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Minimum Recommended Physical Activity, and Perceived Barriers and Benefits of Exercise in Methadone Maintained Persons

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Abstract

Methadone-maintained persons are at increased risk for many physical and mental health disorders compared to the general population. Increased physical activity could offset these risks. We assessed physical activity level, and perceived benefits and barriers to exercise in a group of 305 methadone-maintained smokers. Mean participant age was 39.9 years of age, 50.2% were male, 79.7% were non-Hispanic White, and mean body mass index was 29.8. Nearly 45% endorsed fair or poor physical health. Although participants perceived many benefits of exercise and few barriers, only 38% of participants met weekly recommendations for physical activity, and nearly 25% reported no physical activity. Those who met recommended guidelines were significantly more likely to endorse relapse prevention as a benefit of exercise. Motivating MMT patients to increase physical activity could have important physical, mental health, and drug treatment benefits.

Keywords

Methadone; exercise; barriers; benefits; relapse prevention

1.0 Introduction

Physical activity, defined as “any body movement that works muscles and requires more energy than resting” (National Heart Lung and Blood Institute) has many important health benefits, including decreased risk of chronic disease, depression and anxiety, and premature mortality (Brown, Burton, & Rowan, 2007; Haskell, et al., 2007; Kruk, 2007; Sieverdes, et al., 2012; Warburton, Nicol, & Bredin, 2006). Conversely, the absence of physical activity increases risk of cardiovascular disease, hypertension, diabetes mellitus, osteoporosis, obesity, colon cancer, and psychiatric disorders (Blair, LaMonte, & Nichaman, 2004; Haskell, et al., 2007; Sieverdes, et al., 2012).

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Recommendations from the American College of Sports Medicine (ACSM) and the American Heart Association (AHA) specify that a healthy adult should complete a minimum of 30 minutes of moderate-intensity aerobic physical activity on five days each week or a minimum of 20 minutes of vigorous-intensity aerobic physical activity on three days each week (Garber, et al., 2011; Haskell, et al., 2007). In 2008 the U.S. Department of Health and Human Services increased the recommended vigorous-intensity physical activity to a minimum of 75 minutes a week (U.S. Department of Health and Human Services, 2008). Less than half of U.S. adults (48.8%) engage in physical activity at the minimum recommended level, and nearly 14% are considered physically inactive, reporting less than 10 minutes of activity per week of moderate or vigorous intensity (Centers for Disease Control and Prevention, 2007).

Certain sub-populations are at increased risk for both mental and physical illnesses that may be prevented or improved by regular physical activity. Compared to the general population, persons receiving methadone maintenance treatment (MMT) are at increased risk for diabetes mellitus, hypertension, coronary artery disease, chronic pain, sleep complaints, and other health related co-morbidities (Cullen, O'Brien, O'Carroll, O'Kelly, & Bury, 2009; Fareed, Casarella, Amar, Vayalapalli, & Drexler, 2009; Mertens, Lu, Parthasarathy, Moore, & Weisner, 2003; Sharkey, et al., 2011; Stein, et al., 2004): and they perceive their health to be worse than the general population (Millson, et al., 2004). In addition, nearly 90% of MMT participants smoke cigarettes, heightening their cardiovascular risk (Best, et al., 1998; Clarke, Stein, McGarry, & Gogineni, 2001; Demarie, et al., 2011; Teichtahl, et al., 2004). Psychiatric comorbidity, specifically anxiety and depression, occurs at higher rates in drug dependent individuals (Kandel, Huang, & Davies, 2001). Among opioid-dependent individuals, clinical studies suggest that about half report lifetime depression, and nearly one-third have depressed mood at treatment intake (Rounsaville, Weissman, Kleber, & Wilber, 1982).

Many health-related problems prevalent in methadone populations may be ameliorated by an increase in physical activity. Of special importance in this population, physical activity may help patients achieve and maintain abstinence from drugs and alcohol. Recent pilot studies have assessed the efficacy of exercise, a structured and planned form of physical activity, interventions in addressing drug (Brown, et al., 2010), marijuana (Buchowski, et al., 2011), and alcohol (Brown, et al., 2009) misuse, with positive results (Weinstock, Barry, & Petry, 2008). However, to our knowledge only one study has assessed activity level and motivation to exercise in MMT patients; they found low levels of physical activity in MMT participants, but encouragingly, motivation to exercise was the best predictor of physical activity (Pieper, Templin, Kirsner, & Birk, 2010). Understanding benefits and barriers to exercise as well as level of physical activity in a MMT population may be important to motivate this group to increase physical activity. In the general population, greater awareness of the health risks associated with physical inactivity drives motivation to exercise (Martin, Morrow, Jackson, & Dunn, 2000).

