



Published in final edited form as:

Addict Behav. 2014 May ; 39(5): 885–888. doi:10.1016/j.addbeh.2014.01.014.

Physical Activity as a Coping Strategy for Smoking Cessation in Mid-Life and Older Adults

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Abstract

Smoking prevalence for those ages 45–65 is higher than the national average and the number of mid-life and older smokers is expected to increase as baby boomers age. Cessation, even after age 65, confers health benefits. Both physiologic and psychological mechanisms support use of physical activity (PA)¹ as a coping tool for quitting and improving health. This study focused on use of PA for coping with urges to smoke, factors associated with use, and whether use of PA was associated with abstinence at 12 months for 799 smokers ages 50 and older. Only 11.6% used PA for coping, with walking the most common PA. Females were more likely to use PA relative to males. Though in the predicted direction, use of PA was not significantly associated with 12-month abstinence. Male gender and higher baseline self-efficacy to quit were associated with 12-month abstinence. Encouraging use of PA during smoking cessation does not impede quitting and may improve health outcomes. Further research on whether PA increases abstinence with a larger sample of mid-life and older adults is indicated.

Keywords

smoking cessation; physical activity; coping; older adults

1. INTRODUCTION

Approximately 46 million adults currently smoke in the United States. Smoking prevalence for those ages 45 to 65 (21.4%) is higher than the national average (19.0%) (CDC, 2012). Although smoking prevalence among adults 65 years of age or older (8.4%) is lower than the national average, as baby boomers age, the actual *number* of mid-life and older smokers will continue to increase (CDC, 2013). Tobacco cessation confers significant health benefits

¹PA= Physical Activity

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regardless of age or disease state (Nicita-Mauro, Maltese, Nicita-Mauro, Lasco, & Basile, 2010; Taylor, Hasselbad, Henley, Thun, & Sloan, 2002). Quitting smoking is the most effective way of decreasing smoking-induced disease for older smokers, with a significant decline in all causes of mortality, as well as chronic obstructive pulmonary disease (COPD), coronary artery disease, lung cancer and cerebrovascular disease among older adults who quit (Burns, 2000; Ossip-Klein, McIntosh, Utman, Burton, Spada, & Guido, 2000; Ossip-Klein, Pearson, McIntosh, & Orleans, 1999; Rimer, Orleans, Keintz, Cristinzio, & Fleisher, 1990; Schofield, Kerr, & Tolson, 2007; Service, 1990). Given the growing numbers of mid-life and older smokers, there is an increasing need for smoking cessation interventions targeting this understudied population (Ossip-Klein, et al., 1999).

Older smokers are less likely to make a quit attempt, but more likely than younger smokers to be abstinent at three months when they do try (Burns, 2000; Ferguson, Bauld, Chesterman, & Judge, 2005; Hatzianreou et al., 1990). The most common barriers to cessation in older smokers include cravings, irritability and tension, followed by weight gain, boredom, failing and trouble concentrating (Kerr, Watson, Tolson, Lough, & Brown, 2004; Rimer et al., 1990; Schofield et al., 2007).

Participation in physical activity (PA) can potentially help smokers overcome these barriers while improving overall health. PA and exercise have been found to reduce depressed affect, attenuate cravings and withdrawal symptoms, decrease smoking-related stress, tension, and desire to smoke in the presence of a lit cigarette following cessation, improve poor concentration, and potentially decrease weight gain (Daniel, Cropley, Ussher, & West, 2004; Haasova et al., 2012; Ussher, Taylor, & Faulkner, 2012; Ussher, West, Doshi, & Sampuran, 2006; Van Rensburg, Taylor, & Hodgson, 2009; Williams, Dunsiger, Whiteley, Ussher, Ciccolo, & Jennings, 2011). In addition, PA can prevent or improve outcomes for chronic diseases and cognitive decline that differentially affect mid-life and older adults, and improve overall quality of life (King & King, 2010; Garber, et al. 2011). Thus, PA may provide a coping strategy for increasing success in quit attempts.

