A Dissertation

entitled

Evaluating the Effectiveness of the Adult Marijuana Program

by

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Submitted to the Graduate Faculty as partial fulfillment of the requirements for the
Doctor of Philosophy Degree in Counselor Education and Supervision

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August 2012
Marijuana continues to be the most commonly used illicit drug in the United States. The courts have the dilemma of deciding how to treat people with marijuana offenses: (a) incarceration or (b) therapy. There is limited evidence on the effectiveness of court-mandated marijuana treatment.

The Adult Marijuana Program (AMP) is a 48-hour weekend program offered by a community mental health agency in the Midwestern United States to meet the needs of clients who are court-mandated to undergo treatment. This study examined the effects of AMP participation on clients’ denial of marijuana causing them problems. Decreased denial of a substance use problem is a precursor to increased readiness to use or seek help. The researcher also attempted to determine if other factors such as alcohol use, previous arrest history, educational level, and employment status were related to participant denial.

In this study the researcher found that court-mandated AMP participants reduced their denial of marijuana abuse causing them problems from the time of pre-treatment to post-treatment. Problematic alcohol use, presence of previous arrest history, level of
education, and employment status were not significant factors in participants’ denial changes from pre- to post-treatment. Therefore, there is no evidence to support exclusion of participants with co-occurring alcohol use problem from the AMP. There is also no evidence that special program adjustments need to be made based on participants’ previous arrest history, level of education, or employment status. The outcomes of this study may assist courts, practitioners, clients, and their families when they make a decision to pursue or recommend AMP intervention to people with marijuana-related offenses. It also provides AMP managers and clinicians with data that can be used for evidence-supported treatment planning and marketing.
Acknowledgments

I thank my family who encouraged me to never settle for less than I can become.

I thank my faculty who showed me how to get there.

I thank my friends who have been with me through thick and thin.

I thank Dr. Nick Piazza who helped me to put all of it into perspective.

I feel honored and lucky to have you all in my life.

This dissertation is dedicated to you.
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Chapter 1

Introduction

Marijuana continues to be the most commonly used illicit drug in the United States (Substance Abuse and Mental Health Services Administration [SAMHSA], 2009a). According to the results of the 2008 National Survey on Drug Use and Health: National Findings 15.2 million people used marijuana in the month prior to the survey (SAMHSA, 2009a). The courts have the dilemma of deciding how to treat people with marijuana offenses: (a) incarceration or (b) therapy. There is some indication that the presence of a marijuana-related legal issue was not a significant motivator for quitting marijuana smoking (McBride et al., 1994). Neither repeated nor heavy marijuana users spontaneously quit (Perkonigg, Goodwin, Fiedler, Behrendt, Beesdo, Lieb, & Wittchen, 2008; Perkonigg, Lieb, Hofler, Schuster, Sonntag, & Wittchen, 1999). According to the SAMHSA Treatment Episode Data Set (TEDS) report, the criminal justice system was the largest referral source for drug treatment in 2007, accounting for 37 percent of all TEDS admissions (2009b). Marijuana was the primary drug of abuse in 24 percent of those referrals, preceded by alcohol (43%), and followed by cocaine (11%), methamphetamine (11%), and opiates (7%) (SAMHSA, 2009b). Marijuana intoxication, abuse and dependence are described in the Diagnostic and Statistical Manual of Mental Disorders, fourth edition, text revision (DSM-IV-TR; American Psychiatric Association, 2000). Clinicians reference this manual when they diagnose children and adults with mental and emotional disorders. Court-ordered for treatment individuals may or may not have diagnosable marijuana related conditions. They may also be in denial that marijuana use is causing them problems.
There is limited evidence present as to the effectiveness of court-mandated marijuana
treatment (Gibbons et al., 2010). Program evaluation studies can be used to collect such
evidence. The majority of marijuana treatment outcome studies started to appear within
the last twelve years, with two randomized studies published before 2000 (Budney,
marijuana treatment. Most often researchers were interested in comparing the effects of
clinical, theoretical, and psychopharmacological approaches (Nordstrom & Levin, 2007)
that were previously found to be effective in treating other drug-related conditions
(Barber, 2006; McBride, Curry, Stephens, Wells, Roffman, & Hawkins, 1994; Moore, &
Budney, 2003; Stephens, Curtin, Simpson, & Roffman, 1994a; Stephens, Roffman, &
Simpson, 1994b). Other areas of marijuana treatment research have included the effects
of demographic variables on treatment outcomes (Roffman, Klepsch, Wertz, Simpson, &
Stephens, 1993; Stephens, Roffman, & Curtin, 2000; Stephens, Roffman, Fearer,
Williams, Picciano, & Burke, 2004; Stephens, Wertz & Roffman, 1993; Vendetti,
McRee, Miller, Christiansen, & Herrell, 2002), cost-effectiveness of treatment (Dennis et
al., 2002, 2004; French et al., 2002; Olmstead, Sindelar, Easton, & Carroll, 2007), and the
efficiency of brief interventions (Budney, Moore, Rocha, & Higgins, 2006; Lang,
Engelander, & Brooke, 2000; Stephens, Babor, Kadden, & Miller, 2002).

Most of the marijuana outcome studies implemented randomization in their research
designs and were conducted adhering to high academic standards. Academic study
results, however, do not always generalize well to non-academic environments due to
high cost; staff, educational, and referral source requirements; necessary program
reorganizations; or complexities of mental health issues among non-self-referred clients
of community-based treatment facilities where most drug and alcohol treatment takes place (Miller, Sorensen, Selzer, & Brigham, 2006; Steinberg et al., 2005; Tai, Straus, Liu, Sparenborg, Jackson, & McCarty, 2010). For example, some researchers used other drug abuse as an exclusion criterion (Doyle, Swan, Roffman, & Stephens, 2003; Martin & Copeland, 2008; Kadden, Litt, Kabele-Cormier, & Petry, 2007; Stephens et al., 1994b, 2000; Walker, Stephens, Rowland, & Roffman, 2011b). This criterion may not be possible to meet, however, if the treatment program is designed to provide services to all individuals required to undergo treatment regardless of other substance use. In addition, randomized studies often require extensive funding and time, and are impossible in community-based treatment facilities (Tai et al.). Therefore, researchers are encouraged to use existing patient databases and assess the effectiveness of ongoing treatment programs as they accumulate evidence based practice knowledge. Such an approach allows conducting research at lower cost, and ensures the applicability of study results outside the academic setting.

The Adult Marijuana Program (AMP) is offered by a community mental health agency in the Midwestern United States to meet the needs of clients who are court-mandated to undergo treatment. The AMP is designed to help clients recognize that marijuana is causing them problems, develop motivation for change, and decrease or stop their marijuana use. The AMP is a residential, two-day (48-hour) program for individuals who have been charged with a marijuana-related offense, and is often offered to clients as an alternative to incarceration. The AMP is based on a 12-week curriculum designed by the Marijuana Treatment Project (Steinberg et al., 2005), which was found to be effective with clients who volunteered to participate in treatment (Babor, 2004;
Gibbons et al., 2010; Steinberg et al., 2002; Stephens, Babor, Kadden, & Miller, 2002; Vendetti, McRee, Miller, Christiansen, & Herrell, 2002; Walker, Stephens, Rowland, & Roffman, 2011b). This curriculum was compressed into 2-day (48-hour) program.

**Purpose of the Study**

This study was designed to enable the researcher to determine whether the 48-hour Adult Marijuana Program helps court-mandated clients recognize that marijuana abuse is causing them problems. Specifically, the researcher hoped to show that participating in the AMP would reduce participant denial of a marijuana-related problem from the time of pre-test to post-test. The researcher also hoped to determine whether alcohol use, previous arrest history, education, and employment status were factors in participants’ denial changes from pre- to post-test.

**Statement of the Problem**

There is limited evidence on the effectiveness of court-mandated marijuana treatment (Gibbons et al., 2010). Apparently, only one study exists which concentrated on court-mandated treatment for marijuana related offenses (Carroll et al., 2006). Therefore, further research into court-mandated marijuana treatment appeared to be warranted to establish the best practice for helping this population.

A few studies reported that the level of education and employment status predicted participants’ decision to enroll into treatment (Vendetti et al., 2002) and marijuana treatment outcomes (Stephens et al., 1993). Effects of these variables, however, needed to be studied with the court-mandated population.
The Adult Marijuana Program (AMP) is offered by a community mental health agency in the Midwestern United States to meet the needs of clients who are court-mandated to undergo treatment. Courts, people with marijuana offenses, and their families benefit from knowing whether a brief marijuana treatment program helps clients overcome their denial and recognize that marijuana abuse is causing them problems (see Appendix A). Prochaska, DiClemente, and Norcross (1992) have argued that decreased denial of a substance use problem is a precursor to increased readiness to use or seek help.

**Significance of the Study**

This study examined the effects of AMP participation on clients’ denial that marijuana abuse was causing them problems. The researcher also attempted to determine if other factors such as alcohol use, previous arrest history, educational level, and employment status were related to participant denial. The outcomes of this study may assist courts, practitioners, clients, and their families to determine whether they want to pursue or recommend AMP intervention to people with marijuana-related offenses. It also provides AMP managers and clinicians with data that can be used for treatment planning and marketing.

**Research Questions**

1. Does participation in the AMP result in a change in the number of marijuana-related problems endorsed by clients between the pre- and post-treatment?

2. Is there a difference between the number of marijuana-related problems endorsed at pre-treatment when compared to post-treatment for participants who are positive for an alcohol use disorder and participants who are negative for an alcohol use disorder?
3. Is there a difference between the number of marijuana-related problems endorsed at pre-treatment when compared to post-treatment based on participants’ employment status?

4. Is there a difference between the number of marijuana-related problems endorsed at pre-treatment when compared to post-treatment based on participants’ level of education?

5. Is there a difference between the number of marijuana-related problems endorsed by participants at pre-treatment when compared to post-treatment for participants with a previous arrest history and participants without an arrest history?

**Definition and Operational Terms**

The program in this study was defined as a set of treatment activities directed towards helping clients meet their therapeutic goals under the direction of a treatment team (Wholey, Hatry, & Newcomer, 2010). Program evaluation is a methodical study of program components and results (Fitzpatrick, Sanders, & Worthen, 2004; Wholey et al., 2010). Program outcomes were defined as the results that the program tends to produce (Wholey et al., 2010). For the purposes of this study, the outcome of interest is in reduced denial and endorsement of marijuana-related problems as measured on Marijuana Problem Scale. Stake-holders were defined as people that were interested or affected by the results of this study (e.g., courts, clients and their families, and AMP practitioners and program managers) (Wholey et al., 2010).

**Summary**

Marijuana is the most commonly used illicit drug in the United States (SAMHSA, 2009a). The courts are the primary referral source for marijuana treatment. There is
limited evidence present about the effectiveness of court-mandated marijuana treatment. There is also no evidence of how alcohol use, previous arrest history, employment status, and education level factor in clients’ denial that marijuana abuse is causing them problems, when the clients are court-mandated for treatment. Therefore, further research of marijuana court-mandated interventions was warranted in attempt to establish the best practice for helping this population.

