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Pilot Tobacco Treatment Intervention for Women in Residential Treatment for Substance Use Disorder

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Abstract

Objective—To test the feasibility, acceptability, and efficacy of Get Fit and Quit (GFAQ), a community engaged, holistic, tobacco treatment program for women of childbearing age in a residential, substance use disorder (SUD), treatment facility.

Design—A quasi-experimental, one group, longitudinal design.

Setting—A local Young Men's Christian Association (YMCA) location.

Participants—Twenty-three women of childbearing age were enrolled in the study. Nearly all (21 of 23) participants were White, and most were non-partnered and unemployed. More than one-third of participants had more than high school educations, and five (22%) were pregnant at enrollment.

Methods—The program was conducted in 10 sessions over six months. For each 90-minute session, approximately 45 minutes were dedicated to smoking cessation and 45 minutes were dedicated to group physical activity. Means and 95% confidence intervals were used to summarize nicotine dependence, expired carbon monoxide, urine cotinine, and exercise self-efficacy at baseline, 5-week, 8-week, and 6-month assessments. Cigarettes smoked per day were summarized using medians and interquartile ranges over time. Program satisfaction and regular exercise were presented as percentages with 95% confidence intervals.

Results—Of the 23 women who enrolled in GFAQ, seven (30%) completed the program. Compared to baseline, participants who completed GFAQ had lower nicotine dependence and smoked fewer cigarettes per day. Additionally, at five weeks, more GFAQ participants exercised regularly (64%) compared to baseline (14%). Most participants viewed the program favorably.

Conclusions—Smoking among women of childbearing age with SUDs is an important public health issue. GFAQ is a promising intervention for tobacco treatment for this high-risk population, although the number of initial participants who completed the program was low.

Precis

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Get Fit and Quit is a promising tailored tobacco treatment intervention for women of childbearing age with substance use disorder.

Keywords

tobacco treatment; substance use disorder; community engaged research

Smoking is the leading cause of preventable death and disease and is associated with adverse health outcomes, including cardiopulmonary disease and cancer in nearly every organ in the body (U.S. Department of Health and Human Services, 2014). Although smoking among adults in the United States has been on an overall decline from 20.9% in 2005 to 15.1% in 2015, smoking rates among individuals with substance use disorders (SUDs) remains a concern (Jamal, 2016). In a 1987–2009 review, Guydish and colleagues (2011) found a median annual smoking prevalence of 76.3% among adults enrolled in U.S. addiction treatment programs. These high rates of smoking are concerning because smoking is associated with increased odds of SUD relapse (Weinberger et al., 2017).

Tailored tobacco treatment interventions are needed for women with SUDs, specifically women of childbearing age, because they are a particularly vulnerable group. Compared to men, women with SUDs experience more addiction-related stigma, and have higher rates of depression, anxiety disorders, and post-traumatic stress disorders (Tuchman, 2010). Tobacco use during pregnancy is a modifiable risk factor associated with adverse outcomes such as miscarriage, preterm birth, low birth weight, birth defects, and sudden infant death syndrome (U.S. Department of Health and Human Services, 2014). In pregnant women with opioid use disorders, smoking has been independently linked to the severity of neonatal abstinence syndrome (Guydish et al., 2017). Furthermore, among infants of mothers on medication assisted treatment for opioid use disorder during pregnancy, cigarette smoking during pregnancy was associated with lower infant Apgar scores, an increase in the amount of prescribed morphine during the hospital stay (Guydish et al.), and an increase in the number of days of treatment for neonatal abstinence syndrome (Jones et al., 2013).

