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Landscaping in Lockup:
The Effects of Gardening Programs on Prison Inmates

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Abstract

Background: Incarcerated individuals in the United States suffer from disproportionately poor mental health outcomes.

Objective: This paper examines the effects of prison gardening programs on the psychosocial health of incarcerated individuals in the United States prison system through a systematic review of the literature.

Methods: Databases including Academic Search Premier, Web of Science, PsycArticles, and Google Scholar were used to identify peer-reviewed articles that met inclusion criteria. The quantitative and qualitative results from these articles were compiled and synthesized.

Results: Selected prison gardening programs were shown to increase self-efficacy and self-worth and decrease anxiety in inmates involved in these initiatives. Reduced recidivism rates were reported for participants of prison gardening programs compared to the general prisoner population. Prison gardening programs were shown to enhance incarcerated individuals' psychosocial wellbeing in three key ways: 1) increase in self-efficacy and self-worth, 2) decrease in anxiety and depression spectrum symptoms, and 3) reduction in recidivism rates. Communities within geographic proximity of prisons implementing gardening programs also benefited from organic produce donated by the prison programs to local charities.

Conclusion: There is evidence for using prison gardening programs as an alternative therapy to treat symptoms of mental illness and to help prisoners gain vocational skills that can be used upon release.

Introduction

2.2 million inmates were reported in the United States in 2012, giving the United States the largest prison population in the world (Bonds, 2012). More than half of all prison and jail inmates in the United States have a diagnosable mental health disorder as defined in the Diagnostic and Statistical Manual of Mental Disorders IV (James & Glaze, 2006). One of the Healthy People 2020 goals is to “Increase quality and years of healthy life” (U.S. Department of Health and Human Services, 2010). This is a goal for all Americans, including prison inmates who represent a significant number of citizens. Inmate health is an important public health issue given the large number of incarcerated individuals and subsequent cost of medical care for them. High recidivism rates indicate that incarceration is not effective in rehabilitation or reform of offenders. United States spending on prisons, probation, and parole has almost quadrupled over the past twenty years making it the fastest-growing budget item in the United States after Medicaid (Moran & Jewkes, 2014).

Rehabilitation of offenders must occur in order for former inmates to reenter society and become contributing members of it. It was estimated that 56 percent of state prisoners, 45 percent of federal prisoners, and 64 percent of jail inmates experience mental illness (James & Glaze, 2006). Forty-three percent of state prisoners and 54 percent of jail inmates met the criteria for mania and 23 percent of state prisoners and 34 percent of jail inmates reported symptoms of major depression (James & Glaze, 2006). Fifteen percent of state prisoners and 24 percent of jail inmates met the criteria for a

psychotic disorder (James & Glaze, 2006). Rehabilitation efforts for inmates must take into account the prevalence of mental illness in the prison system.

Studies have shown that gardening is an effective therapy for managing mental illness such as depression and posttraumatic stress disorder (PTSD) (Annerstedt, 2011). Additional benefits to those that garden include providing healthy food, increasing physical activity, and helping to develop skills and work ethic (Elings, 2006). Mark Sandel (2004) describes the benefits of horticulture therapy for inmates. In the prison system, there is a higher proportion of people with mental illness than in the general population (Sandel, 2004). A horticulture program at a detention center comes at very little cost and has proven effective in studies to improve self-esteem and decrease the effects of mental illness (Sandel, 2004). Sandel's study found that gardening helped improve social skills, raised self-esteem, reduced anxiety, and taught patience and delayed gratification to inmates (Sandel, 2004). Sandel also proposed that gardening therapy could be used as a way to reduce aggressive incidents by providing stress-reducing benefits to inmates and staff (Sandel, 2004).

There is much research showing that gardening assists in the treatment of mental and physical disorders. The paper "People-Plant Interaction" by Marjolein Elings (2006) discusses various groups that could benefit from horticulture therapy, including psychiatric patients, Alzheimer patients, those with learning disabilities, the elderly, prisoners, children, and burnout patients (Elings, 2006). Elings performed a literature review of the research done on therapeutic gardening and determined that it has been shown to be effective, yet the mechanisms by which gardening therapy is effective is still

unknown (Elings, 2006). Elings (2006) says that different groups experience the same mental benefits of gardening, such as increased self-esteem, awareness, and responsibility. She goes on to point out that these mental benefits are seen especially when people work in groups. Another review titled “Gardening as a mental health intervention: a review” reviewed ten papers published since 2003. They determined that each of the ten papers reported positive effects from gardening as therapy for mental health disorders (Clatworthy, 2013). They found evidence that gardening reduced symptoms of depression and anxiety. It was also found that people involved in gardening therapy describe other benefits including emotional, social, vocational, physical, and spiritual benefits (Clatworthy, 2013).

Master Gardener Programs in prisons in South Carolina have seen success in elevating inmates’ self-reported well-being and sense of worth (Polomski, Johnson, & Anderson, 1997). Some horticulture programs continued outside of prison have facilitated prisoner reentry into society and greatly reduced recidivism rates (Khatib & Krasny, 2015). In New York, recidivism rates were cut in half when prisoners joined horticulture therapy and work programs while incarcerated (Feldbaum, Kirschenbaum, Mukamal, & Pinderhughes, 2011). These prison gardening programs have seen success in helping inmates reintegrate into society with needed coping mechanisms and skills. The literature review will go into more detail about prison gardening programs and their effects on inmates.

This paper focuses on gardening interventions with the prisoner population in the United States as a promising way to increase rehabilitation efforts as opposed to solely

incarceration. Given the prevalence of mental health disorders and serious mental illness in the U.S. prison population, rehabilitation will help inmates learn coping strategies in order to function in society and not return to jail or prison after release. The purpose of this project is to examine the effects of prison gardening programs on the psychosocial health of incarcerated adults in the United States prison system through a systematic review of the literature.

Methods

Search Strategy and Selection Criteria

Search terms used to find prison gardening programs to analyze in the results section were: “gardening therapy, prison”; “gardening therapy, mental health, prison”; “gardening therapy, mental health AND prison AND inmate”; “green prison programs”; and “therapeutic horticulture theory.” The search databases used were Academic Search Premier, Web of Science and PsycArticles through Arcadia University Library and Google Scholar.

Inclusion criteria for articles include the following: the article was in English; the adult prisoner population spoken of was in the United States of America, and the article was peer reviewed.

Exclusion criteria for articles included the following: no article written before 1980 or after December 2015 was used, no article that was not written in English was used, and no article that evaluated a prison population outside of the United States or about youth in the U.S. was used.