In the general population, barriers to exercise appear to differ by age and gender. The most common barriers cited have been lack of time, health concerns or limitations, lack of energy, and lack of motivation (Cohen-Mansfield, Marx, & Guralnik, 2003). For inactive adults encouraged to identify barriers to physical activity, perceived lack of time was cited as the primary barrier to physical activity (Booth, Bauman, Owen, & Gore, 1997). For elderly adults (aged 60 to 78 years), health concerns appear to be the largest barrier (Newson & Kemps, 2007). Additionally, in a study of elderly Australians, poor health and risk of injury (perceived or actual), were cited as important barriers to physical activity (Booth, Owen, Bauman, Clavisi, & Leslie, 2000). Several studies across substance abusing populations

have suggested that the most common barriers to exercise are lack of motivation, lack of time, and costs associated with exercise (Read, et al., 2001).

While physical activity frequency, and the barriers, benefits, and motivators to exercise have been examined in the general population, no study has broadly described activity level in an MMT population. The purpose of this study is to provide a comprehensive examination of exercise attitudes and physical activity in a sample of MMT smokers. A greater understanding of the benefits and barriers to exercise among this vulnerable subpopulation of substance abusers can potentially inform the development of exercise interventions, which could have important implications for substance use treatment and the physical and mental health of MMT patients.

2.0 Methods

2.1 Participants

Study participants were recruited from nine methadone maintenance treatment (MMT) sites throughout Southern New England for a smoking cessation intervention trial. Study eligibility included: currently a smoker (10 cigarettes per day); enrollment in methadone treatment for at least four weeks; no current (less than two weeks ago) use of pharmacotherapy for smoking cessation; absence of bipolar disorder, schizophrenia, or suicidal ideation; non-pregnant; no recent seizures, psoriasis, dialysis, recent heart problems (study medication contraindications), and the ability to complete the study interviews in English. The study protocol was approved by the Butler Hospital Institutional Review Board.

Between December 2008 and May 2011, 760 individuals were screened for the study. Of those, 246 were ineligible. The most common reasons for study ineligibility were self-reported diagnosis of bipolar disorder or schizophrenia or exclusionary medications (coumadin, insulin, lithium, depakote, thorazine, haldol, clozaril). A total of 514 individuals were eligible for the study, and one hundred ninety three did not attend the initial appointment to enroll; 321 enrolled in the protocol. After written, informed consent, an additional 16 were excluded, most often for not completing the baseline visit. The final sample consisted of 305 participants. All participants completed a 45-minute baseline interview assessment. Baseline data were used in the current analysis.

2.3 Baseline Measures

Physical Activity—Participants were asked to recall their physical activity levels for the previous 7-days using the Short Version of the International Physical Activity Questionnaire (<https://sites.google.com/site/theipaq/questionnaires>; (Craig, et al., 2003). Participants received broad definitions of “vigorous” and “moderate” physical activity to help self-report accuracy. For each type of physical activity, participants were asked to recall on how many days they performed at least 10 minutes of the specific physical activity type. They then provided the average number of hours and minutes of each type of physical activity per day. Following the recommended guidelines for physical activity (Haskell, et al., 2007), we constructed a dichotomous indicator coded 1 if participants reported participating in moderate physical activity for at least 30 minutes per day on 5 or more days a week, or engaged in vigorous-intensity activities for at least 20 minutes per day on 3 or more days a week. We used the more conservative minimum recommendation for vigorous activity currently recommended by the ACSM (Garber, et al., 2011).

Barriers to Exercise—Participants were asked to identify perceived barriers to exercise using an 18-item scale developed by Booth et al (Booth, et al., 1997). Participants rated each

potential barrier on a scale from 1–7, with 1 corresponding to “not at all true for me” and 7 “very true for me”. Items were treated individually; no summated barriers scores were derived.

Benefits to Exercise—Participants rated 16 potential benefits to exercise based on the Motives for Physical Activity Measure (Ryan, Frederick, Lipes, Rubio, & Sheldon, 1997). Additional questions specifically addressing exercise benefits on substance use were included. Participants rated potential benefits to exercise on the same 7-point scale used to assess barriers to exercise and items were once again treated individually.