CALLOUT 1

Smoking has historically been an overlooked epidemic in behavioral health care settings (Prochaska, 2010). Few tobacco treatment interventions have been tested for women of childbearing age with SUDs, and existing interventions have had low success rates (Akerman et al., 2015). Based on our formative research, women in residential treatment for SUD primarily smoke because of stress and a lack of alternative coping mechanisms (Fallin-Bennett, Parker, Miller, Ashford, & Hahn, 2017). Exercise has been proposed as an aid to smoking cessation (Ussher, Taylor, & Faulkner, 2014), and physical activity has been shown to decrease cigarette cravings (Roberts, Maddison, Simpson, Bullen, & Prapavessis, 2012). Being physically active has been positively associated with initiating a quit attempt, confidence to maintain smoking abstinence, and success at stopping smoking (Ussher et al., 2014). Additionally, physical activity has been shown to have promise in increasing smoking abstinence rates, particularly in adult women (Bock et al., 2012).

Using this knowledge combined with the desire to better understand facilitators and barriers to smoking cessation for women in this high-risk population, we developed and pilot-tested a tailored, community-engaged, holistic tobacco treatment program, Get Fit and Quit (GFAQ). GFAQ integrates traditional smoking cessation group education, social support, and physical activity to help participants replace their smoking behaviors with a healthy coping strategy (physical activity/exercise). The purpose of this pilot study was to evaluate the feasibility (recruitment and retention), acceptability, and efficacy of GFAQ among women of childbearing age in a residential SUD treatment facility.

Methods

Design and Setting

We employed a quasi-experimental, longitudinal design. Participants were recruited from a residential SUD treatment program for women. All GFAQ sessions were held at a community Young Men's Christian Association (YMCA) facility. Institutional Review Board approval was obtained from the University of Kentucky before initiation of study activities.

Sample

Women were eligible if they were of childbearing age (18–45), pregnant or non-pregnant, current smokers (100 cigarettes over the course of the lifetime and any cigarettes in the past 30 days), interested in quitting smoking, and able to speak and read in English. Interest in quitting smoking was determined by stage of change based on the question: "Are you currently thinking intently of quitting smoking?" Participants who answered: "Yes, I think I'll quit within the next 30 days" or "Yes, I think I'll quit within the next 6 months" were classified as having an interest in quitting. For women who were pregnant at the time of enrollment, exclusion criteria included being greater than 30 weeks gestation or having an American College of Obstetricians and Gynecologists defined absolute contraindication to physical activity: hemodynamically significant heart disease, restrictive lung disease, insufficient cervix or cerclage, multiple gestation at risk of preterm labor, persistent second or third trimester bleeding, placenta previa after 26 weeks gestation, premature labor during the current pregnancy, ruptured membranes, preeclampsia or pregnancy induced hypertension, or severe anemia (Sperlich, Maina, & Noeres, 2013). Pregnant participants were required to provide documentation from their health care providers that they did not have any contraindications to participation in GFAQ.

Intervention

GFAQ was a community-based collaboration between the University of Kentucky, the residential treatment facility, a local YMCA, and QuitNow Kentucky. The program consisted of a six-month, 10-session design during which participants were empowered to quit smoking by replacing tobacco use with physical activity. For Each 90 minute session, approximately 45 minutes were dedicated to smoking cessation and 45 were minutes dedicated to a specific group physical activity.

A perinatal nurse certified as a tobacco treatment specialist facilitated the didactic portion of the smoking cessation content. This content was informed by The Courage to Quit group smoking cessation program (Respiratory Health Association, 2018) and the Vancouver Coastal Health and Health Canada's Tobacco Dependence Clinical Facilitator's Guide (Khara, Killam, & Okoli, 2011). The combination of these two tobacco treatment programs allowed us to include more sessions to give participants extra time to move through the earlier stages of change. Further, the combination of the programs allowed essential concepts to be reinforced and supplementary concepts to be introduced. The perinatal nurse facilitated the physical activity component along with YMCA and university group instructors. The first four GFAQ sessions were focused on preparing women to be smoke-free by week 4, while the remaining six sessions were focused on maintenance and relapse prevention.

After participating in the group tobacco treatment program, women participated in group physical activity (e.g., kickboxing, Zumba, or yoga). See Table 1 for specific program content and timeframes.

Procedures

Potential participants were approached at a local residential SUD treatment facility for women during an on-site wellness class that all clients attended as part of their treatment. All prospective participants were told that their decision to/not to participate in the study did not have any effect on the services that they received at the residential treatment facility or elsewhere.