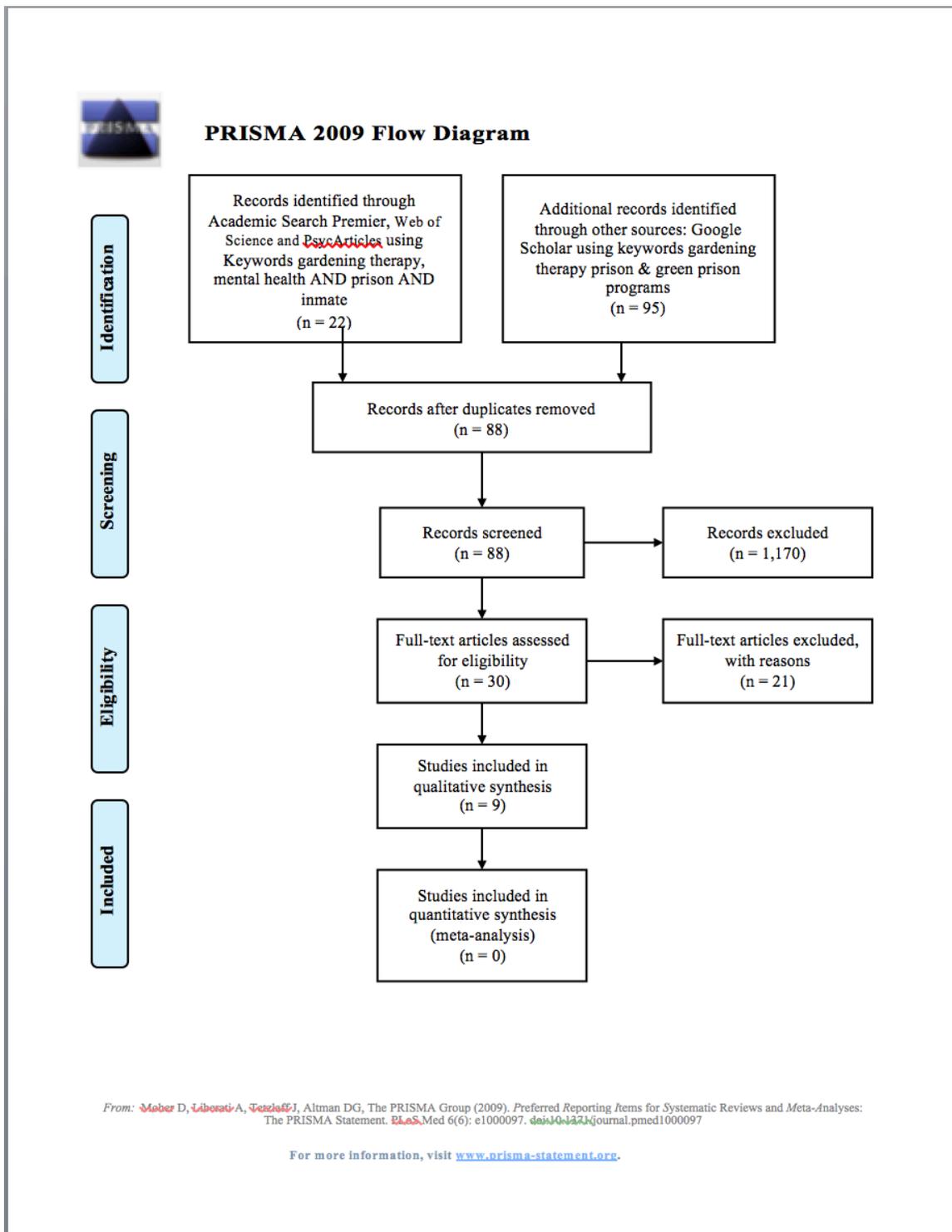
Outline of Study

This study is a review of a promising practice. Peer reviewed articles were used to learn about prison garden programs and their effects on adult inmates in the United States. In the literature review, program websites were also used to identify program missions, goals, and objectives and to discover how the day-to-day running of each program is accomplished. The literature cited uses the terms: garden or gardening therapy, horticulture therapy (HT), nature-assisted therapy (NAT), and social and therapeutic horticulture (STH). Each of these terms refers to using therapeutic horticulture to assist in treating mental or physical disorders.

Prison gardening programs and their effects on the adult inmate population in the United States are analyzed in this paper. The dependent variables under study are the quality of life of inmates and their families, the rate of recidivism amongst those in gardening programs versus the average inmate, and other benefits or harms stemming from inmate gardening programs. Research questions used to form the results section include the following. 1. How do gardening programs affect symptoms of mental illness in inmates? 2. Does participation in gardening programs affect recidivism rates? 3. Are there other benefits of gardening programs for inmates or for the community in which the prisons are located (physical exercise, nutritious food, skill building, decrease in aggressive incidents, food donated to charity, etc.)?

The consort diagram below demonstrates the process of identifying articles that met inclusion criteria.

Figure 1: Consort Diagram



Theoretical Foundation

Gardening programs in prisons can be modeled after many different theories from both the fields of public health and corrections. The theories focused on in this section include two public health theories: Social Cognitive Theory and Social Networks and Social Support. These two theories show how gardening programs can help a person individually and socially. The many benefits of gardening experienced by the prison population include but are not limited to increased self-esteem and self-efficacy, green education, and greatly reduced recidivism rates (Feldbaum, Greene, Kirschenbaum, Mukamal, Welsh, & Pinderhughes, 2011).

Social Cognitive Theory

The Social Cognitive Theory is “a dynamic, ongoing process in which personal factors, environmental factors, and human behavior exert influence upon each other” (National Cancer Institute, 2005, p. 19). According to Social Cognitive Theory, there are three factors that influence a person’s likelihood to change a health behavior (National Cancer Institute, 2005). These three factors are self-efficacy, goals, and outcome expectancies (National Cancer Institute, 2005). For prisoners, hypothesized needed changes could include better management of mental illness, avoiding violent behavior, overcoming addiction, building strong relationships with others, etc. The way in which social cognitive theory and the three factors for change applies to prison populations is included in the following paragraphs.

One hypothesis is that a prisoner can gain a sense of self-efficacy from success in gardening. Gardening takes patience, diligence, and overcoming obstacles. Once success is attained, a great sense of accomplishment is felt. If a person experiences success in gardening and the heightened self-confidence or self-efficacy that comes with it, he or she is then better equipped to change his or her health behavior even when faced with obstacles. Human behavior is governed by the human and his or her experiences as well as by the environment. Gardening provides a growth environment for plants and humans.

