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Impact of a nature-based intervention on incarcerated women

Barb Toews, Amy Wagenfeld and Julie Stevens

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Barb Toews is based at the University of Washington Tacoma, Tacoma, Washington, USA.
Amy Wagenfeld is based at the Department of Occupational Therapy, Western Michigan University, Grand Rapids, Michigan, USA.
Julie Stevens is Professor at the Department of Landscape Architecture, Iowa State University, Ames, Iowa, USA.

Abstract

Purpose – *The purpose of this paper is to understand the impact of a short-term nature-based intervention on the social-emotional well-being of women incarcerated on a mental health unit in a state prison.*

Design/methodology/approach – *This research used a mixed method approach with individual interviews, a focus group and a visual analog scale (VAS).*

Findings – *Qualitative results found that women appreciated the planting party and the way the plants improved the physical environment. Women were also emotionally and relationally impacted by their participation and practiced skills related to planting and working with people. Quantitative results indicate that women were happier, calmer, and more peaceful after the intervention than before.*

Research limitations/implications – *Study limitations include sample size, self-report data and use of a scale not yet tested for reliability and validity.*

Practical implications – *Findings suggest that nature-based interventions can serve as an adjunct to traditional mental health therapies in correctional settings. Nature-based interventions can support women's goals to improve their mental health.*

Social implications – *Findings suggest that nature-based interventions can serve to improve relationships among incarcerated women, which may make a positive impact on the prison community. Such interventions may also assist them in developing relational and technical skills that are useful upon release.*

Originality/value – *To date, there is limited knowledge about the impact of nature-based interventions on incarcerated individuals coping with mental health concerns.*

Keywords *Mental health, Prison, Treatment, Nature, Environmental design, Gardens*

Paper type *Research paper*

Introduction

The USA boasts the world's highest incarceration rate, incarcerating 2.2 million men and women each year in federal and state prisons and local jails (Tsai and Scommegna, 2012). More than half of these individuals cope with mental health problems including substance abuse, depression, schizophrenia and post-traumatic stress disorder (Travis *et al.*, 2014). Incarcerated women struggle with mental health at greater rates than men (Glaze and James, 2006; Prins, 2014; Steadman *et al.*, 2009), with 91 percent of female offenders meeting lifetime criteria for mental health disorders, 82 percent for substance abuse and 53 percent for post-traumatic stress disorder (Lynch *et al.*, 2014). This compromised mental health is due, in part, to women's experiences with childhood abuse as well as intimate partner violence (Lynch *et al.*, 2012, 2013).

The mental health of those incarcerated, both men and women, is clearly of great concern, especially for the way it may contribute to offending (Gottfried and Christopher, 2017). In this era when correctional facilities have become "'de facto' mental health treatment facilities" (Honberg, 2015, para. 6), individuals may receive their first mental health services while incarcerated (Farnworth and Muñoz, 2009). However, of the $8 billion spent annually on correctional healthcare, only 14 percent covered mental health care and pharmaceuticals and 5 percent paid for substance abuse treatment (Henrichson and Delaney, 2012; The Pew Charitable Trusts and MacArthur Foundation, 2014). This limited funding translates into less than one hour of mental

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health counseling by trained professionals per week for those without acute mental illness (Hills *et al.*, 2004). The disconnect between severely constrained funding and a significant need for mental health services, coupled with limited correctional staff training (Daniel, 2007), sets up a system that is stretched, if not inadequate to meet the needs of incarcerated individuals.

It is imperative to find new therapeutic mental health approaches that do not require extensive trained counseling staff and can, in some capacity, be self-directed by the incarcerated person. One approach includes nature-based interventions. Nature has long been known to have therapeutic benefits for those who are not incarcerated (Alcock *et al.*, 2014; Astell-Burt *et al.*, 2014; Mitchell, 2013; Roe *et al.*, 2013; Ulrich, 1984). Nature- and horticulturally oriented programs used within prisons also show positive results (Baybutt and Chemlal, 2016; Flagler, 1995; Patterson, 2013; Rice and Remy, 1998; Richards and Kafami, 1999; Van Der Linden, 2015). These studies, however, do not specifically explore the impact of nature-based interventions on those confined to mental health units within the correctional facility. Participation in nature-based interventions may improve the social-emotional well-being of incarcerated individuals struggling with mental health in such a way that they are confined to specialized units for shorter periods and learn skills for using nature in their daily life to manage and cope with their health. This pilot study is a first step toward understanding the impact of a nature-based intervention on the social-emotional well-being of women incarcerated on a mental health unit in a state prison.