Participants enrolled in GFAQ were eligible to sign up for four free pro-active coaching telephone calls with QuitNow Kentucky and to receive free nicotine replacement therapy. GFAQ program facilitators measured intervention outcomes at baseline, five weeks, eight weeks, and six months via participant surveys and biochemical validation of tobacco use. Between sessions, participants had the opportunity to communicate with the facilitators via text messaging. The facilitators sent out weekly inspirational and informational text messages, as well as reminders about upcoming GFAQ sessions.

Participants received compensation for participation in GFAQ. Upon enrollment, each participant received a 6-month membership for herself and her child(ren) to two local YMCA facilities with the stipulation that she must attend at least five of the first eight GFAQ sessions to maintain membership eligibility. At the end of session 3, a Garmin fitness tracker was given to participants. Finally, to encourage consistent participation in the program, women who completed outcome evaluations at sessions 8 and 10 weeks, and attended at least eight of the ten GFAQ sessions, received a \$20 gift card at session 10.

Measures

Demographic characteristics.—Demographic characteristics were collected via self-report in the participant survey and included date of birth, race, partnered status, education, employment status, pregnancy status, and SUD type.

Smoking variables.—Smoking variables included expired air carbon monoxide (EACO), urine cotinine, nicotine dependence, and number of cigarettes per day. To measure EACO, the Bedfont piCO+ smokerlyzer monitor was used. GFAQ facilitators instructed each participant on how to correctly use the monitor. Each participant was given a new SteriBreath mouthpiece straw. EACO analysis was completed in a private room. An EACO reading of less than 9ppm has a sensitivity of 60% and specificity of 97% for tobacco abstinence over the past 24 hours (Perkins, Karelitz, & Jao, 2013).

Urine cotinine was measured using NicAlert, a valid commercial urine immunochromatographic assay, and values were reported as 0–6 (0–>1000ng/mL). A result of three or above indicates tobacco use. To test urine cotinine, participants were given a sterile specimen cup. Specimens were collected in the YMCA women’s restroom. The study nurse instructed each participant on how to properly use the NicAlert strips as well as how to interpret the results. The participants analyzed their results with assistance as needed from the study nurse in the private changing area of the restroom. Non-latex gloves were provided.

The Fagerstrom Test for Nicotine Dependence is a validated, self-report 6-item tool to measure individual level of dependence on nicotine (Pomerleau, Carton, Lutzke, Flessland, & Pomerleau, 1994). This instrument is focused on traditional cigarette use and yields a score from 0–10; higher scores indicate more dependence on nicotine. Participants are asked, “How soon after waking do you smoke your first cigarette?” Response options include *within 5 minutes* (scored 3 points), *5–30 minutes*, *31–60 minutes*, and *after 60 minutes* (scored 0 points).

Three questions are included on the questionnaire with *yes/no* response options: “Do you find it difficult to refrain from smoking in places where it is forbidden, e.g., church, library, etc.?” “Do you smoke more frequently in the morning?” and “Do you smoke even if you are sick in bed most of the day?” For each, a response of *yes* is scored as 1 point, and *no* is scored as 0 points. Participants are also asked, “Which cigarette would you hate to give up?” Response options include the *first in the morning* (scored 1 point) or *any other* (scored 0 points). For the final question, “How many cigarettes a day do you smoke?” the lowest number of cigarettes per day category, *10 or less*, is scored 0 points, *11–20* is scored 1 point, *21–30* is scored 2 points, and *31 or more* is scored 3 points. A summative score is calculated yielding a total score ranging from 0–10. Higher scores reflect greater levels of nicotine dependence. The Fagerstrom Test for Nicotine Dependence has moderate sensitivity and specificity with EACO and salivary cotinine biomarkers (Huang, Lin, & Wang, 2008).

To determine daily traditional cigarette use, participants were asked the following, open-ended question in the participant survey: “Thinking of the last 30 days, how many cigarettes did you smoke per day?”