Gardening therapy provides an excellent place to develop goals not necessarily for crop yield, but for work and effort. A good goal is “I will pull weeds for 30 minutes every time I garden in order to give my plants their best chance at success.” This type of goal focuses on a person’s actions, and not necessarily the final results of those actions that may or may not be in the person’s control. Prisoners making effective goals in gardening programs will learn to make effective goals in other areas of their lives. They will also learn to modify goals and to continue to work even when progress is slow.

Gardening therapy incorporates the idea of hope. Prisoners involved in gardening programs must work hard even when they do not see the results of their labors. Gardening provides people with a change from the norm of instant gratification so prevalent in the world today. Gardening therapy helps prisoners develop outcome expectancies that are realistic, while also helping them develop patience and hope for the future. They learn that consistent hard work can produce beautiful results.

Social Cognitive Theory resulted from research on Social Learning Theory, which claims “people learn not only from their own experiences, but by observing the actions of

others and the benefits of those actions” (National Cancer Institute, 2005, p. 20).

Prisoners involved in gardening programs interact with others working on their own gardens or the same garden and overcome obstacles together. Other people are part of our environment and influence us, and we need social interaction as humans. More discussion on the social benefits of gardening therapy will be discussed with the Social Networks and Social Support theory.

Social Networks and Social Support

A social network is “a person-centered web of social relationships” (Glanz, Rimer, & Lewis, 2002, p. 187). Social support is “aid and assistance exchanged through social relationships and interpersonal transactions” (Glanz, Rimer, & Lewis, 2002, p. 187). The Social Networks and Social Support theory outlines four types of supportive behaviors: emotional support, instrumental support, informational support, and appraisal support (Glanz, Rimer, & Lewis, 2002). All of these types of support are needed for humans to thrive and can be learned or improved by participating in inmate gardening therapy programs.

In gardening therapy, emotional support is obtained from other people and from interacting with the natural environment. People gardening together have the opportunity to lend emotional support as needed. The person involved in the therapy also has to lend care and love to his or her plants and trust that they will grow. This practice helps a person to develop emotionally.

Instrumental support is the lending of tangible aid and services (Glanz, Rimer, & Lewis, 2002). Instrumental support is given and received as prisoners involved in gardening therapy lend a hand to each other as needed. A person often is in need of physical aid while gardening and thus must learn to give and receive this aid.

Informational support involves giving advice, suggestions and information (Glanz, Rimer, & Lewis, 2002). In gardening programs classes are often led by teachers. These teachers provide informational support in the classroom and in the garden. Program participants can also help one another by giving and receiving informational support.

Appraisal support comes in the form of constructive feedback, affirmation, comparison, and information useful for self-evaluation (Glanz, Rimer, & Lewis, 2002). For many people, receiving appraisal support can be difficult, even if it is given in a constructive way. People can become defensive and hostile when they feel that someone is personally attacking them. Receiving appraisal support about a gardening project can seem less personal and allow the individual to learn that the person giving the appraisal support does not have cruel intentions, but simply wants to help the person (or the person's garden) to become better.

Many prisoners have mental illness and thus suffer socially and some prisoners simply have not been taught to thrive in social situations (James & Glaze, 2006). Gardening therapy can help to teach social skills while at the same time teaching work ethic and helping to provide exercise and healthy food to the participants. Some social network characteristics that are involved in prisoner rehabilitation include reciprocity,

intensity, complexity, density, homogeneity, and geographic dispersion (Glanz, Rimer, & Lewis, 2002).

Reciprocity is the “extent to which resources and support are both given and received in a relationship” (Glanz, Rimer, & Lewis, 2002, p. 187). When it comes to physical resources and instrumental support in gardening therapy, all participants must learn to share resources peacefully and help one another. The more that inmates help one another with their respective gardening projects, the better the projects will turn out and the more social supports will be strengthened.

Complexity of social networks is the extent to which social relationships serve varying functions (Glanz, Rimer, & Lewis, 2002). When a prisoner makes friends with fellow inmates and prison staff through gardening programs, he or she strengthens both the complexity and intensity (the emotional closeness) of their relationships and is thus better equipped to deal with mental illness and stress and to achieve health goals that he or she has set. The support group of an individual may be widened and strengthened through gardening programs.

In the prison population, density and homogeneity of support groups can vary greatly. Density is the “extent to which network members know and interact with each other” (Glanz, Rimer, & Lewis, 2002, p. 187). Homogeneity is the how much members are demographically similar (Glanz, Rimer, & Lewis, 2002). In prison, prisoners may not interact with each other often. For prisoners in a gardening program, however, the level of interaction increases. Whether the group is demographically similar or not (homogeneity) may affect how close (or dense) the relationships can be.

When it comes to geographic dispersion, the prisoner populations are very close. Geographic dispersion is the extent to which network members live in close proximity to each other (Glanz, Rimer, & Lewis, 2002). Living in such close proximity may help prisoners to form strong bonds, especially if they work together in a gardening program.

To conclude, Social Cognitive Theory and the theory of Social Networks and Social Support are two ways to look at the potential beneficial effects of gardening therapy on prisoners. Many other theories have been and will be applied to this population and to this therapy.

Literature Review

Over two million Americans are incarcerated in the United States today, contributing to the United States' status of having the highest incarceration rate in the world (Lindemuth, 2007). The United States incarcerates approximately one percent of its population, which is more than any other industrialized country and around 3.2 percent of the United States population is under some type of correctional control such as incarceration or parole (Khatib & Krasny, 2015; Elsner, 2006). From 1998 to 2008, the number of people in prison in the United States quadrupled moving from around 500,000 to 2.3 million people (Khatib & Krasny, 2015; Criminal Justice Fact Sheet, 2012). These statistics show the vastness of the prison population in the United States of America that is vulnerable to mental illness as discussed in the introduction. According to the Bureau of Justice statistics, more than half of prison and jail inmates have some sort of mental disorder, and only 1 in 6 of these inmates with a mental disorder receive proper treatment

(James & Glaze, 2006). The literature cited below demonstrates how gardening therapy can be beneficial for treating symptoms of mental illness. Gardening is a multifaceted therapy that also provides exercise, healthy food, and job skills and education.

Gardening programs have been utilized in United States prisons for vocational training and therapy and have been shown to be physically and psychologically beneficial for inmates and staff (Lindemuth, 2007). Prison gardens also provide visual enhancement to prisons that can usually be seen from many cells and staff posts (Lindemuth, 2007). Lindemuth (2007) points out that while gardens cannot solve all the health and stress-related issues associated with prison life, they can alleviate some of the harmful effects of imprisonment and improve the ability of prisoners to cope with life inside and outside of prison walls.