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Literature review

There is significant evidence-based research supporting mental, physical, and psychosocial benefits associated with access to nature, across various demographics (e.g. Adevi, and Lieberg, 2012; Währborg *et al.*, 2014). Research has found that engaging in outdoor nature experiences reduces stress (Pasanen *et al.*, 2018) and walking in nature increases positive affect and decreases negative affect, as well as increasing revitalization, positive engagement and tranquility (Johansson *et al.*, 2011). Interaction with nature (IWN) also promotes social inclusion, which in turn enhances quality of life (Diamant and Waterhouse, 2010). Similar positive effects and symptom relief have been found among people who have experienced trauma (Linton, 2017; Lorber, 2011; Rice and Remy, 1998; Uvanile, 2012), been diagnosed with clinical depression (Gonzalez *et al.*, 2011; Kam and Siu, 2010) and exhaustion disorder (Sonntag-Öström *et al.*, 2014). An important takeaway message is, "To consider the availability of nature as merely an amenity fails to recognize the vital importance of nature in effective cognitive functioning" (Berman *et al.*, 2008, p. 1211).

Limited research suggests that nature affords myriad benefits for those who are incarcerated (Van Der Linden, 2015). Horticultural programs facilitated at prisons and jails contribute to prisoner participation in a purposeful goal oriented activity with opportunities to achieve rehabilitative outcomes – e.g., gain associative marketable skills for future employment, experience a sense of accomplishment and resiliency, improve mental health, quality of life, and social skills, and decrease recidivism rates (Gallagher, 2013; Khatib and Krasny, 2015; Lindemuth, 2007; Moore *et al.*, 2015; Patterson, 2013; Polomski *et al.*, 1997; Rice and Remy, 1998; Richards and Kafami, 1999; Sandel, 2004; Van Der Linden, 2015). Other forms of accessing nature also contribute to positive outcomes. Earlier studies found that offenders with views of nature outside their cell windows had fewer health complaints (Moore, 1981) and fewer stress-related physical symptoms (West, 1985), compared to those who lacked such views. Research in Oregon explored the impact of a nature imagery intervention, in which incarcerated men viewed nature projected on a wall during regular exercise periods. Findings showed a more than 25 percent reduction in disciplinary referrals for offenders who exercised while watching nature videos as compared to another group, who were not shown the videos (Oregon Youth Authority Director's Office, 2016). Toews (2016) found that incarcerated women desired to be in natural environments for the ways they imagined it would facilitate experiences of peace, focus and motivation, success and affirmation.

These results suggest that nature-based therapeutic environments and interventions may positively change the mental health and quality of life for incarcerated individuals. Such interventions,

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especially when incorporated into the daily life of the correctional environment through outside and inside gardens and plants, may also address the gap in mental health service provision given limited resources. Nature-based interventions may support improved mental health upon release, if formerly incarcerated individuals have access to greened spaces and apply what they learned while confined.

These findings relative to the impact of IWN are limited, however. Horticultural programs are typically long-term and focus on vocational training and providing a positive antidote to occupational deprivation – a lack of meaningful and purposeful activity to engage in; a prominent feature at many correctional institutions (Migura *et al.*, 1997; Molineux and Whiteford, 1999; Polomski *et al.*, 1997; Whiteford, 1997, 2011). As a result, little emphasis is placed on mental health specifically. Horticulture programs are typically available only to offenders in the general population, rather than including or directed at those with mental health considerations. Views through windows and access to nature imagery do not provide opportunities for direct sensory contact with plants (e.g. to touch and smell). No research exists that specifically explores the impact of the nature-based interventions for those with mental health issues nor that considers the benefits of short-term, one-time interventions in which individuals come in direct contact with plants.