Exercise variables.—We provided participants the following information about exercise in the participant survey:

Regular exercise is any planned physical activity (e.g., brisk walking, aerobics, jogging, bicycling, swimming, rowing, etc.) performed to increase physical fitness.

Such activity should be performed 3 to 5 times per week for 20–60 minute per session. Exercise does not have to be painful to be effective but should be done at a level that increases your breathing rate and causes you to break a sweat.

Following the description, women were asked “Do you exercise regularly according to the above definition?” Responses included *Yes, I have been for more than 6 months*, *Yes, but I have been for less than 6 months*, *No, but I intend to in the next 30 days*, *No, but I intend to in the next 6 months*, and *No and I do not intend to in the next 6 months*. Responses to the first two items were coded as *yes* to exercising regularly, and responses to the latter three items were coded as *no*. Exercise self-efficacy was assessed via participant survey using the validated 10-item Exercise Self-Efficacy Scale, which assesses participants’ confidence that they will exercise when other things interfere (e.g., stress, depression, weather, or travel; Resnick & Jenkins, 2000) Response options for each item followed a 5-point Likert scale ranging from *not at all confident* to *completely confident*. A summative score is calculated to represent overall exercise self-efficacy ranging from 10–50; higher scores indicate more confidence. Cronbach’s alpha at baseline was 0.90 for this sample.

Program satisfaction.—A series of 5 items were used to assess participant’s satisfaction with components of the GFAQ program. Two survey items were used to assess satisfaction with the program affiliated staff: “My GFAQ nurse facilitator is knowledgeable and supportive in my GFAQ activities” and “The YMCA staff are knowledgeable and supportive of my GFAQ activities.” Three survey items were used to assess satisfaction with specific program components: “The physical activity components of GFAQ, including group fitness activities and setting exercise goals, have helped me to reduce/quit my tobacco use,” “The activity tracker provided to me through GFAQ has helped me to reduce/quit my tobacco use by monitoring my daily activity,” and “The GFAQ program is an acceptable program to help me quit (or reduce) tobacco use during my pregnancy OR The GFAQ program is an acceptable program to help me stay quit after having my baby [as applicable].” All responses followed a Likert scale and ranged from *strongly disagree* (1) to *strongly agree* (5).

CALLOUT 2

Finally, to inform future interventions, participants were asked to share their thoughts and comments about our program with open-ended questions on the survey. Questions included, “What are the top three things you are enjoying/have enjoyed about the Get Fit and Quit Program?” and “What are some ideas you would suggest to improve our Get Fit and Quit Program?”

Analysis

We used descriptive statistics, including means, and standard deviations, and frequency distributions, to summarize study variables at baseline. We used median and interquartile ranges to summarize cigarettes smoked per day at each assessment period and mean and 95% confidence intervals to summarize EACO levels, urine cotinine, nicotine dependence, and exercise self-efficacy. Frequency distributions and associated 95% confidence intervals summarized regular exercise. Program satisfaction survey items were described using

frequencies. All data analysis was conducted using SAS, version 9.4 with an alpha level of .05 throughout.

Results

Feasibility

We enrolled 23 women of childbearing age in the study. Nearly all (21 of 23; see Table 2) participants were White, and most were non-partnered (20) and unemployed (19). Over one-third (9) had more than a high school education. Five of the women were pregnant at enrollment. Approximately one-third (8) of participants were seeking treatment at the facility for both alcohol and illicit drug use. One participant withdrew related to the development of symptoms that indicated an increased risk for preterm birth. Six participants did not complete the program because they were removed from or voluntarily left the residential SUD treatment facility prior to completing the SUD treatment program. Participants who completed the program (n=7) did not differ from those who did not in age, race, education, employment status, or reason for SUD treatment (drug use alone versus drug and alcohol use). At enrollment, 13 women accepted a referral to a quitline (Quitnow Kentucky).