Reported Effects and Benefits of Gardening Programs

The purpose of one systematic review by Annerstedt and Wahrborg (2011) was to determine the effectiveness of nature-assisted therapy in improving quality of life for individuals suffering from mental and physical illness. They reviewed controlled and observational studies and determined that nature has a positive effect on human health (Annerstedt & Wahrborg, 2011). Their results showed health improvements in areas ranging from schizophrenia to obesity in 26 out of 29 meta-analyses (Annerstedt and Wahrborg, 2011). This large study concluded that gardening therapy is a relevant source of therapy for public health and may serve as an important public health intervention in the future (Annerstedt and Wahrborg, 2011). A randomized control trial of horticulture

therapy done by Kam and Siu discovered that horticulture therapy was effective for decreasing anxiety, depression and stress (Kam & Siu, 2010). A systematic review and literature synthesis by Clatworthy et al. (2013) evaluated ten papers published since 2003 to determine whether symptoms of depression and anxiety could be affected by gardening therapy (Clatworthy, Hinds, & Camic, 2013). They found that participants described a range of benefits in emotional, social, vocational, physical and spiritual areas of their lives as a result of gardening therapy (Clatworthy et al., 2013).

There are many hypotheses regarding the mechanism by which gardening therapy helps individuals deal with mental illness. Andreas Strohle performed a literature review that indicates that mental disorders may crop up due to physical inactivity (Strohle, 2009). It is a possibility that exercise (in the form of gardening therapy) may be beneficial in preventing mental disorders (Strohle, 2009). An article by Matthew Page introduces the idea of hope gained from gardening therapy (Page, 2008). A person needs to have hope that plants will grow and flourish when he or she gardens (Page, 2008). This effort to develop hope helps the individual develop hope in other areas of his or her life (Page, 2008). Whatever the mechanism, gardening therapy has been shown to reduce symptoms of mental illness in many different individuals.

Reported Effects and Benefits of Garden Programs Specifically for Prison Inmates

In the report *The Greening of Corrections: Creating a Sustainable System*, Feldbaum, Greene, Kirschenbaum, Mukamal, Welsh, and Pinderhughes (2011) state that

prison gardening programs are therapeutic, productive, and educational for inmate participants. The authors illustrate how prison gardening programs work as low cost therapy programs that induce better behavior as a consequence of meaningful activity and as a privilege earned through good behavior (Feldbaum et al., 2011). The programs are productive in that they create valuable food to be consumed by inmates or donated to those in need (Feldbaum et al., 2011). The garden programs are further educational in that they create environmental awareness and help participants to develop skills that can be used to find employment after prison (Feldbaum et al., 2011). “Dan Pacholke, of the Washington DOC, touts the therapeutic quality of the connection to living beings that is gardening, a ‘sense of empathy,’ he says, ‘you can’t replicate through cognitive behavioral therapy’” (Feldbaum et al., 2011).

In *People-Plant Interaction: The physiological, psychological, and sociological effects of plants on people*, Elings teaches the following: different studies show that prisoners enrolled in gardening programs learn various skills such as responsibility, social skills, problem solving and decision-making (Elings, 2006) (Flagler 1995). Participants have been seen to become less hostile when enrolled in prison gardening programs (Elings, 2006) (Rice and Remy 1998). As gardening program participants experience success, and with that built self-confidence and self-esteem, they are less likely to be involved in aggressive incidents (Elings, 2006) (Rice and Remy 1998). McGuinn and Relf (2001) concluded from their research with offenders that horticultural programs might be a tool to improve social bonding of offenders. They further found that the curriculum they tested appeared to be effective at evoking changes in attitudes about

personal success and individual perceptions of personal job preparedness that could lead to the development of pride and a more positive self-image (McGuinn & Relf, 2001).

Many prisons throughout the United States have partnered with local educators, environmental organizations, and outdoor facilities to offer programs for inmates that link environmental stewardship with job training and education (Khatib & Krasny, 2015). As a result of these partnerships, many programs are demonstrating recidivism rates for former inmates that are far below than the national average (Khatib & Krasny, 2015). Krasny (2015) states that on average, participants in job training programs while in prison are more likely to be employed following release, and to have a recidivism rate 20 percent lower than nonparticipants of these job training programs (Khatib & Krasny, 2015; Murray). Many of these job-training programs involve gardening. According to the U.S. Department of Justice, about one third of United States prisons are already integrating green education and training programs, and another third are developing strategies for how to integrate such programs into their facilities (Khatib & Krasny, 2015; Feldbaum et al., 2011). Some of these green education and training programs involve gardening and others involve sustainability education. Many prison gardening programs reward participants for a job well done and often offer a certificate upon completion (Khatib & Krasny, 2015; Flagler, 1995). According to Flagler, (1995), recognition is an important component of how one views him or herself and his or her personal success (Khatib & Krasny, 2015; Flagler, 1995). Rewarding participants of prison gardening programs can heightens prisoners' self-esteem; for most of the participants, this certificate of completion or achievement is the first award they have ever received

(Khatib & Krasny, 2015; Flagler, 1995). Prisoners' increased self-esteem following receipt of a certificate of achievement can be further boosted by the increased self-esteem and self-confidence that accompanies attaining more knowledge and mastery of subject matter and skills learned and perfected (Khatib & Krasny, 2015; Sempik, 2005). Because poor self-esteem contributes to how a person treats him or her self and others around him or her, building self-esteem and self-confidence are good ways to reduce symptoms of mental illness and aggressive incidents (Khatib & Krasny, 2015).

While many state prisons have historically used rural facilities in which to implement gardening programs, these programs can now be extended to urban settings where new techniques such as green roofs, hydroponic gardening, and vertical gardening can provide the needed space and resources for urban gardening (Feldbaum et al., 2011). With today's technology, more inmates can be helped through gardening programs than ever before. Following is a detailed review of selected prison gardening programs taking place throughout the United States.

Selected Prison Gardening Programs

GreenHouse, Rikers Island Jail Complex, New York City, NY

Rikers Island Jail is located in New York City and is connected to Queens by the Rikers Island Bridge (Lindemuth, 2007). Approximately 16,000 male and female inmates live on the island (Lindemuth, 2007). Rikers Island is also home to the largest farm in New York City; up to 40,000 pounds of produce are produced there each year (Khatib & Krasny, 2015) (Jiler, 2006). The gardening program "GreenHouse" at Rikers Island was

started in 1997 by the Horticulture Society of New York (HSNY) and provides horticulture training and work experience in design, installation, and garden maintenance to inmates at Riker's Island Jail (Lindemuth, 2007).