Baseline Characteristics—Assessed demographic characteristics included age, race/ethnicity, and height. Participants were weighed at the time of the interview; 18 refused to be weighed. Body-mass index (BMI) values were derived based on standard calculations using height and weight. Methadone dose was retrieved from the clinic records. Finally, cigarettes smoked per day was measured using a Time Line Follow-Back (Sobell & Sobell, 1996), assessing smoking behavior for the 30 days immediately prior to the baseline interview.

2.4 Analytic Methods

Simple descriptive statistics are reported to summarize participants’ demographic characteristics, smoking behaviors, and patterns of physical activity. We report rates of endorsement of 16 perceived benefits of exercise and 18 perceived barriers to exercise for the entire cohort and by physical activity level. Pearson χ^2 tests were used to compare endorsement rates by physical activity level. These comparisons are not intended as tests of explicit a priori hypotheses. Instead, these exploratory analyses are intended to identify potentially important patterns that can inform future research. For this purpose we believe Type II errors may be as or more egregious than Type I errors. Therefore, we report and interpret p-values unadjusted for the multiple ($n = 34$) comparisons. Bonferonni corrected p-values would provide rigorous control of the family-wise Type I error rate but are very conservative when testing non-independent hypotheses (Narum, 2006). For interested readers we note that the Bonferonni adjusted p-value is $.05/34 \approx .001$. As auxiliary analyses, we used bivariate logistic regression to explore the association of each benefit of and barrier to exercise with age, gender, and BMI.

3.0 Results

Participants averaged 39.7 (± 9.6) years of age, 153 (50.2%) were male, 243 (79.7%) were non-Hispanic White, 8 (2.6%) were African-American, 38 (12.5%) were Hispanic, and 16 (5.3%) were of other ethnic origins (Table 1). Forty (13.1%) participants were employed full-time, 28 (9.2%) part-time, and 237 (77.7%) were currently unemployed; 126 (41.3%) reported that they were currently receiving disability payments. On average, participants smoked 19.7 (± 8.6) cigarettes per day during the 30 days prior to assessment, and the mean methadone dose was 109.2 (± 63.2) mg. BMI scores ranged from 17.7 to 53.3 with a mean of 29.8 (± 6.7). Based on the BMI, only 3 (1.0%) participants would be classified as underweight, 68 (23.7%) as normal weight, 103 (35.0%) as overweight, and 113 (39.4%) as obese. About 20.0% rated their general health as very good or excellent, 35.1% as good, and 45.0% as fair or poor. Minutes of moderate and vigorous physical activity reported per week were strongly and positively skewed. The mean number of minutes of vigorous physical activity reported per week was 300.6 (± 699.4) but the median was only 10, and 151 (49.5%) reported no vigorous physical activity. The mean and median reported minutes of moderate physical activity were 375.9 (± 709.7) and 120, respectively; 93 participants (30.5%) reported no moderate physical activity and 75 (24.6%) participants reported no

minutes of either moderate or vigorous physical activity. The potential influence of extreme reports of physical activity duration is mitigated in subsequent analysis where activity was dichotomized to contrast those meeting recommended physical activity level guidelines with those who do not. More than a third (38.4%) of participants met or exceeded recommended guidelines for weekly physical activity. The likelihood of meeting recommended physical activity criteria was not associated significantly with age ($t_{302} = 0.61$, $p = .543$), gender ($\chi^2 = 1.56$, $p = .211$), or BMI ($t_{285} = 0.79$, $p = .432$).

Participants generally endorsed the benefits of exercise items at high rates (Table 2). Endorsement rates exceeded 75% on maintaining or losing weight to look better (78.2%), increasing confidence to stay clean and sober (78.5%), becoming physically fit (83.5%), improving cardiovascular fitness (88.1%), feeling stronger (88.8%), increasing energy level (89.1%), providing a sense of accomplishment (93.7%), and improving health (96.0%). The perception that exercise decreases urges and cravings to use alcohol and/or drugs was endorsed by 56.1% of the participants; this was the least frequently endorsed item. Other items with somewhat lower rates of endorsement were that exercise decreases depression (61.1%), helps prevent relapse (65.3%), reduces anxiety (70.0%), and improves stress management (70.0%).

