing with depression: calling a friend, increasing physical activity, focusing on goals	30	3.2 (1.1)	3.3 (1.2)	0.669	0.09
When you're in the car: removing the ashtray, cleaning the care (deodorize), keep healthy snacks close	30	3.4 (0.9)	3.5 (1.3)	0.698	0.09
When you are bored: making a list of things you like to do, planning more activities than you have time for, carry a book or game for waiting times	30	3.6 (0.9)	3.8 (1.0)	0.465	0.18
Instead of drinking coffee or tea: switch from coffee to tea (vice versa), drink it faster so urge leaves, switch to decaffeinated	30	3.3 (1.1)	3.2 (1.3)	0.902	0.03
After meals: brushing your teeth right after washing dishes by hand	29	3.8 (0.9)	3.8 (1.2)	1.000	0.00

significantly reduced at post-test compared to baseline, and this reduction continued to be significant at the 1-month time point. While reductions in tobacco use were not significant at the 6-month follow-up compared to baseline, we did lose over half of the baseline participants (57% reduction;  $n = 13$ ), which may have impacted findings. These data diverge from Havercamp and colleagues (2019) who reported continued reduction in tobacco use from 1-month to 6-month follow-up compared to baseline (50% versus 35%). An important difference between these studies, was that Havercamp et al. (2019) included caregivers and their potential to provide continued cessation support.<sup>6</sup> In fact, a key finding from our qualitative analyses revealed that peer accountability was an important factor supporting tobacco cessation efforts among PWD and that, after the intervention ended, there were no interactions between participants. Taken together, our data show that LIFT on its own can significantly reduce tobacco use at post-test and for a short period after (1-month), but continued support, perhaps in the form of peer or support person accountability and support, may be needed to sustain reductions in tobacco use long-term.

We were somewhat surprised to find that participants in our study had been smoking for an average of 33.5 years. Previous research has found that tobacco cessation programming is less effective among long-term tobacco users, which is operationally defined as a multiple of number of packs per day by number of years (pack-year)<sup>13–15</sup> of 30 or more.<sup>16</sup> With mean CO levels of approximately 35.47 ppm at pre-test, participants were smoking at least one pack of cigarettes per day,<sup>17</sup> making their pack-year determination approximately 33.5. These data provide additional evidence for the short-term effectiveness of LIFT to reduce smoking among long-term smokers with disabilities. Although we found statistically significant reductions in tobacco use, few participants quit smoking completely. Tobacco reduction is an important first step in tobacco cessation, and has been linked with parallel reductions in tobacco-related health risks.<sup>18–20</sup> To our understanding, this study is the first of its kind to explore tobacco cessation programming in a sample of long-term smokers with disabilities.

Contrary to our hypotheses, we did not show statistically significant changes from baseline in knowledge and attitudes about tobacco use and coping skills. There are several interpretations for these findings. First, our baseline data revealed that participants already had knowledge about the harmful effects of tobacco and negative attitudes towards tobacco use. This finding may be due to pervasive public health messaging about the harmful effects of smoking over the past several decades.<sup>21–24</sup> Second, since participants agreed to participate in a smoking cessation program, it is likely that they would hold negative attitudes about tobacco use. Finally, participant interviews provided evidence of knowledge

gains as a result of LIFT participation. More specifically, participants cited increased knowledge about coping skills and confidence in their ability to quit smoking. These data run parallel to Barnhart and colleagues (in press) who demonstrated through qualitative analyses that both PWD and their caregivers cited increased knowledge, coping skills, and comfort to reduce smoking as a consequence of LIFT participation.<sup>25</sup> We note that these qualitative impressions were not supported in our quantitative data. Additional research is needed to evaluate the sensitivity of the knowledge, attitudes, and coping skills (the LIFT survey) outcome measures.

#### Limitations and future directions

Results of this study should be interpreted in light of several limitations and future research directions. First, we did not measure readiness to quit tobacco among participants. Previous research found that tobacco cessation programs are most effective when participants are ready to make the commitment, at the preparation or action stages.<sup>26</sup> Future research should screen participants on readiness to quit tobacco to optimize LIFT outcomes. Second, our sample of participants was homogenous in terms of race and ethnicity; future research is needed to establish the efficacy of LIFT in diverse groups. Previous research has shown that intersectionality, in terms of having multiple marginalized identities, can potentiate adverse health outcomes and barriers to health promotion resources.<sup>27–29</sup> Third, because of our relatively small sample size and geographic restrictions, these findings may not generalize to all smokers with disabilities. Fourth, our sample was limited to PWD. Future research should consider factors such as relationships formed between support persons and PWD and the health behaviors of support persons, both of which are known to influence the health behaviors of the people they support.<sup>6,30–35</sup> Future research should build on this study and on Havercamp et al. (2019) to implement LIFT to dyads of PWD and their caregivers to further test the role of social support and peer accountability in impacting outcomes. Fourth and finally, future research should attempt to address how different types of caregivers and different types of disabilities may confer different outcomes in the LIFT intervention. These data are important because they inform best practices for LIFT to be of use to researchers, educators, and policy makers alike.

#### Conclusions

This study provides evidence for the effectiveness of LIFT to result in short-term reduction of tobacco use among PWD in real world settings. These findings were particularly strong given our

sample of long-term smokers with disabilities. Because long-term smokers have been shown to be less supported by tobacco cessation programming than short-term smokers,<sup>16</sup> these data make a meaningful contribution to this literature. Offering accessible health promotion interventions such as LIFT to PWD may help improve population health and achieve health equity for all.

## Funding

This work was supported by the Centers for Disease Control and Prevention Cooperative Agreement Number NU27DD000015-02. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention or the Department of Health and Human Services.

## Declaration of competing interest

The authors report no conflicts of interest.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.dhjo.2019.100882>.

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