This study sought to address these gaps by exploring the impact of a one-time nature-based intervention (planting party) with women incarcerated in a mental health unit. The methodology included short interviews and a visual analog tool, created specifically for this study. The research questions guiding the study inquired about the impact of the nature intervention on women's sense of happiness, hopefulness, anger and stress.

Site and intervention description

The Iowa Correctional Institution for Women is located in rural Iowa and confines approximately 500 women. The Iowa State University (ISU) landscape architecture faculty and students have designed and built multiple landscapes on the prison campus. The healthcare building includes two units dedicated to women with acute and subacute mental health issues. The acute unit treats women with severe mental health diagnoses and includes the suicide and self-injury prevention rooms, which are closely monitored 24-7. Women in this unit are often restricted to their rooms for much of the day or require a counselor or mentor to escort them out of their room. The subacute unit houses approximately 30–40 women with less severe diagnoses, requiring long-term and more specialized care than those in the acute unit. Most of the women in this unit can move freely between their room, the dayroom and courtyard (a concrete "yard" enclosed with chain link fence), eat in the dining hall, and visit the gardens outside the unit. Women often move between these two units, based on their health status.

Women incarcerated in these units have limited access to nature. The units' dayrooms have large windows, which emit moderate levels of natural light and look out to the courtyard. Women in the subacute unit access this courtyard during the day, except during thrice daily headcounts and lockdowns. Women in the acute unit are granted access to the courtyard on a case-by-case basis, often with an escort. The women's rooms have one reasonably large window that provides natural lighting, which is so high that many women require a chair to look out of it. Women also have varied access to the prison's healing garden, which is physically accessible to women in the subacute unit and can be seen from the courtyards and many of the room windows on both units.

The intervention – a planting party – was open to women who lived in the subacute unit and held in the unit's dayroom. Party organizers included university landscape architecture faculty and students with members of the prison garden crew (who work closely with the university landscape architecture faculty and students) serving as "mentors." In total, approximately 15–18 women confined to the unit participated in the party for varying lengths of time given their schedules, as did 11 mentors. The party included two central activities: transplant a variety of small African violets and succulents into plastic cups for women to tend in their rooms; and transplant small trees and plants (e.g. ficus, Norfolk Island pine and peacock or rattlesnake plant) into larger pots for keeping and tending in the dayroom. The women transplanted smaller plants

at the tables and the larger plants at the tables and on the floor. The mentors and landscape architecture hosts guided participants on how to transplant and assisted with the mechanics of it. After transplanting, the women placed the larger plants around the dayroom, working together to try out different configurations and make decisions about final placement with consideration of sightlines to maintain security and circulation to minimize way-finding hazards. They then coordinated the cleanup efforts and restored the dayroom to its original state. The party lasted 60 min. Some of the larger plants were sent to the acute unit for the women to enjoy in their dayroom.

Methodology

This pilot study explored the impact of the planting party on participants' emotions and other self-identified areas of importance. In total, 16 women who participated in the planting party as unit participants ($n = 11$) or mentors ($n = 5$) agreed to also participate in the study. Study participation included completing a short post-party interview or focus group and a pre- and post-planting "IWN" scale. The ISU IRB approved this interdisciplinary study. Due to anticipated low literacy levels and mental health impairments, the informed consent was read aloud to all women after which they took a consent quiz and, if they passed, signed written consent forms. Party participation did not require study participation.

Interviews and focus group

Five women who lived on the mental health unit participated in 15-min post-party interviews and four mentors participated in a 40-min focus group after the party. The semi-structured one-on-one interviews inquired about aspects of the party the women liked and disliked, how party participation and the prospect of tending to plants made them feel, benefits to participation, reactions to the mentors' assistance, and the potential impact of plants on their daily lives. The semi-structured focus group questions were similar to those in the interviews, with the addition of a question to solicit mentors' thoughts on how the women on the mental health unit may be impacted by their participation in the party and having plants in their daily lives.