Those who met guidelines for weekly physical activity were significantly ($\chi^2 = 4.49$, $p = .034$) more likely (72.6% v. 60.8%) than those who were less active to report a reduced likelihood of relapse was a benefit of exercise (Table 2). Those with higher levels of physical activity were also significantly more likely to report that exercise reduced anxiety ($\chi^2 = 5.53$, $p = .019$; 77.8% v. 65.1%), was fun ($\chi^2 = 6.96$, $p = .008$; 82.9% v. 69.4%), and helped with physically fitness ($\chi^2 = 10.73$, $p = .001$; 92.3% v. 78.0%).

As an auxiliary analysis we used bivariate logistic regression to evaluate the association of each benefit of exercise item with gender, age, BMI, and the physical function component of the SF-12 (results not presented in tabular form). Most associations were weak and not significant statistically. Males were significantly (OR = 0.49, $z = -2.45$, $p = .014$) less likely than females to endorse losing weight to look better as a benefit of exercise; this perceived benefit of exercise was also associated positively and significantly with BMI (OR = 1.08, $z = 3.09$, $p = .002$). The likelihood of believing exercise would improve cardiovascular fitness increased significantly as age increased (OR = 1.04, $z = 2.01$, $p = .044$). Gender, age, and BMI were not associated significantly with any of the other individual perceived benefits of exercise items described in Table 2.

Rates of endorsing barriers to exercise were generally much lower. The most frequently endorsed (33.9%) barrier to exercise was feeling too lazy or unmotivated to get started (Table 3). Other relatively frequently endorsed barriers to exercise were not having enough energy (31.3%), having an injury or disability that prevents exercise (27.6%), health problems (24.7%), not being able to afford exercise (22.7%), and not having anyone to exercise with (22.4%). Being too shy or embarrassed to exercise or being too old to exercise were each endorsed by only 8.2% of the participants. All other barriers to exercise had overall endorsement rates ranging from 10% to 20% (Table 3).

Compared to those who met recommended guidelines for weekly physical activity, participants with low physical activity levels were significantly more likely to report: they didn't enjoy physical activity ($\chi^2 = 4.97$, $p = .026$; 16.6% v. 7.7%), they would never keep it up ($\chi^2 = 6.73$, $p = .009$; 24.1% v. 12.0%), their health isn't good enough ($\chi^2 = 12.37$, $p < .000$; 31.6% v. 13.7%), and they didn't have the energy to exercise ($\chi^2 = 7.22$, $p = .0079$; 36.9% v. 22.2%).

As for benefits of exercise, we also evaluated the association of each individual barrier to exercise item with gender, age, and BMI. Males were significantly less likely than females (OR = 0.49, $z = -2.09$, $p = .037$) to report they were too overweight to exercise and significantly more likely than females (OR = 2.09, $z = 2.41$, $p = .016$) to report they didn't have enough time. Age was positively and significantly (OR = 1.06, $z = 2.80$, $p = .005$) associated with endorsing the potential to get injured or damaging one's health as a barrier to exercise, needing time to relax during spare time (OR = 1.05, $z = 2.73$, $p = .006$), reporting their health is not good enough for exercise (OR = 1.06, $z = 3.91$, $p < .000$), and reporting that an injury or disability prevents exercise (OR = 1.05, $z = 3.28$, $p = .001$).

4.0 Discussion

Nearly half of Americans meet the minimum weekly physical activity recommendations (Centers for Disease Control and Prevention, 2007) and 13.5% are classified as inactive, defined as less than ten minutes of physical activity per week. In this sample of methadone maintained smokers, only 38% of participants met the weekly recommendations, and perhaps more alarmingly, nearly a quarter reported no moderate or vigorous physical activity. With nearly three quarters of this cohort of smokers overweight or obese, our findings highlight that methadone programs are treating persons who are at very high risk for cardiovascular disease and other chronic health concerns and may benefit from increased physical activity.

Despite a lack of physical activity at recommended levels, numerous perceived benefits of exercise were identified and relatively few barriers to exercise were endorsed. Although this seems surprising given the low levels of physical activity, most of the benefits endorsed by those who were below recommended levels were similar to benefits reported by media and health care sources. It is likely that most individuals know that physical activity is beneficial for their mental and physical health, but find actualizing a regular exercise routine challenging. Those who met the weekly recommended minimum for physical activity were more likely to rate anxiety reduction and reduced likelihood of relapse as benefits, which are far less likely to be highlighted in the popular press, suggesting they had experienced these benefits first-hand.