Eighty-five to one hundred students are taught by the Horticulture Society of New York at Rikers Island Jail annually (Lindemuth, 2007). Men and women do not work in the garden at the same time so they work in shifts – women in the morning and men in the afternoon (Lindemuth, 2007). The garden on the island is just over one acre in area and is secured by a 10-foot cyclone security fence; it includes a series of lush beds and borders that include butterfly and bird gardens, a medieval herb garden, a vegetable garden, and a native woodland garden (Lindemuth, 2007). The garden also includes built structures such as arbors, post and rail fences, birdhouses, a gazebo, a pond with a waterfall, a greenhouse, and a brick building that is used as an office and classroom (Lindemuth, 2007).

The Rikers Island garden program is structured to provide activities all year round (Lindemuth, 2007). During the winter months when gardening outdoors is difficult, horticulture classes are taught (Lindemuth, 2007). Also during winter months, the greenhouse is turned into a carpentry shop where inmates can make items to place in the garden in the spring (Lindemuth, 2007). The products made in the carpentry shop are also donated to schools and parks in New York City (Lindemuth, 2007). In the summer months, GreenHouse students grow plants for schools and other public entities including libraries in low-income neighborhoods (Lindemuth, 2007). The vegetables grown on

Rikers Island in the summer are donated to cooking classes offered at the Rikers jails and also to homeless shelters in New York City (Lindemuth, 2007).

Graduates of GreenHouse receive a certificate of completion and achievement and are eligible to participate in Horticulture Society of New York's post-release program (Lindemuth, 2007). HSNY's post-release program is known as GreenTeam (Lindemuth, 2007). Participants working with the GreenTeam actively pursue other job possibilities so as to continue working after their time at GreenTeam ends (Lindemuth, 2007). GreenHouse and GreenTeam work together to provide inmates with skills needed to cope with life and to secure employment after they have served their sentence.

In order to assess the GreenHouse and GreenTeam programs, inmate information is entered into a database as soon as they start participating in GreenHouse (Khatib & Krasny, 2015). Database information helps staff to track participant development and status throughout the program and following release (Khatib & Krasny, 2015). The database is individualized enough to allow staff to prepare a personal plan for each inmate and make contacts with programs, agencies, and employers while the inmates are still in prison at Rikers Island (Khatib & Krasny, 2015).

Insight Garden Program, San Francisco Bay Area, CA

Insight Garden Program (IGP) was started in 2003 to provide job skills training to inmates at Solano and San Quentin State Prisons in California (Khatib & Krasny, 2015). IGP offers weekly classes that teach about the "inner" and "outer" gardener (Khatib & Krasny, 2015). The "inner" gardener lessons deal with transformation and change,

meditation, emotional processes, work, and eco-therapy (Khatib & Krasny, 2015). The “outer” gardener lessons deal with human and ecological systems and organic vegetable and flower gardening (Khatib & Krasny, 2015). The inner and outer gardener lessons thus teach a participant how to garden as well as how to use gardening as a mental health therapy. IGP also teaches team building, participatory decision-making, and inmates help to create curriculum that will teach other life skills (Khatib & Krasny, 2015).

After participants of the Insight Garden Program are released from Solano or San Quentin State Prisons, IGP connects participants to opportunities like Planting Justice – a sustainability-training program (Khatib & Krasny, 2015). Planting Justice and other organizations like it provide former inmates with vocational certification, employment skills, entrepreneurial training, paid work experience, job placement support, and access to legal services, mental health and substance abuse support, and housing aid (Khatib & Krasny, 2015). Upon release, Planting Justice also offers employment to selected former inmates (Khatib & Krasny, 2015).

Roots to Re-entry, Philadelphia, PA

At the Philadelphia Prison System’s northeast complex, the Pennsylvania Horticulture Society (PHS) offers gardening and basic landscaping training to inmates (Khatib & Krasny, 2015). This training is done through their Roots to Re-Entry job training and placement program as well as the City Harvest program (Khatib & Krasny, 2015). The Pennsylvania Horticulture Society staff oversee 14 weeks of training to selected inmates (Khatib & Krasny, 2015). The inmates participate in health and job

preparedness workshops offered by the Federation of Neighborhood Centers Career Support Network (Khatib & Krasny, 2015). They also participate in intensive training at the prison greenhouse and garden through PHS (Khatib & Krasny, 2015). The City Harvest program has included over 700 inmates (Khatib & Krasny, 2015). The inmates cultivate seedlings at the prison greenhouse, which are then either grown at the prison's onsite garden or transplanted and grown by volunteers in over 40 community gardens in the area (Khatib & Krasny, 2015). Produce is donated to food kitchens throughout Philadelphia (Khatib & Krasny, 2015).

If an inmate in the Roots to Re-entry program is approved for work release status after the first stage of the program, they enter a six-week training program in landscaping in the Philadelphia area and live in a halfway house (Khatib & Krasny, 2015). They train at Bartram's Garden, Awbury Arboretum, or Friends Hospital (Khatib & Krasny, 2015). When the six-week training program is complete, the former inmate receives job training and placement assistance in local food production or landscape management (Khatib & Krasny, 2015).

Master Gardener Program, Federal Prison Camp, Bryan, Texas

The Federal Prison Camp (FCP) in Bryan, Texas is a minimum-security prison for women (Migura, Whittlesey & Zajicek, 1997). The FCP offers many therapeutic and vocational programs, one of which is the Master Gardener program sponsored by the Texas Agricultural Extension Service (Migura, Whittlesey & Zajicek, 1997). More than 250 inmates had completed the program from its start in 1991 to when this article was

written in 1997 (Migura, Whittlesey & Zajicek, 1997). This Master Gardener program is 3.5 months in length and requires the students to complete 400 contact hours, maintain a scholastic average of 70 or above, and complete all class work and tests (Migura, Whittlesey & Zajicek, 1997). When the women complete the Master Gardener program they are certified by the Texas Agricultural Extension service as Master Gardeners and they receive 40 continuing education credits from Texas A&M University (Migura, Whittlesey & Zajicek, 1997). The Master Gardener program “is designed to maximize the accomplishments of the individual while developing group cooperation, leadership, and responsibility” (Migura, Whittlesey & Zajicek, 1997, p. 300). Participants are paid a minimal salary from the federal government while participating in this program. An experimental study was done evaluating the therapeutic results of the Master Gardener program on female inmates at the FCP and is discussed in the Results section of this paper.