Neither the interviews nor the focus groups inquired about sensitive information and women did not offer sensitive personal information. For some interview participants, however, participating in the party brought back memories of childhood and familial relationships. These memories were expressed positively and did not warrant intervention at that time. Psychological staff on the unit were aware of the party and available to women post-party should intervention have been needed after the party. Unit managers were available to mentors if post-party support was necessary. To the best of the researchers' knowledge, no post-party support was needed for party participants.

Interaction with nature scale

The authors developed and piloted a VAS, called IWN cards, that women completed before and after the planting party. Researchers have found that simple one-item VASs are as effective in measuring physical and psychological conditions as a standardized counterpart and do so in a way that does not overwhelm the participant, especially those with low literacy (Abend *et al.*, 2014; Davey *et al.*, 2007), making them an effective means of data collection for incarcerated women. The IWN card consists of a two-sided 4 ¼ × 5 ½ inch card which includes four VASs to measure perceived movement of four emotional states: sadness-happiness, anger-peacefulness, stressed-calm, and hopelessness-hopefulness. Each scale is anchored with emojis, a simple and universal means to convey personal feelings which users find useful for conveying information (Huang *et al.*, 2008). Participants made a vertical mark along a 93-mm horizontal line to indicate their emotional state before and after the party. The line contained no numbers nor pre-drawn vertical marks in an effort to avoid leading the participant to conform to specific conventions for rating their emotions and removing the cognitive burden of extrapolating feelings to numbers or hash marks. Of the 16 study participants, 12 returned completed both pre- and post-IWN cards, representing a 75 percent return rate.

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Analysis

Researchers used an inductive analytic approach to analyze interview and focus group transcripts. This approach drew on constructivist grounded theory approaches in order to understand the data through increasingly higher levels of coding and engage in constant comparative methods (Charmaz, 2006). Given the constructivist assertion that researchers bring their own biases and preconceptions to the analytic process, analysis began with sensitization to conceptual issues drawn from literature with their respective fields of study, including criminal justice, occupational therapy and landscape architecture. Two researchers analyzed interviews and focus groups transcripts separately and, after comparison and resolution of discrepancies, created a final list of codes, and reanalyzed transcripts. No demographic information was collected beyond offender identification numbers, which were de-identified.

The IWN scores, measured from left to right along a 93-mm horizontal line, were recorded in millimeters. For each of the four emoji pairs, vertical marks made between 0–31 mm were categorized as a negative emotional state (e.g. sad, angry, stressed and hopeless), 31.1–61.9 mm as neutral and 62–93 mm as a positive emotional state (e.g. happy, peaceful, calm and hopeful). To insure interrater reliability, two researchers measured the pre- and post-test emoji ratings using straight rulers. Scoring discrepancies were resolved through re-measurement until calibration was reached. Though working with a small sample size ($n = 12$ completed assessments), paired sample t-tests were also run on the sample to explore, albeit cautiously, statistically significant relationships between pre- and posttest scores.

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Results

Results include qualitative results from interviews and focus groups and quantitative results from analysis of the IWN cards.

Qualitative results

For many of the women, having a living object to nurture in their rooms was profoundly meaningful for them and participants' responses to the plants were enthusiastic. Several overarching themes emerged from the interviews and focus group to suggest that it was not the interaction with the plants *per se* that was most impactful but rather, it was what the plants did for the environment, for the women emotionally, for their relationships with each other and their ability to practice skills.

General reactions party participation

The hands-on planting was a highlight for many women. Stephanie (all names have been changed to protect participant identities), spoke most eloquently on this aspect of the party:

> When I first reached into the potting soil and felt the soil in my hand, [it] was good for me. Why? Because I felt earth that God created […]. I remember[ed] that when a child comes home and is dirty after playing in the mud […] that means your child had fun. So, I was looking forward to getting a little dirt under my nails yesterday.

Others simply enjoyed the beauty of the plants – the colors, textures and visual diversity. All women expressed appreciation for the party and desires for similar events in the future.