**Organization of Chapters**

This dissertation is organized into five chapters. Chapter One included the description and background of the problem that the current research addressed, as well as the purpose, and significance of this study. Chapter One also provided the description of the variables, research questions and relevant terms definitions of this study. Chapter Two encompasses a literature review that is relevant for this topic, offering an overview of the previous research. Chapter Three includes the description of the methods that is used in this study. Chapter Four presents the findings of this study. Chapter Five discusses the findings of this study.
Chapter 2
A Review of the Literature

Marijuana continues to be the most commonly used illicit drug in the United States (Substance Abuse and Mental Health Services Administration [SAMHSA], 2009a). According to the results of a 2008 National Survey on Drug Use and Health National Findings, marijuana was used by 15.2 million people in the month prior to the survey (SAMHSA, 2009a). The courts have the dilemma of deciding how to treat numerous people with marijuana offenses: (a) incarceration or (b) therapy. According to the SAMHSA Treatment Episode Data Set (TEDS) report, the criminal justice system was the largest referral source for drug treatment in 2007, accounting for 37 percent of all TEDS admissions (2009b). Marijuana was the primary drug of abuse in 24 percent of those referrals, preceded by alcohol (43%), and followed by cocaine (11%), methamphetamine (11%), and opiates (7%) (SAMHSA, 2009b).

There is limited evidence present on the effectiveness of court-mandated marijuana treatment (Gibbons et al., 2010). Such evidence can be collected by conducting program evaluation studies. Program evaluation is “the application of systematic methods to address questions about program operations as results” (Wholey, Hatry, & Newcomer, 2010, p.6). It has the goal of determining “the worth or merit” of the program that is evaluated (Fitzpatrick, Sanders, & Worthen, 2004, p.10). There are various types of program evaluation designs and approaches including exploratory evaluation, performance measurement systems, comparison group designs, randomized control trials, case studies, and logic models (Wholey et al.). Program evaluation can also be classified as formative or summative, ongoing or one-shot, observatory or participatory, goal-based
or goal-free, quantitative or qualitative, and problem- or non-problem-oriented (Whooley et al.).

Performance measurement systems, comparison group designs, and randomized control trials are commonly used in assessing drug and alcohol treatment effectiveness (Tai, Straus, Liu, Sparenborg, Jackson, & McCarty, 2010). Performance measurement systems were developed to “track selected measures of program, agency or system performance at regular time intervals and report these measures to managers or other specified audiences [stake-holders] on an ongoing basis” (Whooley et al., 2010, p.101).

Performance measurement is used: to evaluate program performance, and provide stake-holders with necessary information to make management decisions (Wholey et al., 2010). The evaluator can emphasize different program aspects in conducting performance management evaluation: Program outcomes (results that the program produces), cost-effectiveness (the cost of the outcomes received), outputs (quantity of completed work, e.g., number of seminars taught), efficiency (ratio of the outputs to total program costs), service quality or quality of the outputs (e.g., timeliness, turnaround time, accuracy, thoroughness, accessibility, convenience, courtesy and safety), and customer satisfaction (e.g., clients’ perception of their service experience) (Wholey et al., 2010).

In randomized control trials, the researcher randomly assigns participants to an intervention condition (e.g., participation in a program) or a control group (e.g., no participation). This approach is a desired, or in some fields (e.g., pharmacology) even required, design to evaluate the effectiveness of the researched intervention (Wholey et al., 2010). The Coalition for Evidence-Based Policy (2002) argues that randomization is required to consider that the intervention effectiveness is supported by rigorous evidence.
Randomization is not always possible, therefore, comparison group designs are implemented instead. In such designs the evaluator compares the intervention group with a non-intervention (control) group where group participation was not randomized (Wholey et al., 2010). For example, participation in drug treatment was court-mandated. With the help of such designs the evaluator answers the practical question of what would happen if the intervention did not exist.

The majority of marijuana treatment outcome studies started to appear within last twelve years, with only two randomized studies published before 2000 (Budney, Higgins, Randonovich, & Novy, 2000). Only one study was found that focused on court-mandated marijuana treatment (Carroll et al., 2006). Most often researchers were interested in comparing the effects of clinical, theoretical, and psychopharmacological approaches (Nordstrom & Levin, 2007) that were previously found to be effective in treating other drug-related conditions (Barber, 2006; McBride, Curry, Stephens, Wells, Roffman, & Hawkins, 1994; Moore, & Budney, 2003; Stephens, Curtin, Simpson, & Roffman, 1994a; Stephens, Roffman, & Simpson, 1994b).

Marijuana treatment studies concentrated on a number of interventions: Aversion therapy (Morakinyo, 1983; Smith, Schmeling, & Knowles., 1988), behavioral therapy (Budney et al., 2000), cognitive behavioral therapy (CBT) (Budney, Moore, Rocha & Higgins, 2006; Copeland, Swift, Roffman, & Stephens, 2001; Kadden, Litt, Kabele-Cormier, & Petry, 2007; Martin & Copeland, 2008; Stephens et al., 1994b; Stephens, Roffman & Curtin, 2000, Walker, Stephens, Rowland, & Roffman, 2011b), motivational enhancement therapy (Babor, 2004; Budney et al., 2000; Gibbons et al., 2010; Gray, McCambridge, & Strang, 2005; Herrell, 2002; Kadden et al., 2007; McBride et al., 1994;
Miller, Christiansen, & Walker et al., 2011b; Steinberg et al., 2002; Stephens, Babor, Kadden, & Miller, 2002; Vendetti, McRee, Miller, Christiansen, & Herrell, 2002; Stephens et al., 2000; Walker et al., 2011a, Walker et al., 2011b; Walker, Roffman, Stephens, Wakana, & Berghuis, 2006), family therapy (Dennis et al., 2002, 2004; Rigter et al., 2010), individual chemical dependency treatment (Carroll et al., 2006; Olmstead, Sindelar, Easton, & Carroll, 2007), personal feedback (Doyle, Swan, Roffman, & Stephens, 2003; Lang, Englander & Brooke, 2000; Martin, Copeland, & Swift, 2005, Walker et al., 2011b) multimedia feedback (Doyle et al., 2003), psychoeducation (Lang et al., 2000; Walker et al., 2011a), case management (Babor, 2004; Gibbons et al., 2010; Kadden et al., 2007; Steinberg et al., 2002; Stephens et al., 2002; Vendetti et al., 2002; Walker et al., 2011b), voucher incentives (Budney et al., 2000, 2006; Olmstead et al., 2007), social and family support (Dennis et al., 2002, 2004), and psychopharmacological treatment (McRae, Budney, & Brady, 2003; Nordstrom & Levin, 2007). Because the research indicated that some interventions as brief as one or two sessions could be as effective as six or more sessions of treatment (Copeland et al., 2001; Stephens et al., 2000), recent studies have focused on the effectiveness of brief interventions (Babor, 2004; Copeland et al., 2001; Doyle et al., 2003; Gray et al., 2005; Martin et al., 2005; Lang et al., 2000; Smith et al., 1988; Stephens et al., 2000; Walker et al., 2006, 2011a).

Other areas of research interest have included the effects of demographic variables on treatment outcomes (Roffman, Klepsch, Wertz, Simpson, & Stephens, 1993; Stephens, Roffman, Fearer, Williams, Picciano, & Burke, 2004; Stephens, Wertz, & Roffman, 1993b; Vendetti et al., 2002), cost-effectiveness of treatment (Dennis et al., 2002, 2004;
French et al., 2002; Olmstead et al., 2007), and the economic efficiency of brief interventions (Budney et al., 2006; Lang et al., 2000; Stephens et al., 2002).

**Clinical and Theoretical Approaches**

Stephens, Roffman, and Simpson (1994b) conducted one of the first randomized studies into the effectiveness of interventions on treating problematic marijuana use. Stephens et al. randomly assigned participants to either 16 sessions of cognitive behavioral relapse prevention group treatment or 16 sessions of social support group treatment. Results indicated a significant reduction in marijuana use and related problems for both research conditions over a 12 month follow-up period. There were no significant differences between two interventions on days of marijuana use, identified related problems, or abstinence rates. About two-thirds of participants achieved abstinence by the end of the treatment, but only 14 percent of them remained abstinent during the 12-month follow-up period, with the majority of participants relapsing within first few months after treatment.

McBride and colleagues (1994) combined two datasets of marijuana (Stephens et al., 1994b) and cocaine (Wells, Peterson, Gainey, Hawkins, & Catalano, 1994) users to (a) validate the Reasons for Quitting Questionnaire for measuring types of motivation; (b) investigate the differences between types of motivation (intrinsic vs. extrinsic) across substances; and (c) explore the relationship between types of motivation and treatment outcomes. Participants were recruited through radio and newspaper advertisement and volunteered to participate in an outpatient treatment program. In addition to advertising, cocaine users were recruited from a treatment program at the research site. Results of the study indicated that three out of the original four subscales of the Reasons for Quitting
Questionnaire (health concerns, self-control, and social influence) had high internal consistency for both the marijuana and the cocaine users’ samples. There was no significant difference between the effects of internal and external motivation on the level of abstinence at three months follow-up between marijuana and cocaine users. Both marijuana and cocaine users denied legal issues were a significant motivator for quitting, although 22 percent of cocaine users had cocaine-related charges pending at the time of the research and 26 percent of marijuana users were arrested for marijuana-related offenses prior to treatment.

Budney et al. (2000) compared three treatment approaches: (a) 4 sessions of motivational enhancement therapy [MET], (b) 14 sessions of MET combined with behavioral coping skills therapy, and (c) behavioral coping skills therapy combined with a voucher-based incentive program. Incentives (also known as contingency management) consisted of vouchers that increased in value from $1.50 to $10 with each negative cannabinoid urine screen, and could be exchanged for approved retail goods or services. The sample consisted of 60 participants with histories of chronic marijuana use, recruited through newspaper advertising, posters, pamphlets, and letters to professionals. Analysis of the results indicated that participants in the voucher-based therapy were abstaining from marijuana use significantly longer than participants from the other two treatment conditions. There was no significant difference between participants who underwent 4 sessions of MET alone compare to the ones who underwent 14 sessions of motivational enhancement therapy combined with behavioral coping skills therapy.

Budney, Moore, Rocha, and Higgins (2006) conducted a follow up to the Budney et al. study (2000) in which they compared three treatment approaches: (a) cognitive-
behavioral therapy [CBT], (b) abstinence-based voucher incentives, and (c) the combination of both. The sample consisted of 90 participants with a current diagnosis of marijuana dependence who responded to an advertisement for outpatient treatment of marijuana-related problems. The results indicated that abstinence-based voucher incentives were effective in achieving continuous periods of marijuana abstinence during treatment. While CBT did not add to the effect achieved by voucher incentives during the treatment phase, it made a significant difference to the post-treatment phase, adding to the outcomes achieved by voucher incentives.