Marion County Sheriff’s Office Inmate Work Farm Program, Ocala, FL

The Marion County Sherriff’s Office (MCSO) operates a 125-acre farm utilizing inmate labor (Moore, Freer & Samuel, 2015). This farm reduces the tax burden of feeding around 2,000 inmates per day (Moore, Freer & Samuel, 2015). Vegetables, poultry, and dairy are produced on the farm and contribute over \$500,000 annually to the facility’s operation (Moore, Freer & Samuel, 2015). Moore, Freer and Samuel (2015) gave qualitative interviews to inmates participating in this work farm program to

determine how the program affected individuals involved in it. The results of these interviews were positive and are outlined in the results section.

Assessing Gardening Program Outcomes

The effects of gardening programs on the inmate population are difficult to evaluate because many of the effects that gardening programs have on individuals cannot be measured. An assessment of outcomes for each participant is difficult also because each person has individual circumstances, backgrounds, goals, and challenges (Khatib & Krasny, 2015). Some prison gardening programs such as those discussed above have tracked success using recidivism rates as a measure (Khatib & Krasny, 2015). While recidivism rates tell a lot about how participants deal with life following incarceration, this data alone is insufficient to evaluate the more detailed effects that prison gardening programs have on inmates. Despite the barriers to evaluation of gardening programs, several evaluations do exist that go beyond studying recidivism rates alone (Khatib & Krasny, 2015).

In one study, six offenders in Virginia were examined as they went through a hands-on vocational horticulture program over a 17-week period (Khatib & Krasny, 2015) (McGuinn & Relf, 2001). Upon completion of the curriculum, each participant showed better scores in all six categories included in the pre and posttests (Khatib & Krasny, 2015) (McGuinn & Relf, 2001). The categories included in the pre and posttests included participants' views about their peers, themselves, and towards the environment (Khatib & Krasny, 2015) (McGuinn & Relf, 2001). The results of this study testify that

vocational horticulture programs can help prisoners to increase self-worth, and have more positive views toward others and toward society (Khatib & Krasny, 2015) (McGuinn & Relf, 2001).

Another study analyzed a different garden project based in San Francisco (Khatib & Krasny, 2015). The purpose of this study was to examine the psychological value of gardening therapy (Khatib & Krasny, 2015). This project is known as The Garden Project (Khatib & Krasny, 2015). The study looked at a sample of 48 out of 330 inmates at a San Francisco area correctional facility, all of who were serving sentences for drug-related charges (Khatib & Krasny, 2015) (Rice & Remy, 1998). The 48 participants were randomly assigned to either The Garden Project or to another therapeutic program (Khatib & Krasny, 2015). Upon admission, departure from prison, and at least three months after discharge, data was gathered through questionnaires and interviews (Khatib & Krasny, 2015). Researchers studied violence, drug use, family background, and psychosocial functioning and how these effects varied according to race and gender (Khatib & Krasny, 2015). Results from the study showed that the Garden Project participants had a stronger urge to seek help following three months after release (Khatib & Krasny, 2015). Inmates in both groups showed a decrease in drug use following release, although The Garden Project participants reported the greatest decrease (Khatib & Krasny, 2015).

The studies discussed above show different ways of evaluating the effects of gardening programs on prison inmates and others. The results section describes how these methods and others have been used to evaluate the five prison programs discussed

in detail in this literature review and provides a synthesis of these outcomes into three main themes.

Results

Three themes emerged from the study of selected prison gardening programs discussed above. The gardening programs were shown to 1) increase self-efficacy and self-worth for inmates, 2) decrease anxiety and depression symptoms in inmates, and 3) reduce recidivism rates for participants when compared with the general prison population. Communities within geographic proximity of prisons implementing gardening programs also benefited from organic produce donated by the prison programs to local charities. Quotes from qualitative interviews of prisoners involved in prison gardening programs are embedded in the text below to show other effects experienced by individuals involved in these programs.

Increase in Self-Efficacy and Self-Worth

A study was conducted by Migura, Whittlesey and Zajicek (1997) to determine the therapeutic results of the Master Gardener program on female inmates at the FCP in Bryan, Texas. The main objective of the study was to “determine the effects of a vocational horticulture program on the self-development of female inmates” (Migura, Whittlesey & Zajicek, 1997, p. 299). Study subjects were assigned to two groups (Migura, Whittlesey & Zajicek, 1997). Group A contained 36 inmates involved in the Master Gardener program (Migura, Whittlesey & Zajicek, 1997). The control group Group B contained 26 inmates who did not participate in the Master Gardener program

(Migura, Whittlesey & Zajicek, 1997). A confidential survey was administered to the participants containing questions from the Internal-External Control of Reinforcement Scale, the Multidimensional IE Scale, the Prison Locus of Control Scale, the Rosenberg Self-Esteem Scale, and the Satisfaction with Life Scale (Migura, Whittlesey & Zajicek, 1997). The survey contained fifty-five questions and was administered twice: once as a pretest and once as a posttest (Migura, Whittlesey & Zajicek, 1997). Results indicated that Master Gardener and control participants in other vocational programs significantly increased their self-esteem and global life satisfaction scores between the pre- and post-tests (Migura, Whittlesey & Zajicek, 1997). Substance abusers in the Master Gardener program also significantly increased their situation specific internal-external locus of control and their global life satisfaction while participating in the program (Migura, Whittlesey & Zajicek, 1997). Leaders of the program stated:

“The Master Gardener program constitutes a vocational horticulture program and a horticultural therapy program. As a horticultural therapy program, the ultimate goal is the improved well-being of the individual including cognitive, physical, social, and behavioral areas of development” (Migura, Whittlesey & Zajicek, 1997, p. 300).

Positive results for drug and alcohol abusers participating in gardening programs has been reported several times (Migura, Whittlesey & Zajicek, 1997; Cornille, Rohrer, Phillips, and Mosier, 1986; Rice and Remy, 1994). Cornille et al. (1986) reported that recovering male addicts who participated in the horticultural component of the treatment

process at the Florida Alcoholism Treatment Center developed group responsibility, an improved sense of belonging, and an increased feeling of personal effectiveness. Results from this study are encouraging for institutions with high percentages of drug and alcohol abusers (Migura, Whittlesey & Zajicek, 1997).

Participants of GreenHouse at Rikers Island, New York also experienced increases in self-efficacy and self-worth. Following are quotes from qualitative interviews of participants of GreenHouse and GreenTeam obtained by Laichter (2008).

One participant stated:

“I grew up in the Lower East Side...Then I lived in the Bronx. Basically, everywhere I went, where were the middle to lower class neighborhoods, there’s not much garden designs like the one I had seen at Rikers. And the ducks. And the rabbits. It was like I saw life in a whole different way. I started waking up- seeing things...Working with the GreenTeam and learning about plants and learning more about life- it made my spirit lifted. It lifted up my spirit just being with plants. My whole life changed. I was around plants and beautiful things. I started being more aware of what life is about. You know, I started noticing the trees and the birds. It just...it was a whole new world for me” (Laichter, 2008, p. 41).