Impact of plants on the environment

Women spoke repeatedly about how having plants in the dayroom and their rooms made it feel "homey" in several ways. For Neveah, it created an atmosphere of "welcoming," albeit "about as much as you can for a prison." Izzy likened the scent of the pine trees to "a home life. You know, like holidays remind you of family." Those not permitted to go outside appreciated the ability to directly interact with plants, rather than just seeing them through a window. These thoughts amplify the notion that inside plants can impart a sense of deinstitutionalization in a correctional facility.

Women also spoke to the beauty the plants brought to the physical environment, which served to freshen and "cleanse" the dayroom and again, counteract the institutional feel by introducing

color into an otherwise monochromatic environment. Izzy pointed out her concern for the "stagnant air" and noted how the plants "emit [things] into the air," which helped create a better environment. Terri honed in on the colors stating, "I think just having colors alone around me […] makes me feel better, want to do better." Here, Terri begins to connect the environment with emotional health.

Emotional impact

Participants frequently spoke about the positive emotional impact of the party and at the prospect of having plants in their daily living spaces. Women used words like "happy," "cheer," "peaceful" and "calm" to describe their experiences after the party and what they imagined now that the plants were there. In short, the plants served as a mood lifter as well as a mellowing agent. In terms of the latter, Cassandra reflected: "[Planting] calms me down. […] Like, when I have a bad day, I feel like I should be outdoors and calming down, listening to music and planting." Glory attributed these good feelings to being able to "free their mind and focus on something else rather than being in prison […]. It gets our minds off of problems, like, at home or in the world or in their life."

Women also spoke of the ways they experienced a sense of purpose and belonging, related to completing a task and doing something useful. Malinda summed up this feeling when she said, "I felt like I was using my time wisely. I wasn't just wandering around aimlessly doing nothing like I usually do." Their sense of belonging stemmed from a feeling that they were part of something bigger than themselves and something that could not get done with just one of them alone. Stephanie reflected on her experience: "[W]hen you're working with somebody and everybody's working together, there's this happiness inside of continuing a project that's called work. […] It took more than one of God's children to complete, and it was beautiful." Several other women also noted the spiritual aspects of the connection.

Social impact

The women transplanted small plants for themselves as well as larger plants for shared enjoyment in the dayroom. These two activities created numerous opportunities for the women to interact with each other. Many women spoke about the impact of the party on their relationships with each other, especially as it relates to helping behaviors. Neveah noted how the party may instill graciousness among women who have not appreciated each other previously:

> […] you can be on the unit with someone and can't stand them because of their attitude and stuff, but I think the planting and stuff could bring us together, because not everyone's good with plants and what they need [is help] […].

Neveah's reflection highlights the ways in which having plants may facilitate women's comfort to ask for help and inspire a willingness to help.

The women also experienced successful opportunities to achieve goals collaboratively, whether it was filling pots with soil, lifting trees into pots, or arranging the transplanted trees and plants around the dayroom. Stephanie noted how everyone "pitched in" to clean up after the party and try out different options for plant placement:

> People didn't all, like, scatter like roaches when the lights come on […] because everybody was willing to find a broom and pitch in and throw stuff away. […] [E]verybody had suggestions [about where to place the plants], and when plants needed to be lifted and more [than one person was] needed to [carry it], people pitched in and helped.

This collaboration and pitching in may have stemmed from the sense of purpose and belonging discussed earlier.

Skills practice

Women found themselves practicing skills, as it related to plants and working with people who have mental health issues. Some women, already experienced gardeners, learned how to transplant or better care for plants. Cassandra, for instance, stated that she "loved [the planting

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party] because I was excited to try new things. It was like a new thing to me […] so you guys actually taught me how to plant and water them." This skill development came from not only engagement with the university organizers, but also from each other.