Moore and Budney (2003) combined two data sets (Budney et al., 2000, 2006) to research abstinence duration after completing outpatient treatment for marijuana dependence. The results indicated that 71 percent (n = 58) of participants used marijuana at least once following the original date of quitting. Out of those who lapsed once, 71 percent (n = 41) relapsed to further episode of using for at least 4 out of 7 consecutive days within 6 months following the end of treatment. Participants who lapsed (single episode) after fewer days post-treatment had a higher likelihood for a consecutive relapse, heavier use defined in this study as at least 4 days of marijuana use in any 7-day period.

Kadden, Litt, Kabela-Cormier, and Petry (2007) furthered the research of Budney and colleagues (2000) by investigating the effects of adding contingency management (ContM) to MET and CBT. The sample consisted of 240 participants, who were recruited via newspaper and radio advertisement, met diagnostic criteria for marijuana dependence and were randomly assigned to (a) nine 1-hour sessions of MET and CBT combined, (b) nine 15-minute sessions ContM only, (c) nine 1-hour sessions of case
management only (that focused on social, occupational, psychiatric, or educational goals without teaching skills or reinforcing abstinence other than a verbal praise), or (d) nine 1-hour sessions of MET, CBT and ContM combined. Participants who underwent one of the ContM conditions had higher abstinence rates at the end of treatment compared to other two treatment conditions, and participants who underwent the CBT, MET and ContM combined intervention showed the longest abstinence duration. The number of identified problems related to marijuana use dropped on average from 14 at baseline to fewer than 8 at post-treatment and remained at that level during the follow-up period across all treatment conditions (see Appendix A).

**Effectiveness of Brief Interventions**

**Adults**

A number of studies researched the effectiveness of brief interventions for treating adults with problematic marijuana use. Results indicated as few as one or two intervention sessions could be as effective as six or more treatment sessions (Copeland et al., 2001; Stephens et al., 2000). Brief interventions became a primary focus of research in the last decade (Babor, 2004; Doyle et al., 2003; Gray et al., 2005; Lang et al., 2000; Martin et al., 2005; Walker et al., 2006, 2011a).

Morakinyo (1983) researched the effects of emetic aversion therapy with marijuana dependent university undergraduates in Nigeria in one of the clinical trials that focused exclusively on marijuana treatment. Participants were hospitalized due to marijuana related psychotic symptoms and consented to undergo treatment. Participants were given the medication that stimulated the emetic reaction as they reviewed the pictures of their marijuana use. The sample consisted of nine participants who smoked marijuana daily
for at least two years prior to treatment. After three sessions of emetic aversion therapy participants reported abstinence from marijuana for an average of nine months.

Smith, Schmeling, and Knowles (1988) continued researching the effectiveness of aversion therapy with the help of uncomfortable, but not painful, electric stimulation (faradic stimulation). The sample consisted of 22 adults (mean age 29.8 years old) who responded to newspaper advertisements, and smoked on average 3.4 joints a day for 13.7 years. Participants received five sessions of faradic aversion therapy followed by three group self-management counseling sessions. All participants reported abstinence after five sessions of aversion therapy and 16 out of 19 remained abstinent at 12-month follow up per client report.

Stephens, Roffman, and Curtin (2000) furthered their previous research (Stephens et al., 1994a, 1994b) and studied the effectiveness of (a) 14 group sessions of CBT; and (b) two individual sessions of MET (1 month apart), in comparison to four months delayed treatment control condition. Results indicated significant differences between both treatment conditions and delayed treatment. There was no significant difference between the two treatment conditions during 16-month post-treatment follow-up, meaning that the brief MET intervention was as effective as 14 CBT group sessions. 

Lozano, Stephens, and Roffman (2006) used the same dataset to research the effects of personal goals for abstinence or moderation on treatment outcomes. Participants were more likely to achieve the goals they set for themselves. Participants who pursued abstinence as a goal reported higher self-efficacy for achieving the goal compared to the participants with moderation as their goal. Self-efficacy was a significant predictor of goal achievement for both abstinence and moderation.
The Marijuana Treatment Project Research Group studied the effects of two brief interventions for marijuana-dependent adults: (a) two sessions of MET and (b) nine sessions [delivered over 12-week period] of combined MET/CBT and case management in comparison with delayed treatment control group (Babor, 2004; Gibbons et al., 2010; Steinberg et al., 2002; Stephens et al., 2002; Vendetti et al., 2002; Walker et al., 2011b). The sample consisted of 450 participants, targeted females and minority groups, and was randomly assigned. Clients after the 9-session treatment reduced marijuana smoking significantly more than clients after the 2-session treatment. So, the treatment of longer duration was more effective than brief 2-session intervention. Both groups significantly reduced their marijuana smoking when compared to the delayed treatment group. Most differences were maintained over the 15-month post-treatment follow-up. Gibbons and colleagues (2010) further described the adherence, competence, and working alliance effects on treatment outcomes in this study. Their conclusion was that adherence, competence, or their combination did not have significant effects on treatment outcomes. Therapist-client alliance though was a consistent significant predictor of outcomes in both treatment modalities.

Lang, Engeler, and Brooke (2000) conducted a clinical trial of an Integrated Brief Intervention (IBI) in Australia to treat problematic marijuana use. The sample consisted of 61 self-referred participants, recruited via mental health community agencies and a help-line. Participants received a one-session clinical assessment interview, self-help materials, and an appointment for a follow-up visit. All participants identified some marijuana related problems at assessment. Fewer than half of the participants reported
significant improvement in these problematic areas at 1-month follow-up and maintained these changes through a 3-month follow-up.

In another Australian study, Copeland, Swift, Roffman, and Stephens (2001) compared: (a) six sessions of CBT; (b) a single session of CBT, and (c) delayed treatment. The sample consisted of 229 participants who admitted to using marijuana and were willing to quit. Participants who reported more than weekly use of other drugs (e.g., alcohol or nicotine) were excluded from the study. Results indicated that participants in the treatment groups reported better outcome results when compared to the delayed treatment group at the end of treatment and at follow up. There was no significant difference between the two treatment conditions in the probability of achieving abstinence or number of cannabis-related problems reported.

Doyle and colleagues (2003) studied the effects of the Marijuana Check-up brief intervention (Stephens et al., 2004; Stephens, Roffman, Fearer, Williams, & Burke, 2007). The Marijuana Check-up brief intervention consisted of two sessions designed for marijuana users determined to be in the contemplation stage (Prochaska, DiClemente, & Norcross, 1992). The contemplation stage was characterized by people who have questions or concerns about their use, but are not seeking treatment or change. Participants were recruited via newspaper and radio advertising, as well as flyers at the local event in the park. The majority of enrolled participants (93%) met criteria for either marijuana abuse or dependence. Participants were randomly assigned to the (a) Personalized Feedback [PF] report group; (b) Multimedia Feedback [MF] report group; or (c) 7-week Delayed Feedback [DF] report group (Stephens et al., 2007). The PF intervention utilized motivational interviewing techniques where freedom of choice
was emphasized. During the first session the counselor conducted a two hour assessment. During the second session participants received a Personal Feedback Report with recommendations based on the assessment results. The MF group received educational information about the consequences of marijuana use with neither personal feedback given nor motivational interviewing techniques applied. Results indicated that participants in the PF group had fewer dependence symptoms, less frequency of marijuana use per day, and fewer days of use per week compared to participants in DF and MF conditions at 7-week follow-up. Even though these changes were statistically significant, PF group participants still remained regular marijuana users. No significant differences were found in reported amount of marijuana related problems across all three groups at the 12-month follow-up period.

Gray, McCambridge, and Strang (2005) examined the effect of 1-session motivational interviewing intervention on alcohol, cigarette, and marijuana use reduction. Results indicated a significant reduction in reported days of drinking and a significant difference in attempts to cut down cigarette smoking. There was no significant difference, however, in reported marijuana use on any of the study’s outcome measures.

To summarize the research with adult population, motivational interviewing and cognitive behavioral approaches were commonly researched treatment approaches. Interventions as brief as one or two sessions were beneficial for clients’ marijuana use reduction or cessation regardless of the modality of the intervention or theoretical approach. Clients were likely to achieve goals set for themselves congruent with their motivation to make changes.
Adolescents

Dennis and colleagues (2002, 2004; Diamond et al., 2002) conducted a multisite Cannabis Youth Treatment experiment studying the effectiveness and cost-efficiency of selected therapeutic approaches. The study consisted of two trials. In the first trial participants were randomly assigned to (a) five sessions of MET/CBT, (b) 12 sessions of MET/CBT, or (c) Family Support Network. In the second trial participants were randomly assigned to (a) five sessions of MET/CBT, (b) Adolescent Community Reinforcement Approach (ACRA), or (c) Multidimensional Family Therapy (MFT). Results indicated no significant differences across conditions and settings at 12-month follow-up.

Burleson, Kaminer, and Dennis (2006) researched iatrogenic effects (negative/reverse side effect) when mixing adolescents with different severity of substance use in the same treatment group. They found no iatrogenic effect present. In reverse, participants with severe substance use and deviancy (e.g., legal problems) progressed better in groups with mixed levels of substance use severity than in the ones which consisted of heavy substance users only.

Martin, Copeland, and Swift (2005) replicated the Marijuana Check-up research (Doyle et al., 2003; Stephens et al., 2007) with adolescents in Australia. The researchers followed a pre-test/post-test design. The majority of participants (78%) reported significant reduction in their marijuana use and 16.7 percent reported abstinence at 90-day follow-up. This reduction was sustained at 180 days follow-up. Martin and Copeland (2008) conducted a follow-up of this study, using a subset of the original sample. Participants were randomly assigned to (a) 2-session MET and CBT intervention
and (b) 3-month delayed treatment control group. The treatment group experienced significant reductions in frequency and average weekly quantity of use at 3-month follow-up compared to the control group. Subsequently, the proportion of participants who met diagnostic criteria for cannabis dependence reduced from 100 percent to 65 percent at the 3-month follow up.

Walker and colleagues (2006) investigated the effectiveness of brief motivational enhancement intervention in a school setting. Participants were randomly assigned to (a) two sessions of MET or (b) a 3-month delayed condition. Results of their study indicated that participants in both groups significantly decreased their use at 3-month follow-up, however, there was no significant difference between the groups.

Walker and colleagues (2011a) continued their research of brief interventions among adolescents in high schools. Self-referred participants who smoked marijuana regularly were randomly assigned to one of three conditions: (a) two sessions of MET; (b) two sessions of Educational Feedback Control (EFC), or (c) Delayed Feedback Control (DFC) group. The DFC group did not have a contact with clinicians until 3-month follow-up assessment, because from previous research it was not clear if the assessment itself could produce some behavioral changes (Walker et al., 2006; Copeland et al., 2001). Results of this study indicated that participants of both intervention groups significantly decreased their marijuana use and had fewer negative consequences compared to participants in the DFC group at 3-month and 12-month post-intervention follow-up. There was some evidence of more significant reduction in marijuana use among MET participants compared to EFC participants at 3-month follow up. There was
no other significant difference between MET and EFC groups participants in the drug use or marijuana related consequences over 12-month follow-up period.