Prior intervention research has demonstrated some evidence for a short term effect of PA on abstinence. However, evidence for a long-term effect is minimal, though some studies indicate an association between engaging in PA and abstinence (Abrantes et al., 2009; Prochaska, et al., 2008; Taylor & Katomeri, 2007; Ussher, et al 2012; Ussher, West, McEwen, Taylor, & Steptoe, 2003; Whiteley, et al., 2012). Studies have generally been limited by small sample sizes, interventions of insufficient intensity, and poor maintenance of PA.

Intervention research has generally focused on younger or broader age populations, with little data available for mid-life and older adults. Use of PA may be particularly effective for aging adults for whom the immediate health benefits of PA and smoking cessation may be more apparent than for younger groups (Ossip-Klein et al., 1999).

This study examines data specifically for smokers ages 50 and older with three objectives: to identify frequency and types of PA used for coping, to identify predictors of reporting PA as

a coping strategy, and to determine whether use of PA is associated with 12 month abstinence prevalence.

2.METHODS

2.1. Participants

This is a secondary data analysis of an existing dataset (Project 50) from an NIH randomized controlled trial of tobacco cessation intervention for mid-life and older smokers conducted at the University of Rochester Medical Center from 1996–2000 (McIntosh, Ossip-Klein, Spada, & Burton, 2000; Ossip-Klein, Carosella, & Krusch, 1997; Ossip-Klein et al., 2000; Ossip-Klein et al., 1999). Participants were ages 50 and older, smoked 10 cigarettes per day for 10 years, planned to quit within 3 months, and lived in a 15-county area in New York State. The study did not target PA for intervention.

The complete dataset includes 1,975 subjects, of whom a total of 1,640 responded to the 12-month follow-up telephone interview (83% follow-up). The sample was narrowed to include only respondents reporting a 24-hour quit attempt during the past 12-months (n=799), who were thus eligible to report coping strategies.

2.2 Procedure

Baseline data were collected using a self-administered survey of smoking status, readiness to quit, smoking history, and other demographic data. Follow-up telephone interviews were conducted at 6, 12 and 18 months. The current analysis used baseline data as well as PA and abstinence data collected at 12-months to evaluate types of PA, factors associated with use of PA and whether use of PA as a coping strategy is associated with smoking cessation.

2.3 Measures

Abstinence was defined by 7 day point-prevalence abstinence at 12 months, defined as not smoking a cigarette (even a puff) or using any other form of tobacco in the last 7 days (per Hughes et al., 2003 recommendations). Self-reported abstinence was verified by a significant other. If the significant other reported that the subject smoked or the subject refused to let the interviewer contact the significant other, the subject was reclassified as a smoker.

Physical activity was defined based on guidelines and recommendations from the CDC, AHA and American College of Sports Medicine (ACSM) as any bodily movement produced by skeletal muscles that result in energy expenditure above a resting rate (Pate et al., 1995; Centers for Disease Control and Prevention, 2011). For clarity, the CDC definition of PA differs from the CDC definition of exercise, which is a more intense and structured form of activity and may be less appropriate for the target population (Centers for Disease Control and Prevention, 2011). PA was assessed from an open-ended item at 12 months asking what subjects said to themselves or did when tempted to smoke. Responses were coded for presence of PA and type. Two raters independently coded the first 100 records with 100% agreement. A single rater coded subsequent records.

2.4 Statistical Analysis

Summary statistics provided descriptive data, followed by bivariate analyses (chi-square, t-test, ANOVA) to examine differences for individual variables between those who did and did not use PA to cope and those who were and were not abstinent at 12 months. Based on prior research, variables examined for relation with coping were age, gender, race, marital status, education (high school, some college, college), whether participant lives alone (yes/no), self-efficacy (based on 1–10 rating of confidence in quitting), and general health status (excellent, good/very good, fair/poor). Covariates examined for relation with abstinence included gender, race, living alone, education, years smoked, number of cigarettes/day, use of nicotine replacement therapy, self-efficacy (confidence in quitting), baseline PA, other home smokers, number of previous quit attempts, body mass index (BMI), two items based on the SF-12 (depressed mood and perceived health status; Hays, Sherbourne, & Mazel, 1995), and intervention condition. Potential multicollinearity was examined using correlations with no comparisons approaching an a priori strength of $r=0.80$. The final multivariable models (full model logistic regressions) controlled for intervention status and self-efficacy, and included variables significant at $p < .10$ in bivariate analyses. The Hosmer-Lemeshow Chi-Square was used to determine goodness of fit of the models. All analyses were performed using SAS version 8 (The SAS Institute, Inc, Cary NC).