Consistent with previous findings in substance using populations (Read, et al., 2001), the most commonly identified barrier to exercise in the current study was lack of motivation. In older, inactive adults, without substance use disorders, lack of motivation, physical health concerns, and lack of time are often cited as barriers to exercise (Booth, et al., 1997; Cohen-Mansfield, et al., 2003), findings that were replicated here. As age increased in our sample, endorsement of barriers related to possible injury, poor health, or physical disabilities increased, something that would need to be accounted for when recommending exercise or increased physical activity in this population. Increased physical activity can have positive impact on chronic health conditions (Warburton, et al., 2006), including improvement in pain, mobility issues, and mental health concerns (Sawatzky, Liu-Ambrose, Miller, & Marra, 2007).

Brief interventions (BIs) or counseling sessions designed to increase physical activity have been effective in a variety of populations (Calfas, et al., 1996; Orrow, Kinmonth, Sanderson, & Sutton, 2012; Parra-Medina, et al., 2011; Writing Group for the Activity Counseling Trial Research Group, 2001). Although physical activity promotion was part of a multi-faceted health promotion intervention for methadone patients, the study authors noted that interventions to increase physical activity are needed (Fareed, et al., 2010). It is possible that a brief, counselor administered physical activity or exercise intervention would provide health benefits to this population as other interventions targeting different behaviors have

been successful (Darker, et al., 2012; Fareed, et al., 2010; Holbrook & Kaltenbach, 2011). The widely used 5 A's (ask, advise, assess, assist, arrange) smoking cessation intervention (Fiore, Jaen, & Baker, 2008) could be adapted for physical activity or exercise, thereby providing a standardized framework for a clinic based brief intervention. The potential mental health and relapse prevention benefits would be important to mention during the 'advise' portion of the BI. This may be especially important given the high endorsement of perceived benefits from exercise despite low levels of physical activity. Another potentially cost-effective intervention could involve peer led exercise promotion groups run through methadone clinic programs.

The limitations of the current study should be considered in interpreting our findings. First, our study is cross-sectional, which limits our ability to ascribe causality or direction of effect to the results, or changes over time. Second, levels of physical activity were measured by self-report, potentially introducing reporting bias and recall errors. Further, there have been reports that the IPAQ measure may overestimate self-reports of physical activity (Lee, Macfarlane, Lam, & Stewart, 2011). This possibility is likely in this cohort as well. For example, some participants working in the construction industry indicated eight hours of vigorous physical activity a day; others who did not have transportation reported 6 hours a day of moderate physical activity as they walked (at a self-reported moderate pace) for a good part of the day. Future research should include independent objective measures of physical activity such as data gathered from an accelerometer. However, despite the likelihood of participant over-reporting of physical activity, much lower rates of those meeting the public health recommended levels of physical activity were observed in this sample relative to population levels. Further, confidence in the observed associations in this study is increased by our use of dichotomized physical activity outcomes that are less influenced by extreme values and outliers. Third, we did not ask participants to rank their perceived exercise benefits and barriers, or ask which items motivated behavior, therefore no level of importance can be ascribed to the endorsed items. It is possible, although unlikely, that a highly endorsed benefit or barrier has no practical importance to the participants. For example, an individual may endorse that exercise would improve their health; however, they may expect things like changes in diet and smoking behavior to have a more direct impact. Fourth, study participants were recruited for a smoking cessation trial. Although 80–90% of MMT patients are smokers (Nahvi, Richter, Li, Modali, & Arnsten, 2006; Richter, Gibson, Ahluwalia, & Schmelzle, 2001), these results may not generalize to all methadone patients, opioid dependent persons not receiving methadone, or to persons with other substance use disorders. While smokers are at heightened cardiovascular risk compared to non-smokers, smoking may make it more difficult to engage in physical activity for some due to shortness of breath. Fifth, our findings regarding differences in perceived barriers and benefits to exercise by activity level should be interpreted as exploratory and hypothesis-generating rather than confirmatory. We conducted a large number of non-independent comparisons. We chose to not use highly conservative corrections (e.g., Bonferonni or Holm) that limit power to detect potentially important patterns of association. Our findings require confirmation in future research. Sixth, due to medication contraindications, those with serious health issues (i.e. kidney failure, recent heart problems) were excluded from study participation. This may have artificially lowered endorsement of poor health as a perceived barrier to exercise. Finally, our study sample may not be representative of gender, race, and ethnicity of methadone clinics outside of Rhode Island and therefore these results may not generalize to other populations of MMT patients.