Other participants related how the program changed their lives. One participant said

“I always hustled, so I never earned an honest paycheck, because I always did a crime. Working for the GreenTeam was just turning over a new leaf. Literally,

turning over leaves! Working with my hands and liking what I do. The work was exhausting, but I need that. I needed that to take some of the negative energy and turn it into something positive.” (Laichter, 2008 p. 42-43).

Another participant stated, “It’s about learning to care for things... for living things, not just plants... If you can care for a plant, you can care for a person.” (Laichter, 2008 p. 43). The change seen in this individual and others shows how even a short time in a gardening program can increase confidence in inmates to be able to care for themselves and others.

Decrease in Anxiety and Depression Spectrum Symptoms

Almost all of the participants of the qualitative interviews done by Laichter (2008) told stories about how working in nature was consoling and soothing to them and spoke about how gardening was helpful in channeling emotions into positive action. One participant said, “I’m more calm now. I used to be fast to fight, but now I’m calm... There’s just something about that soil. It relaxes me” (Laichter, 2008, p. 41). Another participant said, “What I really liked was when I was at Rikers, and working with the GreenTeam, it’s serene. There’s something about it that just calms you down and makes me feel good.” (Laichter, 2008, p. 42). Another participant stated how emotions are controlled via gardening: “You get a lot of frustration out when you’re digging a hole- it’s like ‘this person made me mad, let me dig this hole’ and as time goes by, you

forget what you were frustrated and mad about. Horticulture taught me a lot of positive things to do in my life” (Laichter, 2008, p. 41).

Reduction in Recidivism Rates

According to Krasny (2015), a study published in 2011 found that out of 117 Insight Garden Program participants who were paroled from 2003-2009, less than 10 percent returned to jail or prison. This is significantly lower than California’s average recidivism rate over the same period, which was 64 percent between 2003 and 2009 (Linden, 2015; CDCR, 2014). This reduction in the recidivism rate saved the state of California 40 million dollars (Khatib & Krasny, 2015).

Roots to Re-entry has measured success so far by the number of job placements that adult males at Philadelphia Prison Northeast Complex get after participating in the program. Forty-two participants have graduated from the Roots to Re-entry program by successfully completing both phases and thirty-six have been placed in jobs with local employers since 2010 (Khatib & Krasny, 2015).

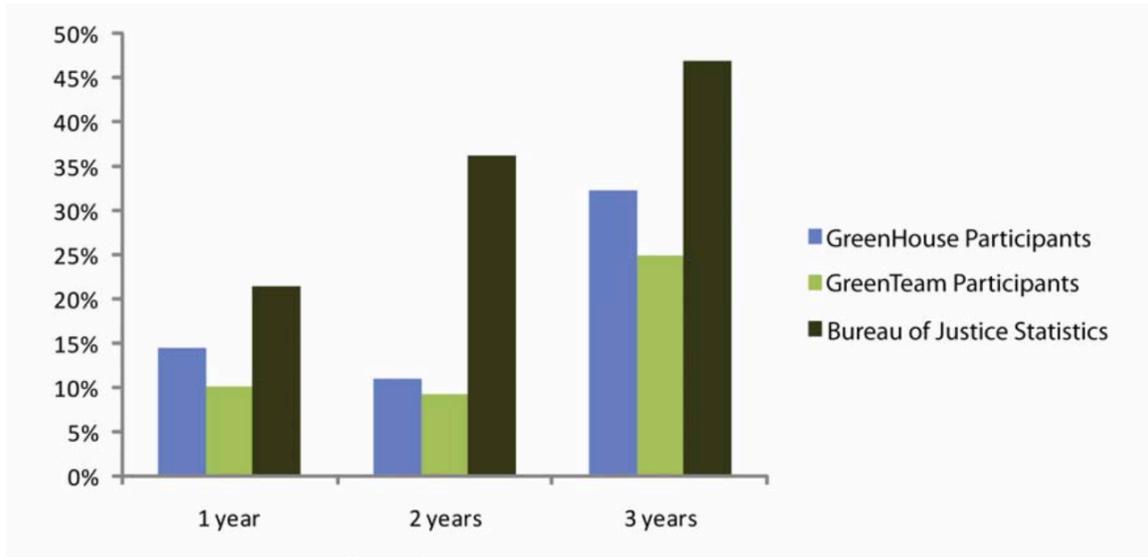
Program evaluation of the The Marion County Sherriff’s Office (MCSO) up to 2015 had been focused on money and food production (Moore, Freer & Samuel, 2015). Moore, Freer and Samuel (2015) focused their attention on inmates’ benefits and development through the program. Results indicated that the work farm program was both positive and beneficial to individual inmates (Moore, Freer & Samuel, 2015). The inmates indicated that they experienced a positive learning environment and developed new skills that would help them find future employment while working on the farm

(Moore, Freer & Samuel, 2015). Inmates often described a transformative learning process as they gained a better work ethic and made plans for their future lives (Moore, Freer & Samuel, 2015). Inmates described working on the farm as more free and relaxed compared to conditions inside the jail (Moore, Freer & Samuel, 2015). Inmates also mentioned that working on the farm helped their time in jail go by much faster. (Moore, Freer & Samuel, 2015). The most commonly cited life skills learned by the work farm participants were responsibility, accountability, and developing a positive work ethic that could be utilized upon release (Moore, Freer & Samuel, 2015). Other life skills learned by the interviewees included patience, interpersonal skills, and self-assessment (Moore, Freer & Samuel, 2015).

The effects of the Rikers Island GreenHouse program can be seen by the decrease in recidivism seen among graduates.

“Utilizing reconviction statistics on more than 500 program participants dating back over the course of eight years provided by the New York State Division of Criminal Justice, a recent study showed that individuals who graduate successfully from the GreenHouse and GreenTeam programs have a much better chance of successfully rejoining society. After one year, the reconviction rate of GreenHouse and GreenTeam graduates was 10 percent, compared to 21.5 percent of the general population of the formerly incarcerated in New York State, and within three years the rate was 25 percent for graduates, compared to 47 percent of the general population” (Feldbaum et al., 2011, p. 19).