Efficacy

Data were available for 12, 11, and 7 women at the 5-week, 8-week, and 6-month sessions respectively. Of the seven participants who provided 6-month data, three participants completely stopped using traditional cigarettes, one completely stopped using tobacco products, and the other two switched entirely to electronic cigarettes. At 5 weeks, the 12 participants reported smoking half the median number of cigarettes smoked per day compared to baseline (m=10.5 [IQR=5.5–17.8] vs. m=20 [IQR=10–20], respectively; see Table 3) and had lower nicotine dependence scores (M=3.00, 95% CI= [1.44, 4.56] vs. M=5.13, 95% CI= [4.23, 6.03]). Expired carbon monoxide and urine cotinine, however, remained similar over time.

For exercise-related variables, there was no change in exercise self-efficacy over time, but there was an increase in the percent of women who reported exercising regularly over time. At baseline, three (14%; 95% CI= [9%, 35%]; see Figure 1) of 23 women reported exercising regularly, while eight of 12 women were exercising regularly at 5-weeks.

Acceptability

Among the seven participants who provided 6-month data, all strongly agreed that the GFAQ nurse facilitator and YMCA staff were knowledgeable and supportive in their GFAQ activities. All but one of the seven participants strongly agreed or agreed that the tobacco cessation education, physical activity components, and activity tracker were helpful in quitting or reducing tobacco use. Participant survey comments indicated that participants, overall, perceived the GFAQ program positively. Participants reported feeling supported by study personnel: “The ladies’ [study nurses’] support, friendship, and how comfortable and easy it was to open up and discuss difficult topics with them, without the fear of them judging us.”

Another commented: “It was a reminder that there are people who care about my progress and well-being.”

Participants also provided feedback on program components. One reported that she appreciated “having a quit date, having something to look forward to, believing in myself, and having healthy coping skills.” Another reported that she appreciated “having a support group that actually talks about the severe addiction to smoking...our dependency on cigarettes is always swept under the rug.” An additional participant revealed that lessons learned were transferrable to other areas because she found “a new coping skill not just for smoking but for addiction.” In addition, participants responded favorably to the text messaging component of the intervention: “It reminded me of what I truly desired deep down, of the commitment I made to myself and the program, which I take seriously.” Most of the comments were positive, however, some participants reported that more intensive support would have been beneficial: “Maybe to meet more and I swear to even have some kind of overnight to jump start our quit date. I would absolutely be down for [interested in] that.”

Callout 3

Discussion

The GFAQ intervention shows promise as an intervention to reduce tobacco use in a high-risk population: women of childbearing age with SUDs. This is encouraging, particularly because of the lack of tailored smoking cessation interventions for women of childbearing age with SUDs. Study participants who completed the program experienced a decline in their levels of nicotine dependence and reduced their cigarettes smoked per day, possibly increasing their chances for successful cessation in the future. Klemperer and colleagues (2015) reviewed naturalistic and intervention studies on smoking reduction and found that cigarette reduction was associated with improved odds of successful cessation (Klemperer & Hughes, 2015). Further, Lindberg and colleagues (2015) demonstrated that lower nicotine dependence was associated with successful smoking cessation over a three-year period among smokers with chronic obstructive pulmonary disease (Lindberg et al., 2015).

Participants in GFAQ who completed the program increased their regular physical activity, which is promising, because individuals who use exercise to cope with stress have been shown to be less likely to use drugs or alcohol to cope with stress (Cairney, Kwan, Veldhuizen, & Faulkner, 2014). This is particularly important for this population, because women with SUDs have consistently reported stress as a barrier to smoking cessation (Fallin-Bennett et al., 2017; A. Fallin, Miller, & Ashford, 2016), which is not surprising given this population’s level of perceived stress and the documented strong link between stress and smoking in the general population (Sperlich et al., 2013). Since successful smoking cessation has been linked to reduced rates of anxiety, stress, and depression, as well as improvements in quality of life and positive affect, a program that successfully interrupts the stress-smoking connection would be invaluable (Taylor et al., 2014). Furthermore, there is a strong association between stress and nicotine withdrawal symptoms, with the effect being even more pronounced in women. Therefore, interventions that reduce stress have the

potential to decrease withdrawal symptoms and thus improve smoking cessation outcomes (Lawless, Harrison, Grandits, Eberly, & Allen, 2015).