Walker, Stephens, Rowland, and Roffman (2011b) investigated if the types of motivational statements used by clients in treatment (e.g., desire, ability, reasons, need, commitment, and readiness to change) predicted marijuana treatment outcomes. The authors studied marijuana dependent adult participants randomly assigned to either 9 or 4 sessions of MI/ CBT/Case Management. Both treatment modalities began with a motivational interviewing session which included a Personal Feedback Report review. Results indicated that desire and reasons for change were significant predictors of marijuana treatment outcomes up to 34-month follow-up. Interestingly, desire for change became a significant predictor only after the Personal Feedback Report was discussed with clients and they were able to verbalize their desire.

To summarize the research with adolescent population, motivational interviewing and cognitive behavioral approaches remained most commonly researched treatment approaches. Participants needed to verbalize their motivation for change to achieve better and prolong treatment outcomes. There was no negative effect observed when clients with different severity of substance use were placed in the same group. With the exception of one study (Walker et al., 2006), interventions as brief as two sessions remained beneficial for clients’ marijuana use reduction or cessation regardless of the modality of the intervention, setting, or theoretical approach. Therefore, cost-efficiency studies were necessary to determine the best cost to benefit treatment approaches.
Cost-Efficiency

A number of studies suggested that brief interventions are as effective as traditional therapy approaches (Babor et al., 2004; Copeland et al., 2001; Doyle et al., 2003; Gray et al., 2005; Lang et al., 2000; Martin et al., 2005; Smith et al., 1988; Stephens et al., 2000; Walker et al., 2006, 2011a), and several researchers stressed the need for investigating their cost-efficiency (Budney et al., 2006; Lang et al., 2000; Stephens et al., 2002). Two studies followed this recommendation and examined cost-efficiency of treating marijuana use problems (Dennis et al., 2002, 2004; French et al., 2002; Olmstead et al., 2007).

Olmstead, Sindelar, Easton, and Carroll (2007) examined the cost-efficiency of four treatment approaches used in a criminal justice system: (a) MET/CBT; (b) MET/CBT with case management; (c) individualized drug counseling [DC]; and (d) DC combined with case management. A case management treatment included monetary voucher incentives for negative drug screens and attending treatment. All treatments were delivered in a format of individual weekly sessions over an 8-week period. The results of the Olmstead et al. study indicated that the most effective treatment modality, MET/CBT with case management, was more likely to be most expensive. The least effective treatment, DC, was also more likely to be the cheapest. MET/CBT treatment was more likely to be the most efficient cost-to-benefit intervention.

Dennis and colleagues (2002, 2004) conducted a multisite Cannabis Youth Treatment experiment studying the effectiveness and cost-efficiency of (a) 5 sessions of MET/CBT, (b) 12 session MET/CBT, (c) Family Support Network, (d) Adolescent Community Reinforcement Approach [ACRA], and (e) Multidimensional Family Therapy. The study consisted of two trials. Results of this research indicated no significant differences in
outcomes across treatment conditions and settings. In the first trial the most cost-efficient interventions were 5- and 12-session MET/CBT conditions ($1,089 and $1,256 per episode, respectively). In the second trial the most cost-efficient interventions were ACRA and 5-session MET/CBT intervention ($1,445 and 1,459 per episode, respectively). The researchers reported significant site differences in cost across conditions (Dennis et al., 2004; French et al., 2002).

**Court-Mandated**

Only one study was found that concentrated on the population court-mandated for treatment of problematic marijuana use. Carroll and colleagues (2006) studied the effects of four 8-week interventions for cannabis-dependent young adults: (a) MET/CBT; (b) MET/CBT in combination with contingency management (ContM); (c) individual drug counseling (CD), and (d) CD in combination with ContM. Results indicated that clients who underwent MET/CBT with ContM treatment had significantly better outcomes than clients who underwent MET/CBT treatment only. Individual drug counseling alone produced significantly worse treatment results than the other three treatments. Clients who underwent MET/CBT treatment continued to improve during 6-month follow-up.

**Demographic Profile**

There were four studies which concentrated on researching an association between client demographic profile and marijuana treatment outcomes or willingness to enroll into treatment (Roffman et al., 1993; Stephens et al., 1993b; 2004; Vendetti et al., 2002).

Stephens, Wertz, and Roffman (1993b) investigated how demographic (age and gender), socioeconomic (ability to pay bills, residence and reported income), marijuana
use (amount of days of marijuana use in the past 90 days), psychological distress, and self-efficacy predicted marijuana treatment outcomes. Participants used marijuana at least 50 times over the prior 90 days and wanted help to quit using. Results of the Stephens et al. study indicated that only marijuana use/abuse and self-efficacy predicted post-treatment use at 12-month follow-up. Owning a home versus renting predicted fewer problems after treatment. Severity of pretreatment abuse, but not the frequency of use, predicted the number of marijuana-related problems during the post-treatment follow-up period. Severity of psychiatric symptoms was unimportant in predicting treatment outcomes.

Using the same sample, Roffman, Klepsch, Wertz, Simpson, and Stephens (1993) investigated the relationship between multiple demographic variables and treatment dropout. Results of their analysis indicated that participants who dropped out of treatment early were younger, more likely to rent their residence than own, less able to pay bills, and reported a higher level of stress than those who completed treatment. Late dropouts had no significant demographical differences compared to those who completed treatment.

Stephens, Roffman, Fearer, Williams, Picciano, and Burke (2004) further compared demographic information of people who were eligible for Marijuana Check-Up intervention and scheduled an assessment appointment and those who were eligible and did not schedule an appointment. Participants who scheduled an appointment were on average four years older, reported slightly more drinks per day, and fewer problems associated with their use, though both groups had similar levels of marijuana use. There were no other demographical differences between these two groups. A typical study
participant was a white male, 30 years of age, who used marijuana several times a day, 2 days out of 3, without legal issues, ambivalent or unwilling to change (Stephens et al., 2004), employed (full- or part-time) and single (Stephens et al., 2007). The researchers repeated the same analysis with a Marijuana Treatment Project (MTP) sample and observed the same similarities and differences between the groups, even though the sample size was smaller than Marijuana Check-Up intervention sample (Stephens et al., 2004).

Vendetti, McRee, Miller, Christiansen, and Herrell (2002) studied the demographic characteristics of participants who chose to enroll versus the ones who did not enroll into the Marijuana Treatment Project (Babor, 2004; Gibbons et al., 2010; Steinberg et al., 2002; Stephens et al., 2002; Walker et al., 2011b). Younger age, single marital status, unemployment, less education and being of Asian or Native American descent as well as the participants’ belief of not being dependent on marijuana predicted the choice not to enroll into treatment.

**Marijuana Treatment Project Curriculum**

The Adult Marijuana Program, that is a focus of this study, was based on a 12-week curriculum designed by the Marijuana Treatment Project (Steinberg et al., 2005). This curriculum consisted of activities designed to help clients explore the consequences of marijuana use; develop quitting and refusal skills; understand marijuana use patterns; cope with cravings, triggers, and lapse; develop assertiveness; practice problem solving; and develop coping skills with negative moods. This curriculum also included Personal Feedback Report writing. During this activity participants stated their marijuana use patterns, perceived problems that marijuana use caused them, their reasons for quitting,
triggers and challenges to sobriety, and accompanying other alcohol or drug issues. All of these activities were intended to help clients enhance their intrinsic motivation for change and empower them to make the desired behavioral modifications.

**Conclusion**

Reviewed marijuana treatment research raised questions about effectiveness, duration, and cost-efficiency in helping people with marijuana-related problems (Babor, 2004). Interventions, as brief as one or two sessions, could be as effective as six or more sessions of treatment (Copeland et al., 2001; Stephens et al., 2000). Some cost-efficiency studies suggested that brief MET/CBT interventions yield best cost-to-benefit treatment results (Dennis et al., 2002, 2004; Olmstead et al., 2007).

Most of the marijuana outcome studies implemented randomization in their research designs and were conducted adhering to high academic standards. Academic study results, however, do not always generalize well to non-academic environments due to high cost; staff, educational, and referral source requirements; necessary program reorganizations; or complexities of mental health issues among non-self-referred clients of community-based treatment facilities where most drug and alcohol treatment takes place (Miller, Sorensen, Selzer, & Brigham, 2006; Steinberg et al., 2005; Tai, Straus, Liu, Sparenborg, Jackson, & McCarty, 2010). For example, some researchers used other drug abuse as an exclusion criterion (Doyle, Swan, Roffman, & Stephens, 2003; Martin & Copeland, 2008; Kadden, Litt, Kabele-Cormier, & Petry, 2007; Stephens et al., 1994b, 2000; Walker, Stephens, Rowland, & Roffman, 2011b). This criterion may not be possible to meet, however, if the treatment program is designed to provide services to all individuals required to undergo treatment regardless of other substance use. In addition,
randomized studies often require extensive funding and time, and are impossible in community-based treatment facilities (Tai et al.). Therefore, researchers are encouraged to use existing patient databases and assess the effectiveness of ongoing treatment programs as they accumulate evidence based practice knowledge. Such an approach allows conducting research at lower cost, and ensures the applicability of study results outside the academic setting.

There is limited evidence of marijuana treatment effectiveness with court-mandated population. There is some indication that the presence of the marijuana-related legal issue was not a significant motivator for quitting marijuana smoking (McBride et al., 1994). Neither marijuana users spontaneously quit (Perkonigg, Goodwin, Fiedler, Behrendt, Beesdo, Lieb, & Wittchen, 2008; Perkonigg, Lieb, Hofler, Schuster, Sonntag, & Wittchen, 1999). Therefore, further research of marijuana court-mandated treatment is warranted in attempt to establish the best practice for helping this population.
Chapter 3

Method

The first chapter of this study was an introduction to the treatment of marijuana-related problems, particularly, evaluating the effectiveness of brief interventions with court-mandated population. The second chapter reviewed the research about the effectiveness of various clinical and theoretical approaches in treating problematic marijuana use. The issues of cost-efficiency, duration of treatment, and helping the court-mandated population were described. In this chapter the author concentrates on the method used in the present study, which examined the effectiveness of a court-mandated brief Adult Marijuana Program (AMP).

Hypotheses

1. There is no statistically significant difference between the number of marijuana-related problems endorsed by participants at pre-treatment when compared to post-treatment.

2. There is no statistically significant difference between the number of marijuana-related problems endorsed at pre-treatment when compared to post-treatment for participants who are positive for an alcohol use disorder and participants who are negative for an alcohol use disorder.

3. There is no statistically significant difference between the number of marijuana-related problems endorsed at pre-treatment when compared to post-treatment based on participants’ employment status.
4. There is no statistically significant difference between the number of marijuana-related problems endorsed at pre-treatment when compared to post-treatment based on participants’ level of education.