3. RESULTS

Subject characteristics are presented in Table 1. Though about half reported engaging in PA at baseline (58.7%), only 11.6% ($N=93$) of subjects reported using PA as a coping strategy. For these subjects, walking was the most popular type of PA (64.5%), followed by “exercise,” (22.6%), housework (7.5%), gardening (8.6%), and other (e.g., Tai Chi, swimming, bicycling; 16.1%).

3.1 Women use PA to cope during a quit attempt

Chi-square analysis of differences between those who did and did not use PA to cope revealed one statistically significant variables at $p < 0.05$, female gender (14.31% vs. 7.42% females vs. males, respectively; $\chi^2(1) = 8.77, p=0.003$), and one additional variable at $p < .10$, baseline PA (13.55% vs. 9.17% yes vs. no, respectively, $\chi^2(1) = 3.54, p=0.06$). These variables were entered into the logistic regression along with intervention group and self-efficacy as covariates. The Hosmer-Lemeshow Chi-Square was not significant, demonstrating an adequate fit for the model ($\chi^2(8) = 5.54, p=0.70$). Results (Table 2) identified female gender as the only characteristic to significantly predict the use of PA for coping during a quit attempt (OR=2.03, 95% CI: 1.24–3.34).

3.2 PA is not associated with abstinence at 12 months

Four variables were associated with 12 month abstinence at $p < 0.05$ in bivariate analyses: male gender (males: 40.00 %; females: 28.63%; $\chi^2(1) = 11.09, p=0.0009$), higher baseline self-efficacy (quitters: $M=6.07, SE=0.15$; non-quitters: $M=5.58, SE=0.11$; $t(797)=2.61, p=0.009$), less depressed mood (quitters: $M=4.50, SE=0.07$; non-quitters: $M=4.27, SE=0.06$; $t(621.46)=2.65, p=0.008$; higher score indicates less depressed mood), and no other home smokers (none: 35.22%; any other home smokers: 28.02%; $\chi^2(1) = 3.85, p=0.0497$). These

covariates, along with intervention condition and PA, were entered into the logistic regression model. The Hosmer-Lemeshow Chi-square was not significant, indicating an adequate fit for the model ($\chi^2(8) = 4.70, p=0.79$). Though in the predicted direction, PA was not significantly associated with abstinence (36.56% vs. 32.58% for quitters and smokers; $OR=1.24, CI: 0.78-1.98$) (Table 2). Two variables were associated with 12-month abstinence: male gender ($OR=0.62, CI: 0.45-0.83$ with males as the reference group) and higher baseline self-efficacy ($OR=1.08, CI: 1.02-1.15$).

4. DISCUSSION

This study examined frequency and types of PA used for coping during quitting, factors associated with use of PA, and whether it is associated with increased quit rates during a cessation attempt in a sample of smokers ages 50 and older. Only 11.6% of participants reported using PA as a coping strategy, with walking by far the most common PA. Females were twice as likely as males to report PA as a coping strategy. Though 12 month abstinence rates were higher among smokers who used PA relative to those who did not, this difference was not statistically significant.

Higher use of PA by females is consistent with prior research indicating higher baseline exercise reported by women than men enrolled in a cessation study (Abrantes et al., 2009). It is also possible, however, that the current results reflected a response bias if women were more likely to respond to an open-ended question on type of coping strategy used.