Lessons learned from this pilot will guide modifications to the GFAQ protocol. There was a high dropout rate among participants in GFAQ. In order to address this implementation challenge, future programs will be shorter, with weekly sessions throughout. A lesson learned with this pilot related to feasibility was that it was a challenge to maintain contact with participants over a six month period. Over time, clients moved through phases of the program in the residential treatment facility and became employed, moved to transitional housing, or graduated and relocated. Further, having a shorter, more intensive program was supported by participant feedback. Participants reported that more intensive meetings are needed, with weekly sessions continuing longer than the initially-prescribed five weeks. In addition to increasing meeting frequency, future interventions could be designed to test the efficacy of booster interventions, such as continued phone contact with participants, to increase the likelihood of maintaining behavioral change.

To further enhance the efficacy, future GFAQ programs will incorporate a peer support element, which has potential to promote successful smoking cessation among disadvantaged populations (Ford, Clifford, Gussy, & Gartner, 2013). Further, although the percentage of clients engaging in regular physical activity increased, there was no change in exercise self-efficacy, indicating a need to focus more on addressing exercise barriers and simplifying group exercise activities. In addition, the overall results of this intervention indicate the need for multi-level interventions to reduce tobacco use among women of childbearing age with SUDs. Guydish and colleagues (2017) demonstrated that a tobacco-free grounds policy was associated with reduction in smoking prevalence and cigarettes per day among clients in SUD treatment. Additionally, these policies have been associated with increased intentions among clients to remain smoke-free after discharge (Richey, Garver-Apgar, Martin, Morris, & Morris, 2017). Despite common misperceptions, tobacco-free grounds policy in SUD treatment facilities are not associated with clients leaving treatment early (Richey et al., 2017). A future program protocol would focus on collaborating with the SUD treatment facility to work towards establishing a tobacco-free grounds. Finally, in order to increase the scalability of GFAQ, creative community partnerships are needed to reduce the cost of the intervention (e.g., partnerships with a community gym that would provide free or low-cost membership to participants).

Interestingly, two out of the seven participants who completed the GFAQ reported switching entirely from conventional cigarettes to electronic cigarettes at the 6-month session. This is in accordance with previous research among clients with SUDs who were engaged in medication-assisted treatment: 15% of clients who were current smokers had used electronic cigarettes as part of a smoking cessation attempt (Shah, Cunningham, Brisbane, DeLuca, & Nahvi, 2017). Oncken and colleagues (2017) reported that a history of substance abuse was associated with electronic cigarette use during pregnancy. Previous research indicates that women of childbearing age, as well as women who were pregnant or postpartum, use electronic cigarettes because they perceive them to be safer or as a smoking cessation aid (Ashford et al., 2016; Amanda Fallin, Miller, Assef, & Ashford, 2016; McCubbin, Fallin-Bennett, Barnett, & Ashford, 2017; Oncken et al., 2017). There is a need for clear messaging

on the overall risks of electronic cigarette use as well as the harms of nicotine exposure during pregnancy, including the increased risk for stillbirth, preterm birth, low birth weight, and altered neurodevelopment of the fetus (Bruin, Gerstein, & Holloway, 2010).

Limitations of our study included a small sample size and a low retention rate over time. Because we aimed to evaluate the feasibility of the GFAQ program in this special and transient population, no a priori power analysis was conducted. However, the ability to recruit women to participate in the study is promising for successful recruitment in a larger study, and the retention rates over time will be useful in estimating the necessary inflation of sample size for the following larger study for which an a priori power calculation will be conducted. Also, the majority of participants were white, and thus, our results may not be generalizable to more diverse populations. All the participants in GFAQ were currently in residential SUD treatment, however, we did not adjust for their level of engagement with services at the facility (e.g. attendance at counseling sessions, medical appointments, and support group meetings). Future researchers should test GFAQ as part of a randomized controlled trial. It is also a limitation that cigarettes smoked per day was self-reported and thus subject to social desirability bias. Finally, in this pilot study, we were unable to objectively assess physical activity. Although we provided study participants with a Garmin physical activity tracker, we were unable to use this data due to numerous challenges with participants uploading their data. Future evaluations should incorporate practical solutions to objectively monitor physical activity.