5. There is no statistically significant difference between the number of marijuana-related problems endorsed by participants at pre-treatment when compared to post-treatment for participants with a previous arrest history and participants without an arrest history.

**Design of the Study**

The criterion variable, number of marijuana-related problems, was a continuous ratio variable. There were five predictor variables in this study. The primary predictor variable was participation in the AMP. The four secondary predictor variables were problematic alcohol use, employment status, level of education, and previous arrest history. All of the secondary predictor variables were categorical. Problematic alcohol use was a dichotomous variable represented by two levels: (a) positive or (b) negative for problematic alcohol use. Employment status was a categorical variable represented by two levels: (a) not employed or (b) employed part- or full-time, or a student. Education was also a categorical variable comprised of three levels: (a) did not complete high school, (b) high school diploma/GED, or (c) beyond high school. Arrest history was a dichotomous variable comprised of two levels: (a) presence or (b) absence of previous arrest history.

This study was nonexperimental and retrospective by design. The primary predictor variable, participation in the AMP, was not manipulated by the researcher, which is a characteristic of a nonexperimental study (Johnson, 2001). Kerlinger (1986) argues that
any “systematic empirical inquiry in which the scientist does not have direct control of independent [predictor] variables because their manifestations have already occurred [italics in original]” (as cited in Johnson, p.7) should be classified as nonexperimental research without distinguishing further for causal-comparative or correlation research (Johnson). This research also incorporated data collected on the predictor variable in the past, which made this study retrospective or ex post facto by design (Johnson). This study used a comprehensive sampling technique and included all AMP participants who underwent AMP treatment during the researched period.

Participants

This study included all of the clients who participated in the AMP from June, 2010, through December, 2011. The AMP was offered bi-monthly and on average consisted of 13 participants. The AMP provided services to 131 clients during the study period. The researcher had access to all AMP evaluation data to conduct this retrospective study. AMP clients were 18 years of age or older. They were referred by the two Midwest county municipal courts, which are the only two municipal courts operating in that county. Most of the clients were facing their first marijuana-related charge and did not have a substantial criminal history. Courts typically offered a record expunge of the current drug related offense upon successful completion of AMP as a part of a court restorative justice program.

Intervention

The intervention in this study was the Adult Marijuana Program (AMP). The purpose of this intervention was to help clients develop motivation for change and decrease or totally stop their drug use. The AMP was a residential, two-day (48-hour) program for
individuals who had been charged with a marijuana-related offense. It was a court-mandated intervention provided as an alternative to incarceration.

Licensed counselors used motivational interviewing and behavioral strategies as well as goal setting and skill building techniques. These techniques were designed to assist individuals in exploring the consequences of marijuana use, developing quitting skills, understanding marijuana use patterns, coping with cravings and triggers, developing assertiveness, practicing problem solving, and learning refusal skills. Clients took part in group therapy as well as attended one individual therapy session. During the individual session, participants discussed their alcohol and other drugs use as well as depression screen results, marijuana-related problems, reasons for quitting, and self-efficacy to abstain from marijuana use in high-risk situations. Participants took an active part in writing their Personal Feedback Report (Steinberg et al., 2005) with the counselor where they discussed their substance use diagnosis, marijuana use patterns, perceived problems that marijuana use caused them, reasons for quitting, triggers, difficult situations to remain sober, and accompanying other alcohol or drug issues.

The AMP curriculum and activities were based on the Marijuana Treatment Project (Babor, 2004; Gibbons et al., 2010; Steinberg et al., 2002; Stephens, Babor, Kadden, & Miller, 2002; Vendetti, McRee, Miller, Christiansen, & Herrell, 2002; Walker, Stephens, Rowland, & Roffman, 2011b). The AMP included all of the Marijuana Treatment Project manual content areas (Steinberg et al., 2005) and followed the suggested curriculum closely, in a 48-hour residential treatment format. During this treatment, AMP participants spent about 26 hours in group treatment in addition to the one-hour individual therapy session over the span of 48 hours, compared to 9.5 hours of
group therapy and 1.5-hour assessment delivered over a 12-week span in the original Marijuana Treatment Project intervention.

**Instrumentation**

The Marijuana Problem Scale (MPS) was adapted from the Drug Abuse Screening Test originally designed to identify problems related to drug use (Stephens, Roffman, & Simpson, 1993a). The MPS was a nineteen-item self-report measure which addressed 19 marijuana-related social, physical, and occupational problems (e.g., family and friendship relationships, employment, physical health, memory, finances, self-confidence, etc.) (Stephens, Roffman, & Curtin, 2000). Participants rated each item on a 3-point scale: no problem (0 points), minor problem (1 point), or serious problem (2 points). Stephens and colleagues reported high internal consistency reliability (mean Cronbach’s $\alpha = .90$ for marijuana when the rating scale values were summed up to create a problem score). In the current study, the number of problems was counted regardless of severity rating (minor or serious problem) (see Appendix A).

The CAGE is a screening instrument designed to identify a potential problem with alcohol use by asking four questions about the person trying to cut down drinking, feeling criticized for drinking, feeling guilty about drinking, or drinking first thing in the morning (Ewig, 1984). The CAGE is a self-report measure, which takes less than a minute to complete. The score ranges from 0 to 4 (1 point for each positive answer) and a score of 2 or higher indicates that there is possible problematic alcohol use. Internal reliability was reported to be .68, which was appropriate to establish adequate psychometric reliability for this instrument (Skogen, Overland, Knudsen, & Mykletun, 2011).
The Alcohol Use Disorders Identification Test (AUDIT) is a ten-item screen to identify early problems with alcohol in the developing and developed countries (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001). Each of the ten items has five or six response options, ranging from 0 to 5 points. The total score ranges from 0 to 45. A score of eight or more indicates “hazardous” and “harmful alcohol use” as well as “possible alcohol dependence” (Babor et al.). Several studies reported high internal consistency reliability of the AUDIT, with Cronbach’s α values ranging from .77 to .94 with various populations (Allen, Litten, Fertig, & Babor, 1997). Righmaiden and colleagues (1995) also found high concurrent validity (r=.78) between the CAGE and AUDIT (as cited in Allen et al., 1997).

The mental health agency that administered AMP designed a Demographic Form to collect information about clients. A copy of the Demographic Form can be seen in Appendix B.

**Procedure**

As a part of AMP participants’ assessment process, AMP staff administered the Demographic Form, CAGE, AUDIT, and MPS, then, collected and recorded the information. The researcher was granted access to the AMP database for analysis. The database included no identifying information. Therefore, there was no risk to participants’ identity disclosure and no participants’ consent for the research was necessary. The University of Toledo Institutional Review Board (UT IRB) exempted this study from oversight (see Appendix C for a copy of the UT IRB letter).
Statistical Analysis

The criterion variable, the number of marijuana-related problems, was a continuous ratio variable. All of the predictor variables (participation in the AMP, problematic alcohol use, arrest history, employment status, and level of education) were categorical variables. This research study incorporated a pre-test/post-test design. Therefore, the primary research question of whether participation in the AMP resulted in a change in the number of pre- and post-test marijuana-related problems endorsed by clients was answered using the dependent t-test. The rest of the research questions were answered using analysis of covariance (ANCOVA) with the pre-test scores being a covariate. Demitrov and Rumrill (2003) considered this method of analysis to be preferential for pre-test/post-test designs. The ANCOVA assumes the normality of the sample distribution, homogeneity of variance, linearity, and the homogeneity of regression slopes (Tabachnick & Fidell, 2007). These assumptions as well as univariate outliers in the dependent variable were checked prior to the ANCOVA analysis (Tabachnick & Fidell).

Because this was a program evaluation study, it was important to clearly communicate results to interested stake-holders. The ANCOVA and dependent t-test do not report the magnitude of the relationship between the variables. Therefore, the effect size was reported to illustrate the practical significance of the results. Because interested stake-holders might be more familiar with descriptive statistics (e.g., mean scores) than the analysis of covariance (e.g., meaning of the F value and the effect size) (Wholey, Hatry, & Newcomer, 2010), the researcher also reported mean scores of the groups.
Validity of the Study

Internal Validity

There were several factors that enhanced the internal validity of this research. A pre-test established the baseline for the post-test result comparison, which helped to observe changes that participants attained during the AMP (Wholey et al., 2010). The duration of the AMP treatment was only 48 hours in an inpatient setting. This minimized the history threat, i.e., the threat of research participants acquiring conditions unrelated to treatment that might influence the outcome results (Onwuegbuzie, 2000; Wholey, et al.). This study incorporated psychometrically well-established instruments with high levels of reliability and validity to avoid instrumentation threat to internal validity (Onwuegbuzie). During the interpretation stage it was important to correctly interpret corresponding p-values and the effect size because statistical and practical significance could be easily confused (Onwuegbuzie; Wholey et al.).

This study followed the recommendation of Wholey, Hatry, and Newcomer (2010) and set the confidence level at 90 percent (p ≤ .10). Standard confidence levels of 99 and 95 percent were originally adopted from sciences where a high level of precision is crucial (Wholey et al.). Wholey and colleagues considered such confidence levels to be unrealistic for program evaluation studies where obstacles exist to collecting strong evidence. Evaluation studies are performed with smaller sample sizes and results might be applicable and worth discussing at confidence levels of 80-90 percent. In addition, such a strategy reduces costs of the study because fewer research participants are required to arrive at necessary program recommendations (Wholey et al.).
**External Validity**

The dataset of this study was continuously collected over 18 months and included all AMP participants from ten 48-hour programs. This ensured that the sample had no stratification bias and reliably represented overall program outcomes (Wholey et al., 2010). This study also had strong population validity (Onwuegbuzie, 2000) because it included all of the clients referred for treatment by county courts due to a marijuana-related offense. There are only two municipal courts in the researched county and both courts participated in this research. Therefore, the results of this study accurately represented the population of individuals charged with a first marijuana-related offense in the Midwest county where the research was conducted.

**Limitations of the Design**

To enhance the ecological validity and generalize the results to a broader population, this study needs to be replicated in other locations and settings (Onwuegbuzie, 2000; Wholey, et al., 2010). This research only represented changes that have occurred pre-treatment and immediately after the AMP, and did not measure how those changes were sustained over time.
Chapter 4

Results

The findings within this chapter were the result of analyzing the Adult Marijuana Program database that consisted of 131 clients who underwent AMP treatment from June, 2010 through December, 2011. Most of the clients were referred by local municipal courts and were facing their first marijuana-related charge. After the data screening, four cases were eliminated from the analysis due to the absence of the pre-test (1 case) or the post-test (3 cases). Therefore, the final sample consisted of 127 participants. The sociodemographic information of the sample is presented in Table 4.1.