The women, those who lived on the unit and those who did not, gained new insights and skills related to interacting with and assisting those who struggle with their mental health. For some, it was simply learning more about the mental health unit, its services, and the women it served, and dispelling misunderstandings about what it is like. Others gained more personal insight. Stephanie, who lived on the unit, found herself learning the need for patience:

> [W]hen we first started, I was looking at the plants and the soil, and I wanted to get started. And I was impatient […] So I had to sit and wait for us to read the purple paper and sign […]. So [the other women] were taking longer, and I was getting irritated and impatient […].They have to sign something, so I understand that part. But I wasn't patient.

Terri indicated that this "learning" experience was the best part of the party.

Quantitative results

The IWN VAS offers preliminary insight into the quantitative impact of the planting party on the women. Prior to the party, the women were neutral on all emotional ranges, except hopeless-hopeful for which they indicated feeling more positive; that is, hopeful. After the party, the women indicated feelings toward the positive end of the range for all emotions. This positive movement from pre- to post-party was significant for three emotion pairs: sad-happy ($t(3.04)$, $p = 0.011$), stressed-calm ($t(2.72)$, $p = 0.02$) and angry-peaceful ($t(3.4)$, $p = 0.006$). No significance was noted with the hopeless-hopeful scale (Table I).

Discussion

The planting party significantly impacted the women who participated, both those confined on the mental health unit and the mentors. Overall, the participants enjoyed the party in various ways – e.g., an opportunity to get dirty and just generally be around beauty and color. They also appreciated the way having plants on the unit made it feel more welcoming and homey, while beautifying the environment. The women's involvement brought about a sense of happiness, calm, and belonging and an overall improved mood, while facilitating relationships between them and opportunities to work collaboratively. The party also contributed to skill development, both with plants but also working with those who struggle with mental health. These findings are consistent with previous literature related to IWN and its impact on mental health, social, and vocational outcomes.

The women's interviews also highlight the emotional impact of the party and the presence of plants. They were happy and excited to participate and anticipated the "good vibes" and peacefulness that could come from interacting directly with plants in their rooms and the dayroom. Their reflections, however, suggest that the more valuable party outcomes relate to a sense of purpose and belonging, their relationships with each other, and skill development.

Table I Means and *t*-scores for IWN scores pre- and post-planting party

Emotion range	M^{ab} (SD) *Pre-party*	*Post-party*	t^{c} (SD)
Sad-Happy	58.6 (18.17)	74.5** (14.51)	3.04 (18.11)
Stressed-Calm	57.0 (20.34)	68.6* (19.60)	2.72 (15.10)
Angry-Peaceful	63.3 (20.19)	75.2** (14.36)	3.40 (12.05)
Hopeless-Hopeful	63.1 (28.21)	71.3 (20.69)	2.04 (13.95)

Notes: $n = 12$. [a]All means and standard deviations in millimeters; [b]0–31 = negative emotion (e.g. sad, angry, stressed and hopeless); 31.1–61.9 = neutral emotion; 62–93 = positive emotion (e.g. happy, peaceful, calm and hopeful); [c]df = 11. $*p < 0.05$; $**p < 0.01$

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Rather than idly doing their time or engaging in tasks that seemed inconsequential to them, the women participated in a meaningful and purposeful activity in which they could create beauty, experience its benefits immediately, and imagine the future benefits for them and for others. They knew that the process for creating that beauty and future experience could not be achieved by or for them alone; it required the women coming together. The women extended this purposeful experience to their relationships with other participants, both those who were confined to the unit and the mentors. They asked for help from others and gave it when asked in the party, and offered their help outside the party, especially as it related to the plants in their rooms. They collaborated to transplant plants and trees, taking on individual tasks to complete the transplant and sharing tasks to make the process more efficient. They talked together to discern where to place the trees in the dayroom and worked together to move them from place to place. The final outcome – greened cells and dayroom – was something that they accomplished together because it required everyone to be involved.