Figure 2: Reconvictions Post-Release for GreenHouse and GreenTeam Participants, Compared to the General Incarcerated Population



(Laichter, 2008)

Table 1: A Summary of the effects of Selected Prison Gardening Programs

Program	Population	Measures	Results
GreenHouse	Adult men and women at Riker's Island state prison, NY.	Recidivism rates, qualitative interviews.	RECIDIVISM: After 1 year: 10% recidivism of graduates versus 21.5% of the general population of the prison. After 3 years: 25% for graduates versus 47% for the general population of the prison. PSYCHOSOCIAL: Prisoners reported greater happiness, more inner calm, and a greater sense of caring.
Insight Garden Program	Adult males at San Quentin state prison, CA.	Recidivism rates.	RECIDIVISM: Of 117 program participants paroled from 2003-2009, less than 10% returned to jail or prison compared to California's average recidivism rate over the same period of 64%. This reduction in recidivism saved the state of CA \$40 million.
Roots to Re-entry	Adult males at Philadelphia Prison Northeast Complex, PA.	Number of job placements.	RECIDIVISM: 36 out of 42 participants have been placed in jobs with local employers.
Master Gardener Program, FPC, Bryan, TX	Adult women at the Federal Prison Camp, Bryan, Texas.	Experimental study involving a survey with questions from the Internal-External Control of Reinforcement Scale, the Multidimensional IE Scale, the Prison Locus of Control Scale, the Rosenberg Self-Esteem Scale, and the Satisfaction with Life Scale.	SELF-EFFICACY: Master Gardener and control participants in other vocational programs significantly increased their self-esteem and global life satisfaction scores between the pre- and post-tests. Substance abusers in the PSYCHOSOCIAL: Master Gardener program also significantly increased their situation specific internal-external locus of control and their global life satisfaction while participating in the program.
Marion County Sheriff's Office Inmate Work Farm Program	Adult Males at Marion County Jail in Ocala, FL.	Qualitative interviews.	RECIDIVISM: Inmates reported a positive learning environment while participating in the program and they described a transformative learning process in which they gained a better work ethic and made plans for the future. PSYCHOSOCIAL: Inmates felt a greater sense of calm as they worked in nature.

Discussion

This review has uncovered many effects of prison gardening programs on the life success of inmates and former inmates. These effects could be due to many factors such as mental therapy, vocational training, and self-efficacy all gained through prison gardening programs.

Even though the United States has the largest prison population in the world (Bonds, 2012), U.S. prison rehabilitation programs have been criticized for lacking demonstrable efficacy and “having no appreciable effect on recidivism” (Linden, 2015). After studying many prison gardening programs, Linden (2015), a professor of psychology at Princeton University, stated “Green prison programs essentially provide a form of eco-therapy to prisoners – which is prescribed physical and psychological therapy through nature-based methods administered by trained professionals” (p. 1). Linden (2015) goes on to describe other benefits of prison gardening programs such as basic vocational education, practice in mindfulness, and social skills. Linden (2015) proposes that prison gardening programs be a focal point of interest to research and public policy due to their effectiveness in terms of 1) low recidivism rates, and 2) improved mental health. Self-published recidivism rates of graduates of prison gardening programs are very low, ranging between 10 and 24 percent (Gilbert, 2012).

Linden (2015) states, “The success rate of green prison programs is not entirely unexpected. Prison environments are often bleak, chaotic, overcrowded and isolating, with little access to nature. Garden programs offer an opportunity for relaxation and relief from such harsh social environments” (p. 3; Lindermuth, 2007). Moore (1981) found that

cells with views of nature were associated with fewer sick calls from prisoners.

Qualitative interviews with graduates of prison gardening programs help to bring to light some of the mechanisms that contribute to the success of prison garden programs

(Linden, 2015). Qualitative interviews showed that garden programs promote feelings of purpose, self-efficacy and self-worth (Waitkus, 2004; Laichter, 2008; Benham, 2014).

With these feelings, the participants feel less depressed, less aggressive, and more relaxed leading to better life outcomes (Waitkus, 2004; Laichter, 2008; Benham, 2014).

The main findings of this review include 1) increase in self-efficacy and self-worth, 2) decrease in anxiety and depression spectrum symptoms, and 3) reduction in recidivism rates. These findings are important to policy makers and prison officials. These findings could be used to better rehabilitate inmates and treat symptoms of mental illness, provide vocational training, and reduce tax spending on expensive therapies and recidivism. A main effect of gardening programs on inmates as shown by the literature and program websites of selected gardening programs in this analysis was better access to green jobs after release and reduced rates of recidivism. Potential reasons for reduced recidivism rates could be that inmates gain skills in order to get jobs and reduce symptoms of mental illness that can cause a person to commit crime. Inmates reported increased personal responsibility, better work ethic, and improved interpersonal skills as a result of participation in agricultural programs (O'Callaghan, Robinson Reed & Roof, 2010). These results were also seen in the Marion County Sherriff's Office Work Farm Program (Moore, Freer & Samuel, 2015).

Limitations

Limitations of this study include a lack of differentiation of men versus women and a lack of differentiation between rural and urban programs, both of which may affect outcomes. An inmate must also demonstrate good behavior to be in a prison gardening program. This could be a confounding variable when using recidivism rate data. There is always a risk of bias from article authors at the study and outcome level. There is also a risk of incomplete retrieval of identified research or reporting bias at the review level.

Conclusion

Prison gardening programs are promising practices for inmate rehabilitation efforts for a few reasons: prison gardening programs are generally low cost, they have been shown through qualitative interviews to be effective in treating symptoms of mental illness, and have been shown through statistical data to decrease recidivism rates. Prison gardening programs give inmates tools to use when confronted with symptoms of mental illness and skills they need to succeed in the workforce as they reenter society following incarceration.

Implications for Practice

The results of this study show potential for a low-cost alternative therapy to treat symptoms of mental illness in prison inmates that would additionally teach vocational skills and provide healthy food and exercise to these individuals as well as healthy food donated to charities in prison areas.

According to Migura et al. (1997), all fifty states offer Master Gardener programs. Because Master Gardener programs have shown usefulness when adapted to the prison population, this nationwide network may provide a valuable starting point for the development of many more prison gardening programs. It may also prove useful for providing employment or group inclusion to help inmates readjust to life after release from prison.

Implications for Research

One gap seen in the literature was a lack of standardization of prison gardening program evaluation. A meta analysis to standardize research reporting would be a good next step in the study of this topic.

Further studies could focus on the differences in the effects of prison gardening programs between male and female inmates. Other studies could focus on the youth prison gardening programs that are in operation in the United States and study the differences in the effects that prison gardening programs have on youth and adult inmates. Another option for further study is to study the mechanisms behind each of the effects of prison gardening programs that have been shown to be effective.

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