Nearly 300,000 individuals are enrolled in methadone maintenance programs at any given time in the United States (Substance Abuse and Mental Health Services Administration, 2011). This study assessed the attitudes about exercise and level of physical activity in a cohort of methadone maintained persons from 9 distinct programs, demonstrating high

levels of obesity and low levels of physical activity. Physical activity is well known to have positive impacts on physical and mental health (Brown, et al., 2007; Haskell, et al., 2007; Kruk, 2007; Sieverdes, et al., 2012; Warburton, et al., 2006), and evidence is emerging as to the positive role of exercise in the treatment of drug and alcohol disorders (Brown, et al., 2009; Brown, et al., 2010; Buchowski, et al., 2011; Roessler, 2010). Given this, it would seem useful to add a brief discussion of physical activity and exercise to monthly counseling sessions, or scheduled physician visits. Developing efficacious and low-cost physical activity adjuncts to this population at high risk for lifestyle-induced medical conditions may have important benefits for health and drug treatment outcomes.

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Table 1

Background Characteristics (n = 305 Except Where Noted)

	n (%)	Mean (SD)	Median
<i>Age (Years)^a</i>		39.7 (± 9.6)	40.0
<i>Gender (Male)</i>	153 (50.2%)		
<i>Race/Ethnicity</i>			
non-Hispanic White	243 (79.7%)		
African-American	8 (2.6%)		
Hispanic	38 (12.5%)		
Other Ethnic Minority	16 (5.3%)		
<i>Employment Status</i>			
Employed Full-Time	40 (13.1%)		
Employed Part-Time	28 (9.2%)		
Unemployed	237 (77.7%)		
<i>Receiving Disability (yes)</i>	126 (41.3%)		
<i>Age Started Smoking Regularly</i>		16.6 (± 5.0)	16.0
<i>Years Regular Smoking^a</i>		23.1 (± 10.2)	23
<i>Mean Cigs/TLFB Day^c</i>		19.7 (± 8.6)	20
<i>Methadone Dose^c</i>		109.2 (± 63.2)	100
<i>Mean BMI^b</i>		29.8 (± 6.7)	28.3
Underweight (< 18.5)	3 (1.0%)		
Normal (18.5 – 24.9)	68 (23.7%)		
Overweight (25 – 29.9)	103 (35%)		
Obese (≥ 30)	113 (39.4%)		
<i>Mean Perceived Health Rating</i>		3.29 (0.99)	3.00
Poor	27 (8.9%)		
Fair	110 (36.1%)		
Good	107 (35.1%)		
Very Good	47 (15.4%)		
Excellent	14 (4.65%)		
<i>Minutes Moderate Physical Activity/week</i>		375.9 (± 709.7)	120
<i>Minutes Vigorous Physical Activity/week</i>		300.6 (± 699.4)	10
<i>Met Minimum Physical Activity Recommendation</i>	117 (38.4%)		

^aValid n = 304.^bValid n = 287.^cValid n = 297.

Table 2

Perceived Benefits of Exercise by Physical Activity Level

Item	n (%) ENDORSED ITEM ^a			χ^2 (p =) ^b
	Total (n = 303)	Met Physical Activity Criteria		
		No (n = 186)	Yes (n = 117)	
Decrease urges and cravings to use alcohol and/or drugs.	170 (56.1%)	101 (54.3%)	69 (59.0%)	0.64 (.425)
Decrease my depression.	185 (61.1%)	110 (59.1%)	75 (64.1%)	0.74 (.388)
Be less likely to relapse.	198 (65.3%)	113 (60.8%)	85 (72.6%)	4.49 (.034)
Experience less anxiety.	212 (70.0%)	121 (65.1%)	91 (77.8%)	5.53 (.019)
Manage stress better.	212 (70.0%)	124 (66.7%)	88 (75.2%)	2.50 (.114)
It would help me quit smoking.	226 (74.6%)	136 (73.1%)	90 (76.9%)	0.55 (.459)
Have fun.	226 (74.6%)	129 (69.4%)	97 (82.9%)	6.96 (.008)
Provide structure in my life.	235 (77.6%)	141 (75.8%)	94 (80.3%)	0.85 (.357)
Maintain or lose weight so I look better.	237 (78.2%)	143 (76.9%)	94 (80.3%)	0.50 (.477)
Increase my confidence to stay clean and sober.	238 (78.5%)	142 (76.3%)	96 (82.1%)	1.39 (.239)
Become physically fit.	253 (83.5%)	145 (78.0%)	108 (92.3%)	10.73 (.001)
Improve my cardiovascular fitness.	267 (88.1%)	161 (86.6%)	106 (90.6%)	1.12 (.290)
Feel stronger.	269 (88.8%)	163 (87.6%)	106 (90.6%)	0.63 (.426)
Increase my energy level.	270 (89.1%)	162 (87.1%)	108 (92.3%)	2.01 (.156)
Give me a sense of accomplishment.	284 (93.7%)	174 (93.5%)	110 (94.0%)	0.03 (.870)
Improve my health.	291 (96.0%)	180 (96.8%)	111 (94.9%)	0.68 (.408)