The women valued the skills they learned anew and advanced through their party participation, as it is related to both gardening and the mentors, working with those with mental health considerations. While the skill practice that occurred in the party was minimal and basic given the short-time frame and tasks, the overall potential for this is consistent with the vocational skill development that occurs in prison-based horticultural programs. While this study was not intended to be a functional assessment of women's skills, when taken into consideration alongside the social outcomes, there exists a vision that, even within the confines of a restrictive correctional environment (Tan *et al.*, 2015), engagement with nature through gardening may be a purposeful and meaningful activity that "create[s] satisfactory engagements that lead to functional improvement among offenders" (Tan *et al.*, 2015, p. 528). More so, it may be a path to reduce occupational deprivation for those confined in a correctional facility, including those with mental health considerations.

The quantitative IWN scale results suggest that a planting party may improve the mood of participants, consistent with existing literature on the impact of IWN on emotional and mental health. Overall, participants felt more happy, calm, and peaceful after the party. It is important to note that mean scores for all four emoji pairs trended in a neutral-to-positive and positive-to-more positive direction – e.g., the sad-happy and stressed-calm scores pre-party were in the high neutral range and moved to positive post-party and ratings for angry-peaceful were in the positive range pre-party and became more positive post-party – rather than other permutations, such as negative-to-neutral or negative-to-positive. While these results are promising in the trend toward positivity, they are indicative of moderate, rather than dramatic, changes in emotional state for the way women already had relatively positive affect prior to the party. The lack of significant relationship between the pre- and post-party ratings on the hopeless-hopeful scale is unexpected, as one would expect it to also increase because of the positive experiences women had in the party. This null finding may be due to high levels of hope women already had coming into the party. It may also stem from validity issues or sample size. Overall, these findings must be considered with caution, given the small sample size and that the negative, neutral and positive emotion ranges were arbitrarily determined and may not be clinically meaningful.

Overall, these pilot findings suggest that gardening, even something as simple as a one-hour transplanting party, could be an adjunct to traditional mental health therapy or provide therapeutic opportunities when traditional methods are unavailable or limited. This study, however, is not without limitations. The sample size is quite small and future research necessitates expanding the number of participants involved in the gardening intervention and utilizing the IWN scale. Further, emotional health was used as a proxy for mental health, which may limit how much we actually know about the impact of short-term gardening intervention on mental health specifically. The study also relied on participant self-report of their emotions on a scale that had not been tested for validity and reliability, leaving much open to interpretation. We do not know, for instance, the meaning each woman ascribed to each emotion or if their responses were an attempt to curry favor with the organizers in hopes of a second planting party. We also do not know definitively why they felt more positive – e.g., was it because of the planting or the social aspects of the party. Future research requires addressing these limitations by: exploring the psychometric properties of the IWN instrument; measuring outcomes via

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biometrics (e.g. heart rate variability and salivary cortisol levels) and over a longer duration after the intervention; and comparing outcomes across different interventions – e.g., planting and arts/craft activities – to explore the degree to which outcomes are associated with gardening or other factors inherent to the intervention. Further, in order to determine a causal relationship between gardening and emotions, it is important to undertake randomized control trial research using the IWN. Questions also surface about the potential for beneficial impacts of a planting party on the staff who work on the unit during the party. Benefits may include improved mood resulting from their own view of, and possibly direct interaction with, plants and improved perceptions of incarcerated individuals with mental health issues that stem from witnessing them actively collaborate. Future research can also explore these beneficial, as well as negative, outcomes on staff.

The results of this study suggest that a short-term, one-time nature intervention can have positive emotional effects on women incarcerated in a mental health unit and provide them with much needed meaningful social and vocational enrichment. If plants stay on the unit, the intervention may also impart a sense of deinstitutionalization, which may further positively impact the well-being of unit residents. Such interventions are more feasible to implement than multi-week programs that require substantial funding, staff and material resources or extensive gardening initiatives that require use of facility grounds. This approximately one-hour, one-time intervention can be facilitated in partnership with existing horticultural programs inside and outside the correctional facility, a community-based master gardener club, or by correctional staff themselves, especially those who enjoy gardening at home. Indeed, as research related to this intervention continues, the decision to offer such an intervention is a small, short term investment that may have a powerful emotional, social, and vocational impact on the individuals who participate.

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Corresponding author

Barb Toews can be contacted at: btoews@uw.edu

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