While in the predicted direction, this study did not find a significant association between PA and 12-month abstinence. There were limitations that may have obscured a relationship. The small sample size of those reporting PA reduced statistical power and also precluded sub-analyses of relative effects of particular PA types and of potential interactions. Further, the study was not designed to specifically assess PA. Prospective examination of use of PA for coping with a more detailed assessment may provide greater measurement accuracy and reduce response bias. In addition, randomized controlled trials of PA with mid-life and older smokers are needed to determine efficacy for smoking cessation specifically in this population.

Male gender and higher self-efficacy were predictive of 12-month abstinence. These findings are consistent with prior literature in broader aged populations (Caponnetto & Polosa, 2008; Ferguson et al., 2005; Lennox, 1992; Mudde, Kok, & Strecher, 1995; Perkins & Scott, 2008).

Overall, the current study provided an initial examination of PA as a coping strategy for mid-life and older smokers attempting to quit. Very few reported using PA, and though it did not significantly increase abstinence, PA did not impede quit success. Whether a relationship would be found with a larger sample, more detailed assessment of PA, or particular types of PA remain to be studied. Given the potential for both smoking cessation and increased PA to improve health and quality of life in the growing population of mid-life and older adults, more systematic research on the value of combining these interventions for this understudied group is indicated.

References

- Abrantes AM, Strong DR, Lloyd-Richardson EE, Niaura R, Mahler CW, Brown RA. Regular exercise as a protective factor in relapse following smoking cessation treatment. *The American Journal on Addictions*. 2009; 18(1):100–101.10.1080/10550490802545182 [PubMed: 19219672]
- Burns DM. Cigarette smoking among the elderly: Disease consequences and the benefits of cessation. *American Journal of Health Promotion*. 2000; 14(6):357. [PubMed: 11067570]
- Caponnetto P, Polosa R. Common predictors of smoking cessation in clinical practice. *Respiratory Medicine*. 2008; 102(8):1182–1192.10.1016/j.rmed.2008.02.017 [PubMed: 18586479]
- Centers for Disease Control and Prevention. Physical activity for everyone. A glossary of terms. 2011. Retrieved 7/24/2013 from <http://www.cdc.gov/physicalactivity/everyone/glossary/>
- Centers for Disease Control and Prevention. Current cigarette smoking among adults-- United States, 2011. *Morbidity and Mortality Weekly Report*. 2012; 61(44):889–894. [PubMed: 23134971]
- Centers for Disease Control and Prevention. The state of aging and health in America 2013. Atlanta, GA: Centers for Disease Control and Prevention, US Dept of Health and Human Services; 2013.
- Daniel J, Cropley M, Ussher M, West R. Acute effects of a short bout of moderate versus light intensity exercise versus inactivity on tobacco withdrawal symptoms in sedentary smokers. *Psychopharmacology*. 2004; 174(3):320–326. [PubMed: 14997270]
- Ferguson J, Bauld L, Chesterman J, Judge K. The English smoking treatment services: One year outcomes. *Addiction*. 2005; 100(Suppl 2):59–69. [PubMed: 15755262]
- Garber CE, Blissmer B, Deschenes MR, Franklin BA, Lamonte MJ, Lee I-M, Swain DP. for the American College of Sports Medicine. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: Guidance for prescribing exercise. *Medicine & Science in Sports & Exercise*. 2011; 43(7): 1334-1334–1359. [PubMed: 21694556]
- Haasova M, Warren FC, Ussher M, Van Rensburg KJ, Faulkner G, Cropley M, Byron-Daniel J, Everson-Hock ES, Oh H, Taylor AH. The acute effects of physical activity on cigarette cravings: systematic review and meta-analysis with individual participant data. *Addiction*. 2012; 108:26–37. doi: 10.1111/j.360-0443.2012.04034.x. [PubMed: 22861822]
- Hatziandreu EJ, Pierce JP, Lefkopoulou M, Fiore MC, Mills SL, Novotny TE, Davis RM. Quitting smoking in the United States in 1986. *Journal of the National Cancer Institute*. 1990; 82(17):1402–1406. [PubMed: 2388290]
- Hays, RD.; Sherbourne, CD.; Mazel, R. User's manual for the medical outcomes study (MOS) core measures of health-related quality of life. Santa Monica, CA: RAND Corporation; 1995.
- Hughes JR, Keely JP, Niaura JP, Ossip DJ, Richmond RL, Swann GE. Measures of abstinence in clinical trials: Issues and recommendations. *Nicotine and Tobacco Research*. 2003; 5(1):13–25. [PubMed: 12745503]
- Kerr, S.; Watson, H.; Tolson, D.; Lough, M.; Brown, M. Developing evidence-based smoking cessation training in partnership with older people and health professionals. Glasgow, Scotland: Caledonian Nursing and Midwifery Research Center; 2004.
- King AC, King DK. Physical activity for an aging population. *Public Health Reviews*. 2010; 32(2): 410–426.
- Lennox AS. Determinants of outcome in smoking cessation. *British Journal of General Practice*. 1992; 42(359):247–252. [PubMed: 1419248]
- McIntosh S, Ossip-Klein DJ, Spada J, Burton K. Recruitment strategies and success in a multi-county smoking cessation study. *Nicotine and Tobacco Research*. 2000; 2(3):281–284. [PubMed: 11082829]
- Mudde AN, Kok G, Strecher VJ. Self-efficacy as a predictor for the cessation of smoking: Methodological issues and implications for smoking cessation programs. *Psychology and Health*. 1995; 10(5):353–367.
- Nicita-Mauro V, Maltese G, Nicita-Mauro C, Lasco A, Basile G. Non-smoking for successful aging: Therapeutic perspectives. *Current Pharmaceutical Design*. 2010; 16(7):775–782. [PubMed: 20388087]