Conclusion

Smoking among women of childbearing age with SUDs is an important public health issue. Compared to baseline, participants in GFAQ had lower nicotine dependence and smoked fewer cigarettes per day. GFAQ is a promising intervention for tobacco treatment for this high-risk population. To enhance the feasibility of implementation, future programs with this population should be shorter in length with more intensive meetings (i.e., weekly). To improve program efficacy, future researchers could incorporate peer support as well as advocate for a tobacco-free grounds policy at the residential SUD treatment facility.

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Three call-outs:

1. Although smoking rates have dramatically declined, the prevalence of smoking remains high among women with substance use disorders.
2. Compared to baseline, participants who completed Get Fit and Quit had lower nicotine dependence and smoked fewer cigarettes per day.
3. Get Fit and Quit is a promising tobacco treatment intervention for this high-risk patient population.

Figure 1.
Percent and 95% confidence interval for Get Fit and Quit participants reporting regular exercise over time.

Get Fit and Quit Design

Table 1.

Session	Session Content		Goal Tracking		
	Smoking	Physical Activity	Smoking	Activity	Other
1 Weekly Month 1	Orientation to program Know your stats Personal reflection Stages of change Decisional balance Homework: Assess personal triggers (<i>Pack Tracker</i>)	Orientation to YMCA Benefits of and barriers to physical activity Safe physical activity in pregnancy/warning signs Group fitness activity: Walking and stretching	NicAlert EACO Monitor Initiate Pack Tracker	Baseline wellness assessments	Survey Personal stats (Weight, HR, B/P, 02 Sat)
2 Weekly Month 1	Identifying triggers Creating a trigger coping plan Health facts about smoking (self, fetus, child, family) Benefits of quitting (self, fetus, child, family) Money spent/saved Preparing to quit	Setting personal physical activity goals Exploring activities of interest Group fitness activity: Cardio/Weights	Initiate Personal Tracking Log Pack Tracker	Initiate Personal Tracking Log YMCA Check-Ins	
3 Weekly Month 1	Addiction pathway Withdrawal symptoms/coping with withdrawal Nicotine Replacement Therapy Setting a quitdate (by week 4) Obstacles to quitting Creating a plan for success	Establishing fitness routines Group fitness activity: Kickboxing/Total body workout/Insanity/RIPPED	PersonalTracking Log Pack Tracker (Optional)	PersonalTracking Log YMCA Check-Ins	
4 Weekly Month 1	Quit Date Relapse prevention Coping with withdrawal Slip versus relapse Quit contract	Identifying positive support for physical activity Group fitness activity: Zumba	Personal Tracking Log Pack Tracker (Optional)	Personal Tracking Log YMCA Check-Ins Garmin Tracking (Steps, Active Minutes)	
5 Weekly Month 1	Maintenance Managing stress Personal stress management plan	Building confidence Using physical activity to manage stress Group fitness activity: Yoga	NicAlert EACO Monitor Personal Tracking Log Pack Tracker (Optional)	Personal Tracking Log YMCA Check-Ins Garmin Tracking (Steps, Active Minutes)	Personal Stats (Weight, HR, B/P, 02 Sat)
6 Biweekly Month 2	Maintenance Nutrition Healthy lifestyle	Using nutrition to fuel physical activity Group fitness activity: Gym class	PersonalTracking Log Pack Tracker(Optional)	PersonalTracking Log YMCA Check-Ins Garmin Tracking(Steps, Active Minutes)	
7 Biweekly Month 2	Maintenance Staying positive and supported Understanding self-talk/identifying individual support systems	Slips and relapses in physical activity/learning the art of getting back on track Group fitness activity: Let group decide!	Personal Tracking Log Pack Tracker (Optional)	Personal Tracking Log YMCA Check-InsGarmin Tracking (Steps, Active Minutes)	
8 Monthly Month 3	Maintenance Committing to a smoke-free life	Committing to physical activity for life (postpartum and beyond) Fitness activity: Freedom to choose individual or group activity	NicAlert EACO Monitor Personal Tracking Log Pack Tracker (Optional)	Personal Tracking Log YMCA Check-Ins Garmin Tracking (Steps, Active Minutes)	Survey Personal Stats (Weight, HR, B/P, 02 Sat)
9 Monthly Month 4	Maintenance Healthy family	Fit family Fitness activity: Family exercise	PersonalTracking Log Pack Tracker(Optional)	PersonalTracking Log YMCA Check-Ins Garmin Tracking(Steps, Active Minutes)	
10 Bimonthly Month 6	Maintenance Evaluation Mentoring others who desire to quit	Evaluation Exercising outside a gym Role modeling an active lifestyle	NicAlert EACO Monitor Personal Tracking Log Pack Tracker (Optional)	Personal Tracking Log YMCA Check-Ins Garmin Tracking (Steps, Active Minutes)	Survey Personal Stats (Weight, HR, B/P, 02 Sat)