Data Screening

Group Sizes

The study research questions were answered with the help of dependent t-test and analysis of covariance (ANCOVA). Descriptive statistics were performed first (see Table 4.2). The total number of cases of pre-test and post-test were even which is desired for the dependent t-test analysis. The number of cases in the groups formed by secondary predictor variables (problematic alcohol use, employment status, level of education, and arrest history), which were analyzed with the help of ANCOVA, were uneven. This makes the design unbalanced. Therefore, adjusted sum of squares were used in further analysis of covariance (Tabachnick & Fidell, 2007).
Table 4.1

*Sociodemographic Information of AMP Participants (n=127)*

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</tr>
<tr>
<td>did not complete HS</td>
<td>14</td>
<td>11</td>
</tr>
<tr>
<td>HS diploma/GED</td>
<td>44</td>
<td>35</td>
</tr>
<tr>
<td>vocational Training</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>some college</td>
<td>53</td>
<td>42</td>
</tr>
<tr>
<td>Associate degree</td>
<td>1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Bachelor's degree</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
**Assumptions testing**

Dependent t-test and ANCOVA assume the normality of the sample distribution and homogeneity of variance. In addition, ANCOVA assumes the homogeneity of regression slopes and linear relationship between the covariate and dependent variable (Tabachnick & Fidell, 2007). These assumptions as well as presence of the univariate outliers in the dependent variable were checked with the help of the Statistical Package for the Social Sciences [SPSS], version 17.0.1, prior to the dependent t-test and ANCOVA analyses were performed.

Table 4.2

**Descriptive Statistics**

<table>
<thead>
<tr>
<th>Descriptives</th>
<th>Problematic Alcohol Use</th>
<th>Employment Status</th>
<th>Level of Education</th>
<th>Previous Arrest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-test</td>
<td>Post-test</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>n</td>
<td>127</td>
<td>127</td>
<td>43</td>
<td>84</td>
</tr>
<tr>
<td>M</td>
<td>4.29</td>
<td>5.65</td>
<td>6.60</td>
<td>5.17</td>
</tr>
<tr>
<td>SD</td>
<td>3.15</td>
<td>3.74</td>
<td>3.79</td>
<td>3.64</td>
</tr>
<tr>
<td>Median</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Min</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Max</td>
<td>14</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Skewness</td>
<td>0.65</td>
<td>0.55</td>
<td>0.36</td>
<td>0.67</td>
</tr>
<tr>
<td>SE</td>
<td>0.22</td>
<td>0.22</td>
<td>0.36</td>
<td>0.26</td>
</tr>
<tr>
<td>Z ratio</td>
<td>3.02</td>
<td>2.54</td>
<td>1.00</td>
<td>2.55</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>-0.15</td>
<td>-0.27</td>
<td>-0.48</td>
<td>0.17</td>
</tr>
<tr>
<td>SE</td>
<td>0.43</td>
<td>0.43</td>
<td>0.71</td>
<td>0.52</td>
</tr>
<tr>
<td>Z ratio</td>
<td>0.36</td>
<td>0.63</td>
<td>0.68</td>
<td>0.33</td>
</tr>
</tbody>
</table>
Normality

The Kolmogorov-Smirnov goodness-of-fit test for a single sample was conducted to test the normality of data distribution. This test assumes the null hypothesis of the sample to be normally distributed. Therefore, an insignificant result is desired ($p > .05$). The results indicated normality violations in the groups of clients with no problematic alcohol use, with education beyond High School, who were employed, and without previous arrest history (see Table 4.3). Normality violations were also indicated in overall pre-test and post-test score distributions. Further examination of descriptive statistics indicated no kurtosis in the data as evidenced by the kurtosis $z$ ratio being less than 2 (see Table 4.2). However, the distribution of the raw scores was positively skewed in all of the groups where the normality assumption was violated. The skewness $z$ ratio was over 2 for these groups indicating positive skewness (see Table 4.2), meaning that participants in these groups were identifying fewer problems associated with their marijuana use. Tabachnick and Fidell (2007) explained that because the assumption of normality pertains to the distribution of means and not the raw scores, “the skewness by itself poses no problem”, because as the sample size increases, the sample distribution of means approaches normal (p. 305).
Table 4.3

*The Kolmogorov-Smirnov Goodness-of-Fit Test for a Single Sample and Levene Test*

*Results*

<table>
<thead>
<tr>
<th></th>
<th>Kolmogorov-Smirnov</th>
<th>Levene Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$D$</td>
<td>$df$</td>
</tr>
<tr>
<td>Pre-test</td>
<td>0.12</td>
<td>127</td>
</tr>
<tr>
<td>Post-test</td>
<td>0.10</td>
<td>127</td>
</tr>
<tr>
<td>Problematic Alcohol Use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>0.10</td>
<td>43</td>
</tr>
<tr>
<td>No</td>
<td>0.11</td>
<td>84</td>
</tr>
<tr>
<td>Employment Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>0.11</td>
<td>116</td>
</tr>
<tr>
<td>Not Employed</td>
<td>0.14</td>
<td>11</td>
</tr>
<tr>
<td>Level of Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No HS</td>
<td>0.15</td>
<td>14</td>
</tr>
<tr>
<td>HS/ GED</td>
<td>0.08</td>
<td>44</td>
</tr>
<tr>
<td>Beyond HS</td>
<td>0.12</td>
<td>69</td>
</tr>
<tr>
<td>Previous Arrest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>0.12</td>
<td>54</td>
</tr>
<tr>
<td>No</td>
<td>0.14</td>
<td>72</td>
</tr>
</tbody>
</table>

*Equality of variances*

The equality of variances was checked with the help of the Levene test of equality of error variances. This test assumes the null hypothesis of the group variances to be equal, and therefore, an insignificant result is desired ($p > .05$). Because a pre-test score was used as a covariate in ANCOVA analysis, it was also added to the model when variances of problematic alcohol use, employment status, level of education, and arrest history were tested. The Levene test results were insignificant for all of the groups (see Table 4.3). The standard deviations were examined next. They were all in the same ballpark for all of the groups, indicating the same dispersion or variance (see Table 4.2).
**Linearity**

It is important to establish the linearity of the variable relationship because the ANCOVA analysis is based on Pearson correlations, which considers linear relationships only and ignores non-linear ones, even if significant (Tabachnick & Fidell, 2007). The linearity assumption was checked by visual examination of the bivariate scatterplots between the dependent variable (post-test scores) and covariate (pre-test scores) (see Figure 4-1). One can observe no curvilinear patterns between examined variables.

Figure 4-1

*The Bivariate Scatterplot between Pre-test and Post-test Variables*
Outliers

Because dependent t-test and ANCOVA are based on analysis of means, it is important to identify outliers, numerically distant scores from the rest of the scores, which may skew mean value of the groups (Tabachnick & Fidell, 2007). Stem and leaf plots were examined for the absence of univariate outliers (see Figure 4-2). Similar to a histogram, stem and leaf plot represents the distribution of the raw scores, where the last digit of values is listed under the leaf and first digits are listed under the stem. For example, there are 11 people who identified 0 problems in Pre-test group and 2 people who identified 12 problems in the Positive for Problematic Alcohol Use group. Post-test score is used as a dependent variable in stem and leaf plots for the groups formed by secondary predictor variables (problematic alcohol use, employment status, level of education, and arrest history). No outliers were indicated.
Figure 4-2

Stem and Leaf Plots

<table>
<thead>
<tr>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>Stem &amp; Leaf</td>
</tr>
<tr>
<td>11.00</td>
<td>0 . 00000000000</td>
</tr>
<tr>
<td>20.00</td>
<td>1 . 00000000000000000000</td>
</tr>
<tr>
<td>11.00</td>
<td>2 . 0000000000</td>
</tr>
<tr>
<td>16.00</td>
<td>3 . 00000000000000000000</td>
</tr>
<tr>
<td>16.00</td>
<td>4 . 00000000000000000000</td>
</tr>
<tr>
<td>12.00</td>
<td>5 . 00000000000000000000</td>
</tr>
<tr>
<td>10.00</td>
<td>6 . 00000000000000000000</td>
</tr>
<tr>
<td>9.00</td>
<td>7 . 00000000000000000000</td>
</tr>
<tr>
<td>10.00</td>
<td>8 . 00000000000000000000</td>
</tr>
<tr>
<td>2.00</td>
<td>9 . 00</td>
</tr>
<tr>
<td>4.00</td>
<td>10 . 0000</td>
</tr>
<tr>
<td>4.00</td>
<td>11 . 0000</td>
</tr>
<tr>
<td>1.00</td>
<td>12 . 00</td>
</tr>
<tr>
<td></td>
<td>1.00 Extremes (&gt;=14.0)</td>
</tr>
<tr>
<td>Stem width:</td>
<td>1</td>
</tr>
<tr>
<td>Each leaf:</td>
<td>1 case(s)</td>
</tr>
</tbody>
</table>
### Employed

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Stem &amp; Leaf</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.00</td>
<td>0.0000000</td>
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<tr>
<td>12.00</td>
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<td>10.00</td>
<td>3.0000000000</td>
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<tr>
<td>11.00</td>
<td>4.000000000000000</td>
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<tr>
<td>12.00</td>
<td>5.000000000000000</td>
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<tr>
<td>10.00</td>
<td>6.000000000000000</td>
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<tr>
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<tr>
<td>7.00</td>
<td>8.0000000</td>
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<tr>
<td>2.00</td>
<td>9.00</td>
</tr>
<tr>
<td>3.00</td>
<td>10.0000000</td>
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<tr>
<td>5.00</td>
<td>11.0000000</td>
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<td>1.00</td>
<td>13.0000</td>
</tr>
<tr>
<td></td>
<td>6.00 Extremes (&gt;=14.0)</td>
</tr>
</tbody>
</table>

**Stem width:** 1  
**Each leaf:** 1 case(s)

### Not Employed

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Stem &amp; Leaf</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.00</td>
<td>0.23</td>
</tr>
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<td>7.00</td>
<td>0.5667889</td>
</tr>
<tr>
<td>2.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**Stem width:** 10  
**Each leaf:** 1 case(s)

### No HS

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Stem &amp; Leaf</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>Extremes (=&lt;0)</td>
</tr>
<tr>
<td>2.00</td>
<td>0.24</td>
</tr>
<tr>
<td>9.00</td>
<td>0.555667788</td>
</tr>
<tr>
<td>2.00</td>
<td>1.11</td>
</tr>
</tbody>
</table>

**Stem width:** 10  
**Each leaf:** 1 case(s)

### HS/GED

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Stem &amp; Leaf</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.00</td>
<td>0.000011111</td>
</tr>
<tr>
<td>6.00</td>
<td>0.222333</td>
</tr>
<tr>
<td>7.00</td>
<td>0.4444555</td>
</tr>
<tr>
<td>10.00</td>
<td>0.666677777777777777777</td>
</tr>
</tbody>
</table>

**Stem width:** 10  
**Each leaf:** 1 case(s)

### Beyond HS

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Stem &amp; Leaf</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>1.1</td>
</tr>
<tr>
<td>1.00</td>
<td>1.2</td>
</tr>
<tr>
<td>3.00</td>
<td>1.445</td>
</tr>
</tbody>
</table>

**Stem width:** 10  
**Each leaf:** 1 case(s)

### Extremes

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Stem &amp; Leaf</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.00</td>
<td>0.001111111</td>
</tr>
<tr>
<td>15.00</td>
<td>0.222222223333333333333</td>
</tr>
<tr>
<td>13.00</td>
<td>0.444445555555555555555</td>
</tr>
<tr>
<td>15.00</td>
<td>0.666667777777777777777</td>
</tr>
<tr>
<td>3.00</td>
<td>1.445</td>
</tr>
</tbody>
</table>

**Stem width:** 10  
**Each leaf:** 1 case(s)
Finally, the homogeneity of regression slopes assumption was checked. This assumption implies that there is no significant interaction effect of the independent variable (problematic alcohol use, employment status, level of education, or arrest history) and a covariate (pre-test scores) (Tabachnick & Fidell, 2007). All interaction effects were insignificant ($p > .05$), meaning that the regression slopes were homogeneous (see Table 4.4).