- Ossip-Klein DJ, Carosella AM, Krusch DA. Self-help interventions for older smokers. *Tobacco Control*. 1997; 6:188–193. [PubMed: 9396102]
- Ossip-Klein DJ, McIntosh S, Utman C, Burton K, Spada J, Guido J. Smokers ages 50+: Who gets physician advice to quit? *Preventive Medicine*. 2000; 31(4):364–369. [PubMed: 11006061]
- Ossip-Klein DJ, Pearson TA, McIntosh S, Orleans CT. Smoking is a geriatric health issue. *Nicotine and Tobacco Research*. 1999; 1(4):299–300. [PubMed: 11072426]
- Pate RR, Pratt M, Blair SN, Haskell WL, Macera CA, Bouchard C, Wilmore JH. Physical activity and public health: A recommendation from the Centers for Disease Control and Prevention and the American College Sports Medicine. *Journal of American Medical Association*. 1995; 273(5):402–407.
- Perkins KA, Scott J. Sex differences in long-term smoking cessation rates due to nicotine patch. *Nicotine and Tobacco Research*. 2008; 10(7):1245–1250.10.1080/14622200802097506 [PubMed: 18629735]
- Prochaska JJ, Hall SM, Humfleet G, Muñoz RF, Reus V, Gorecki J, Hu D. Physical activity as a strategy for maintaining tobacco abstinence: A randomized trial. *Preventive Medicine*. 2008; 47:215–220. [PubMed: 18572233]
- Rimer BK, Orleans CT, Keintz MK, Cristinzio S, Fleisher L. The older smoker: Status, challenges and opportunities for intervention. *Chest*. 1990; 97(3):547–553. [PubMed: 2306958]
- Schofield I, Kerr S, Tolson D. An exploration of the smoking-related health beliefs of older people with chronic obstructive pulmonary disease. *Journal of Clinical Nursing*. 2007; 16(9):1726–1735. [PubMed: 17727591]
- Taylor AH, Katomeri M. Walking reduces cue-elicited cigarette cravings and withdrawal symptoms and delays ad libitum smoking. *Nicotine and Tobacco Research*. 2007; 9(11):1183–1190. [PubMed: 17978993]
- Taylor DH, Hasselbad V, Henley SJ, Thun MJ, Sloan FA. Benefits of smoking cessation for longevity. *American Journal of Public Health*. 2002; 92(6):990. [PubMed: 12036794]
- Ussher M, Taylor A, Faulkner G. Exercise interventions for smoking cessation. *Cochrane Database of Systematic Reviews*. 2012; 1:1–39.
- Ussher M, West R, Doshi R, Sampuran AK. Acute effect of isometric exercise on desire to smoke and tobacco withdrawal symptoms. *Human Psychopharmacology: Clinical and Experimental*. 2006; 21(1):39–46. [PubMed: 16389665]
- Ussher M, West R, McEwen A, Taylor A, Steptoe A. Efficacy of exercise counselling as an aid for smoking cessation: A randomized controlled trial. *Addiction*. 2003; 98(4):523–532. [PubMed: 12653822]
- Van Rensburg KJ, Taylor A, Hodgson T. The effects of acute exercise on attentional bias towards smoking-related stimuli during temporary abstinence from smoking. *Addiction*. 2009; 104(11):1910–1917.10.1111/j.1360-0443.2009.02692.x [PubMed: 19832788]
- Whiteley JA, Williams DM, Dunsiger S, Jennings EG, Ciccolo JT, Bock BC, Albrecht A, Marcus BH. YMCA Commit to Quit, Randomized trial outcomes. *American Journal of Preventive Medicine*. 2012; 43(3):256–262. [PubMed: 22898118]
- Williams DM, Dunsiger S, Whiteley JA, Ussher MH, Ciccolo JT, Jennings EG. Acute effects of moderate intensity aerobic exercise on affective withdrawal symptoms and cravings among women smokers. *Addictive Behaviors*. 2011; 36:894–897. [PubMed: 21543158]