^aItem Endorsement was defined as a score of 5 or higher on a 7 point response scale ranging from 1 “not at all true for me” to 7 “very true for me.” Items are ordered from lowest to highest endorsement rates in the total cohort.

^bBecause these comparisons are intended to identify potentially important patterns in a cohort of methadone-maintained smokers, rather than test explicit a priori hypotheses, we did not adjust reported p-values for multiple comparisons; but if we had, the conservative Bonferonni adjusted p-value would have been $.05/34 \approx .001$.

Table 3

Perceived Barriers to Exercise by Physical Activity Level

Item	n (%) ENDORSED ITEM ^a			χ^2 (p =) ^b
	Met Physical Activity Criteria			
	Total (n = 304)	No (n = 187)	Yes (n = 117)	
I'm too shy or embarrassed	25 (8.2%)	13 (7.0%)	12 (10.3%)	1.04 (.308)
I'm too old	25 (8.2%)	17 (9.1%)	8 (6.8%)	0.48 (.487)
There aren't any suitable facilities nearby	31 (10.2%)	17 (9.1%)	14 (12.0%)	0.65 (.420)
I might get injured or damage my health	37 (12.2%)	26 (13.9%)	11 (9.4%)	1.36 (.243)
I'm not the sporty type	37 (12.2%)	26 (13.9%)	11 (9.4%)	1.36 (.243)
I'm too overweight	38 (12.5%)	27 (14.4%)	11 (9.4%)	1.67 (.196)
I don't enjoy physical activity	40 (13.2%)	31 (16.6%)	9 (7.7%)	4.97 (.026)
I haven't got the right clothes or equipment	42 (13.8%)	27 (14.4%)	15 (12.8%)	0.16 (.691)
I need to rest and relax in my spare time	45 (14.8%)	32 (17.1%)	13 (11.1%)	2.06 (.152)
I've got young children to look after	48 (15.8%)	32 (17.1%)	16 (13.7%)	0.64 (.424)
I haven't got time	57 (18.8%)	33 (17.6%)	24 (20.5%)	0.39 (.533)
I'd never keep it up	59 (19.4%)	45 (24.1%)	14 (12.0%)	6.73 (.009)
There's no one to do it with	68 (22.4%)	41 (21.9%)	27 (23.1%)	0.05 (.815)
I can't afford it	69 (22.7%)	44 (23.5%)	25 (21.4%)	0.19 (.661)
My health is not good enough	75 (24.7%)	59 (31.6%)	16 (13.7%)	12.37 (.000)
I have an injury or disability that stops me	84 (27.6%)	56 (29.9%)	28 (23.9%)	1.30 (.254)
I haven't got the energy	95 (31.3%)	69 (36.9%)	26 (22.2%)	7.22 (.007)
I'm too lazy/not motivated/can't get started	103 (33.9%)	71 (38.0%)	32 (27.4%)	3.62 (.057)

^aItem Endorsement was defined as a score of 5 or higher on a 7 point response scale ranging from 1 "not at all true for me" to 7 "very true for me." Items are ordered from lowest to highest endorsement rates in the total cohort.

^bBecause these comparisons are intended to identify potentially important patterns in a cohort of methadone-maintained smokers, rather than test explicit a priori hypotheses, we did not adjust reported p-values for multiple comparisons; but if we had, the conservative Bonferonni adjusted p-value would have been .05/34 \approx .001.