Table 4.4

The Homogeneity of Regression Slopes

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Adjusted $SS$</th>
<th>$MS$</th>
<th>$F$</th>
<th>$p$</th>
<th>$\eta^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem Alc Use</td>
<td>1</td>
<td>25.34</td>
<td>25.34</td>
<td>2.28</td>
<td>.133</td>
<td>.018</td>
</tr>
<tr>
<td>Pre-test X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td>1</td>
<td>8.8</td>
<td>8.8</td>
<td>0.78</td>
<td>.379</td>
<td>.006</td>
</tr>
<tr>
<td>Pre-test X</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Education</td>
<td>2</td>
<td>13.38</td>
<td>6.69</td>
<td>0.59</td>
<td>.557</td>
<td>.01</td>
</tr>
<tr>
<td>Pre-test X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arrest History</td>
<td>1</td>
<td>0.14</td>
<td>0.14</td>
<td>0.01</td>
<td>.911</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>
**Research Question 1**

The first research question of this study was: Does participation in the AMP result in a change in the number of marijuana-related problems endorsed by clients between the pre- and post-treatment? The level of significance was set at $p \leq .1$. The result of the dependent t-test was significant, $t(126) = -4.23, p < .1$ and is illustrated in Table 4.5.

Table 4.5

*The Dependent t-test Result for the Change in Number of Marijuana Related Problems Endorsed by Clients between the Pre- and Post-treatment*

<table>
<thead>
<tr>
<th></th>
<th>Pre-test</th>
<th>Post-test</th>
<th>df</th>
<th>t</th>
<th>p</th>
<th>Cohen's d</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>4.29</td>
<td>5.65</td>
<td>126</td>
<td>-4.23</td>
<td>&lt;.001</td>
<td>-0.39</td>
</tr>
<tr>
<td>SD</td>
<td>3.15</td>
<td>3.74</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Research Question 2**

The second research question of this study was: Is there a difference between the number of marijuana-related problems endorsed at pre-treatment when compared to post-treatment for participants who are positive for an alcohol use disorder and participants who are negative for an alcohol use disorder? The level of significance was set at $p \leq .1$. The result of the ANCOVA was insignificant, $F(1, 124) = -4.23, p > .1$ (see Table 4.6). The result also indicated that the test had insufficient statistical power, $1 - \beta = 0.219$. In other words, the probability to reject the false null hypothesis was 21.9 percent.

**Research Question 3**

The third research question of this study was: Is there a difference between the number of marijuana-related problems endorsed at pre-treatment when compared to post-treatment based on participants’ employment status? The result of the ANCOVA was
insignificant, $F(1, 124) = 0.07, p > .1$ (see Table 4.5). The statistical power of this test was 11.1 percent.

**Research Question 4**

The fourth research question of this study was: Is there a difference between the number of marijuana-related problems endorsed at pre-treatment when compared to post-treatment based on participants’ level of education? The result of the ANCOVA was insignificant, $F(2, 123) = 0.32, p > .1$ (see Table 4.5). The statistical power of this test was 17.4 percent.

**Research Question 5**

The fifth research question of this study was: Is there a difference between the number of marijuana-related problems endorsed by participants at pre-treatment when compared to post-treatment for participants with a previous arrest history and participants without an arrest history? One data point was missing for the arrest history and this case was eliminated from this analysis ($n=126$). The result of the ANCOVA was insignificant, $F(1, 123) = 1.42, p > .1$ (see Table 4.5). The statistical power of this test was 32.5 percent.
Table 4.6

The Analysis of Covariance results for four Factors in Participants’ Denial Changes from Pre- to Post-test

<table>
<thead>
<tr>
<th>Factor</th>
<th>df</th>
<th>Adjusted SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
<th>( \eta^2 )</th>
<th>1-( \beta )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Alc Use</td>
<td>1</td>
<td>8.13</td>
<td>8.13</td>
<td>0.73</td>
<td>.396</td>
<td>.006</td>
<td>0.219</td>
</tr>
<tr>
<td>Employment</td>
<td>1</td>
<td>0.76</td>
<td>0.76</td>
<td>0.07</td>
<td>.796</td>
<td>.001</td>
<td>0.111</td>
</tr>
<tr>
<td>Education</td>
<td>2</td>
<td>7.28</td>
<td>3.64</td>
<td>0.32</td>
<td>.726</td>
<td>.005</td>
<td>0.174</td>
</tr>
<tr>
<td>Arrest History</td>
<td>1</td>
<td>15.64</td>
<td>15.64</td>
<td>1.42</td>
<td>.236</td>
<td>.011</td>
<td>0.325</td>
</tr>
</tbody>
</table>

Summary

The first null hypothesis was rejected because the result of the analysis was significant. It means that participation in the AMP resulted in a change in the number of marijuana-related problems endorsed by clients between the pre- and post-treatment. Participants tended to admit more marijuana related problems after the 48-hour AMP intervention (\( M_{pre-test} = 4.29, SD = 3.15 \) compared to \( M_{post-test} = 5.65, SD = 3.74 \)). The researcher retained the rest of the null hypotheses, due to insignificant results. It means that alcohol use, arrest history, education, and employment status were not significant factors in participants’ denial changes from pre- to post-test.
Chapter 5

Discussion

The purpose of this study was to enable the researcher to determine whether the 48-hour Adult Marijuana Program (AMP) helped court-mandated clients recognize that marijuana abuse was causing them problems. Specifically, the researcher hoped to show that participating in the AMP program would reduce participant denial of a marijuana-related problem from the time of pre-test to post-test. The researcher also hoped to determine whether alcohol use, arrest history, education, and employment status were factors in participants’ denial changes from pre- to post-test.

The researcher analyzed AMP database that included 127 usable cases. The database consisted of the client responses to Demographic Form, CAGE, the Alcohol Use Disorders Identification Test, and Marijuana Problem Scale (see Appendix A). AMP staff administered these instruments as a part of AMP participants’ assessment process. AMP clients were 18 years of age or older. They were referred by the only two municipal courts in the Midwest county in which the study occurred. Most of the clients were facing their first marijuana-related charge and did not have a substantial criminal history. Courts typically offered a record expunge of the current drug related offense upon successful completion of the AMP as a part of a court restorative justice program.

Summary of Results

Five research questions and five null hypotheses were analyzed in this study. The research questions were answered with the help of dependent t-test and analysis of covariance (ANCOVA):
1. Does participation in the AMP result in a change in the number of marijuana-related problems endorsed by clients between the pre- and post-treatment?
   
   Null hypothesis: There is no a statistically significant difference between the number of marijuana-related problems endorsed by participants at pre-treatment when compared to post-treatment.
   
   The researcher rejected the null hypothesis, as the result of the dependent t-test was significant at the $p \leq .1$ level.

2. Is there a difference between the number of marijuana-related problems endorsed at pre-treatment when compared to post-treatment for participants who are positive for an alcohol use disorder and participants who are negative for an alcohol use disorder?
   
   Null hypothesis: There is no statistically significant difference between the number of marijuana-related problems endorsed at pre-treatment when compared to post-treatment for participants who are positive for an alcohol use disorder and participants who are negative for an alcohol use disorder.
   
   The researcher retained the null hypothesis, as the result of the ANCOVA was insignificant at the $p \leq .1$ level.

3. Is there a difference between the number of marijuana-related problems endorsed at pre-treatment when compared to post-treatment based on participants’ employment status?
   
   Null hypothesis: There is no statistically significant difference between the number of marijuana-related problems endorsed at pre-treatment when compared to post-treatment based on participants’ employment status.
The researcher retained the null hypothesis, as the result of the ANCOVA was insignificant at the $p \leq .1$ level.

4. Is there a difference between the number of marijuana-related problems endorsed at pre-treatment when compared to post-treatment based on participants’ level of education?

Null hypothesis: There is no statistically significant difference between the number of marijuana-related problems endorsed at pre-treatment when compared to post-treatment based on participants’ level of education.

The researcher retained the null hypothesis, as the result of the ANCOVA was insignificant at the $p \leq .1$ level.

5. Is there a difference between the number of marijuana-related problems endorsed by participants at pre-treatment when compared to post-treatment for participants with a previous arrest history and participants without an arrest history?

Null hypothesis: There is no statistically significant difference between the number of marijuana-related problems endorsed by participants at pre-treatment when compared to post-treatment for participants with previous arrest history and participants without an arrest history.

The researcher retained the null hypothesis, as the result of the ANCOVA was insignificant at the $p \leq .1$ level.

**Implications of the Study**

In this study the researcher found that court-mandated AMP participants reduced their denial of marijuana abuse causing them problems from the time of pre-test to post-test. Problematic alcohol use, presence of previous arrest history, level of education, and
employment status were not significant factors in participants’ denial changes from pre-
to post-test.

This research suggests that interventions as brief as 48-hours in duration can help
clients, who initially were not willing to seek treatment, to realize that their marijuana use
was problematic. This result is consistent with the results of previous studies where brief
interventions were efficient in helping clients who volunteered to participate in treatment
(Copeland et al., 2001; Stephens et al., 2000) and one other study with a court mandated
population (Carroll et al, 2006). None of the previous studies researched the program
effectiveness delivered via a 48-hour inpatient modality.

The study results did not indicate a difference between AMP participants who were
positive for an alcohol use disorder and participants who were negative for an alcohol use
disorder in their denial that marijuana use is causing them problems at the time of post-
test, when pre-treatment differences were removed from the post-treatment variability.
This suggests no evidence for excluding people with co-occurring alcohol use problem
from treatment focused on problematic marijuana use.