Table 1

Participant Demographics and Characteristics (N=799)

Demographic	N (%)
Gender	
Female	489 (61.2)
Male	310 (38.8)
Ethnic Group	
White	737 (92.4)
Black	46 (5.8)
Other	15 (1.9)
Marital Status	
Married	413 (51.7)
Not married	386 (48.3)
Living Arrangements	
Lives alone	267 (33.4)
Lives with other(s)	532 (66.6)
Education	
High school	351 (44.0)
Some college	234 (29.3)
College	198 (24.8)
Other	15 (1.9)
General Health Status	
Excellent	36 (4.5)
Good/Very Good	535 (67.2)
Poor/Fair	225 (28.3)
Intervention Condition	
Phone Calls	256 (32.0)
Mailings	274 (34.3)
Usual Care	269 (33.7)
Baseline Physical Activity	
Yes	465(58.7)
No	327 (41.3)
Used Physical Activity for Coping	93 (11.6)
Types of Physical Activity Used for Coping (n=93) ^a	
Walking	60 (64.5)
“Exercise”	21 (22.6)
Housework	7 (7.5)
Gardening	8 (8.6)
Other	15 (16.1)
	Mean (SE)
Age	58.03 (0.24)

Demographic	N (%)
Confidence to quit (1–10 scale)	5.74 (0.09)
BMI	26.42 (0.18)
Number of years smoked	39.26 (0.33)
Number of cigarettes per day	23.64 (0.38)
Depressed mood ^b	4.35 (0.04)

^aTotal exceeds 100% because multiple responses were allowed;

^bHigher score indicates less depressed mood

Table 2

Odds Ratios and 95% Confidence Intervals for the Logistic Regression Models

Predictors of Using Physical Activity for Coping		
Independent Variable	OR	95% CI
Gender (female vs. male)	2.03*	1.24–3.34
Intervention condition		
Phone vs. usual care	1.04	0.60–1.77
Mail vs. usual care	1.04	0.61–1.76
Self-efficacy	0.98	0.90–1.07
Baseline PA (yes vs. no)	1.52	0.95–2.42
Predictors of Abstinence at 12 months		
Independent Variable	OR	95% CI
Gender (female vs. male)	0.62*	0.45–0.83
Intervention condition		
Phone vs. Usual Care	1.20	0.83–1.73
Mail vs. Usual Care	0.89	0.62–1.30
Self-efficacy	1.08*	1.02–1.15
PA for Coping (yes vs. no)	1.24	0.78–1.98
Lives with another smoker (no vs. yes)	1.39	0.99–1.96
Depressed mood	1.14	1.00–1.29

*
p 0.05