Notes: B/P: Blood pressure; EACO= expired air carbon monoxide; HR=heart rate; YMCA= Young Men's Christian Association

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Table 2.

Sociodemographic Characteristics of Women Participating in the Get Fit and Quit Program At Baseline
(*N*=23)

Characteristic	Mean (SD); range or <i>n</i> (%)
Age	28.7 (5.8); 20–43
Race	
White	21 (91.3)
Other	2 (8.7)
Partner status	
Married or living with partner (prior to entering residential substance use disorder treatment)	3 (13.0)
Not partnered	20 (87.0)
Education	
Less than high school education	3 (13.0)
High school graduate/GED	11 (47.8)
More than high school	9 (39.1)
Employment status	
Employed part time	4 (17.4)
Unemployed	19 (82.6)
Pregnant	
Yes	5 (21.7)
No	18 (78.3)
SUD type	
Drug use	15 (65.2)
Alcohol and drug use	8 (34.8)

Table 3.

Means and 95% Confidence Intervals for Smoking Behavior Variables and Exercise Self-Efficacy Over Time

Variables	Baseline (N = 23) Median [IQR] or Mean [95% CI]	5-weeks (n = 12) Median [IQR] or Mean [95% CI]	8-weeks (n = 11) Median [IQR] or Mean [95% CI]	6-months (n = 7) Median [IQR] or Mean [95% CI]
Smoking				
Cigarettes per day ^a	20 [10–20]	10.5 [5.5–17.8]	10 [5–15]	2.5 [0–7]
Nicotine dependence ^b	5.13 [4.23, 6.03]	3.00 [1.44, 4.56]	3.38 [1.54, 5.21]	2.00 [0.00 ^c , 4.32]
Expired CO	8.83 [6.36, 11.30]	11.25 [6.84, 15.66]	12.60 [8.24, 16.96]	11.50 [0.00 ^c , 23.72]
Urine cotinine	5.82 [5.60, 6.00 ^c]	5.83 [5.59, 6.00 ^c]	5.90 [5.67, 6.00 ^c]	5.17 [3.02, 6.00 ^c]
Exercise				
Exercise self-efficacy	48.83 [43.36, 54.30]	45.63 [34.59, 56.68]	51.00 [37.58, 64.42]	47.57 [31.50, 63.64]

Note. CI = confidence interval; CO = carbon monoxide.

^a Medians and interquartile ranges are presented rather than means and 95% confidence intervals because the distribution is right skewed.

^b Nicotine dependence measured by the Fagerstrom Test for Nicotine Dependence with a potential range of 0–10; higher scores indicate more dependence on nicotine.

^c Confidence interval bounds truncated to reflect the minimum or maximum possible value.