The result of this study did not indicate any difference between people with previous
arrest history and without an arrest history in their denial that marijuana use is causing
them problems at the time of post-test, when pre-treatment differences were removed
from the post-treatment variability. This result is consistent with the previous studies
where participants with more severe substance use and deviancy were effectively treated
in mixed groups with people of less severe levels of substance use severity and deviancy
(Burleson, Kaminer, & Dennis, 2006).
The result of the study did not indicate any difference between AMP participants’ denial that marijuana is causing them problems at the time of post-test, when pre-treatment differences were removed from the post-treatment variability, and participants were compared based on their employment status or level of education. This does not necessarily contradict the previous findings where these demographic variables predicted treatment outcomes, treatment enrollment, or probability to drop out from treatment (Roffman, Klepsch, Wertz, Simpson, & Stephens, 1993; Stephens, Wertz, & Roffman, 1993b; Stephens et al., 2004; Vendetti, McRee, Miller, Christiansen, & Herrell, 2002). In previous research the pre-test differences were not removed (or controlled) from the post-test variability (Stephens et al., 1993b), which makes it unclear if differences between the groups were present at the time of the pre-test and were preserved through treatment. This study results suggest that no special treatment accommodations are necessary for people who vary on studied sociodemographic variables.

The results of this research are directly applicable to the existing AMP program, which is not always the case with randomized control trials (Miller, Sorensen, Selzer, & Brigham, 2006; Tai, Straus, Liu, Sparenborg, Jackson, & McCarty, 2010). Courts, practitioners, clients, and their families now have evidence that AMP participants decrease their level of denial that marijuana use is causing them problems at the time of post-treatment compared to pre-treatment. Prochaska, DiClemente, and Norcross (1992) have argued that decreased denial of a substance use problem is a precursor to increased readiness to use or seek help. Therefore, the results of this study provide basis to pursue or recommend AMP intervention to people with marijuana-related offenses in the researched community. This study results also allow AMP managers and clinicians to
conduct evidence-supported treatment planning and marketing. In addition, the data collection did not require significant effort from staff. Therefore, this study was feasible financially and time wise for an ordinary community-based treatment facility (Tai et al.). Conducting such program evaluation studies appears to be an efficient way of accumulating evidence based practice knowledge.

**Limitations of the Study**

This study included all of the clients referred for treatment by county courts due to a marijuana-related offense. There are only two municipal courts in the researched county and both courts participated in this research. Therefore, the results of this study accurately represented the population of individuals charged with a first marijuana-related offense in the Midwest county where the research was conducted. To enhance the ecological validity and generalize the results to a broader population, this study needs to be replicated in other locations and settings (Onwuegbuzie, 2000; Wholey, et al., 2010).

This research only represents changes that have occurred pre-treatment and immediately after the AMP, and does not measure how those changes are sustained over time. This research was conducted in a non-academic environment where the researcher had no control over the group sizes. There were not enough subjects to establish necessary statistical power, i.e., 100 percent probability to reject the null hypothesis when it is false.

**Suggestions for Future Research**

This is the second study that concentrated on the population court-mandated for problematic marijuana use treatment. Both of the studies indicated effectiveness of the
treatment interventions. Further cost-efficiency research is necessary to establish best cost to benefit therapeutic approaches.

Because this research included only one post-test measure, immediately after the treatment, the follow-up research focused on how treatment changes were sustained over time is warranted. The research also needs to be replicated in other locations, settings, and include diverse populations.

**Conclusion**

In this study the researcher found that court-mandated AMP participants reduced their denial of marijuana abuse causing them problems from the time of pre-test to post-test. Problematic alcohol use, presence of previous arrest history, level of education, and employment status were not significant factors in participants’ denial changes from pre- to post-test. Therefore, there is no evidence to support exclusion of participants with co-occurring alcohol use problem from the AMP. There is also no evidence that special program adjustments need to be made based on participants’ previous arrest history, level of education, or employment status. The outcomes of this study may assist courts, practitioners, clients, and their families when they make a decision to pursue or recommend AMP intervention to people with marijuana-related offenses. It also provides AMP managers and clinicians with data that can be used for evidence-supported treatment planning and marketing.
References


Onwuegbuzie, A. (2000, November). *Expanding the framework of internal and external validity in quantitative research*. A paper presented at the Annual Meeting of the Association for the Advancement of Educational Research (AAER), Ponte Vedra, FL.


Statistical Package for the Social Sciences (Version 17.0.1) [Computer software]. Armonk, NY: IBM.


Appendix A

The Marijuana Problem Scale

<table>
<thead>
<tr>
<th>Has marijuana use caused you...</th>
<th>No Problem</th>
<th>Minor Problem</th>
<th>Serious Problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Problems between you and your partner</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2. Problems in your family</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3. To neglect your family</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>4. Problems between you and your friends</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>5. To miss days at work or miss classes</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>6. To lose a job</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>7. To have lower productivity</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>8. Medical problems</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>9. Withdrawal symptoms</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>10. Blackouts or flashbacks</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>11. Memory loss</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>12. Difficulty sleeping</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>13. Financial difficulties</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>14. Legal problems</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>15. To have lower energy level</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>16. To feel bad about your use</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>17. Lowered self-esteem</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>18. To procrastinate</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>19. To lack self-confidence</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
Appendix B

The Demographic Form

CLIENT NAME ___________________________ Client #: _____________________ DATE ______/_____/____

(PRINT) DD MM YY

AGE _____ GENDER: M F COUNTY OF RESIDENCE ______________________ STATE OF RESIDENCE __

ETHNIC ORIGIN: ☐ Caucasian ☐ Hispanic ☐ African-American ☐ Other, specify _______________________

MARITAL STATUS: ☐ Married or equivalent ☐ Never Married ☐ Divorced ☐ Widowed ☐ Separated

WHERE DO YOU LIVE: ☐ Dorm ☐ Apartment ☐ In the Parent's House ☐ Own House

☐ Other, specify _______________________

☐ I live with roommates

HIGHEST LEVEL OF EDUCATION:

☐ Did not complete high school. Highest grade completed __________

☐ HS Diploma/GED

☐ Vocational Training

☐ Some College. Credit hours completed __________

☐ Bachelor's Degree

☐ Some graduate school. Credit hours completed __________

☐ Graduate degree

☐ Some post-graduate education. Credit hours completed __________

☐ Doctorate degree

OCCUPATION ______________________________

OCCUPATION CATEGORY:

☐ Management ☐ Financing ☐ Administration ☐ Engineering

☐ Architecture ☐ Information technology ☐ Health Care ☐ Social Services

☐ Education ☐ Government Service ☐ Art ☐ Culture

☐ Recreation ☐ Sport ☐ Sales ☐ Transport

☐ Trades ☐ Equipment Operator ☐ Processing ☐ Manufacturing

☐ Other, specify _____________________________

EMPLOYMENT STATUS: ☐ Full-time ☐ Part-time ☐ Not Employed ☐ Student

☐ Homemaker ☐ Disabled ☐ Retired

WEEKLY PERSONAL TAKE HOME INCOME:

☐ Prefer not to answer ☐ $301-400 ☐ $701-800

☐ $0 ☐ $401-500 ☐ $801-900

☐ Less than $200 ☐ $501-600 ☐ Over $900

☐ $200-300 ☐ $601-700
ARE YOU A PARENT OF A MINOR CHILD? Y N
ARE YOU PREGNANT? Y N
HOW MANY CHILDREN DO YOU HAVE?________

PRIMARY SUBSTANCES OF CHOICE:
- Marijuana
- Alcohol
- Cocaine
- Crack
- Methamphetamine
- PCP
- Heroin
- Barbiturates
- Other, specify________

SECONDARY SUBSTANCE OF CHOICE:
- Marijuana
- Alcohol
- Cocaine
- Crack
- Methamphetamine
- PCP
- Heroin
- Barbiturates
- Other, specify________

AGE OF FIRST USE:__________ DATE OF CURRENT OFFENSE: _____/_____/____ DD MM YY

HOW MUCH MONEY PER WEEK DID YOU SPEND ON MARIJUANA? __________

HOW MUCH MONEY PER WEEK DID YOU SPEND ON DRUGS/ALCOHOL ALL TOGETHER________

FREQUENCY OF MARIJUANA USE PRIOR TO CHARGE:
- None
- 3-6 times per week
- 1-3 times per month
- Daily
- 1-2 per week

HOW MUCH MARIJUANA DID YOU NORMALLY USE PER OCCASION:______________

LAST DRUG USE:
- Today
- 1-6 days ago
- 1-4 weeks ago
- Month ago

WHAT IS YOUR CURRENT CHARGE:
- Possession of marijuana
- Possession of other drugs, specify________
- Possession of paraphernalia
- OVI
- Trafficking
- Cultivation of Marijuana
- Underage: Drinking
- Possession of Alcohol
- Consumption
- Other, specify__________________________

HAVE YOU BEEN ARRESTED BEFORE FOR ANY REASON? Y N IF YES, HOW MANY TIMES?____

HAVE YOU RECEIVED HELP FOR ALCOHOL/DRUG PROBLEMS BEFORE? Y N
IF YES, WHAT KIND?
- Detox
- Individual Counseling
- Inpatient treatment
- Other, specify__________________________
- Intensive Outpatient (IOP)

DO YOU HAVE MENTAL HEALTH CONDITION/DIAGNOSIS? Y N
IF YES, WHAT KIND:
- Bipolar
- Depression
- Anxiety
- OCD
- ADHD
- Psychotic
- Other, specify__________________________
Appendix C

A Copy of the UT IRB Letter

The University of Toledo
Department for Human Research Protections
Social, Behavioral & Educational Institutional Review Board
Office of Research, Rm. 2300, University Hall
2801 West Bancroft Street, Mail Stop 944
Toledo, Ohio 43606-3390
Phone: 419-530-2844 Fax: 419-530-2841
(FWA00010686)

To: Nick Piazza, Ph.D. and Olga Zaporozhets
   Department of School Psychology, Legal Specialties & Counselor Education
From: Barbara K. Chesney, Ph.D., Chair
      Kamala London, Ph.D., Vice Chair
      Walter Edinger, Ph.D., Chair Designee
Signed: B.K. Chesney Date: 05/09/12
Subject: IRB #107873
Title: Evaluating the Effectiveness of the Adult Marijuana Program

On 05/09/12, the above research was reviewed and approved as Exempt (category #4) by the Chair and
Chair Designee of the University of Toledo (UT) Social Behavioral & Educational Institutional
Review Board (IRB). The requirement to obtain a signed consent/authorization for use and disclosure
of protected health information form has been waived as this research is determined to be minimal risk
and a signed consent/authorization document would be the only record linking the subject to the data.
It was determined that this waiver for signed consent/authorization will not adversely affect the rights
and welfare of the participants. This action will be reported to the committee at its next scheduled
meeting.

Please Note: A consent form is not required for this study. However an Information Sheet regarding
the study should be distributed to potential participants. This Information Sheet should include the
name and telephone number of a contact person in case the subjects need additional information. It is
also strongly encouraged that the study be explained verbally to potential subjects.

Items Reviewed:
- IRB Application Requesting Exempt Review

Designated as EXEMPT RESEARCH on: 05/09/12

Please read the following attachment detailing Principal Investigator responsibilities.