

## Article

# Evaluation of Military Service Member Preferences of Landscape Design Elements in Therapeutic Gardens

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**Abstract:** Military service members (MSVMs) suffer from mental and physical health ailments upon returning home from enlistment. Due to the enormity of these different and complex ailments, many unique therapeutic methods, like therapeutic gardens, have been utilized on MSVM populations to improve their overall wellbeing. Therapeutic gardens are built following a set of guidelines meant to serve general populations instead of target populations. There has been little research on the preferences of landscape design elements in therapeutic gardens by MSVMs. To determine if landscape design elements can be optimized for therapeutic gardens that serve MSVMs, a series of questions with pictures pertaining to preferences were created in an online survey that was released to civilians on social media and MSVMs through U.S. military organizations (N = 366, 90.6% completed). The average respondents were male, Caucasian, and 25–35 years old. The majority of MSVM respondents were or had enlisted in the Army branch, and were currently active duty, or honorably discharged. MSVMs and civilians had overall similar preferences of utilities and garden elements. While commonalities were found among the two respondent groups, with a preference for clear walkways, lighting wild and natural views, there were differences. In contrast to civilians, MSVMs also overwhelmingly preferred fences and gates, and the creation of privacy and prospect views instead of refuge views. Results indicate that an increased line-of-sight in fenced-in areas may make MSVMs more comfortable in therapeutic garden settings. These differences may assist urban planners and landscapers in the building of green spaces tailored to target populations like MSVMs and to illustrate the importance of building inclusive spaces for populations of concern.

**Keywords:** military; mental health; urban planning landscape preference; therapeutic gardens



**Citation:** Thomas, A.; Monsur, M.; Lindquist, C.S.; Montague, T.; Simpson, C.R. Evaluation of Military Service Member Preferences of Landscape Design Elements in Therapeutic Gardens. *Land* **2024**, *13*, 658. <https://doi.org/10.3390/land13050658>

Academic Editor: Thomas Panagopoulos

Received: 25 March 2024

Revised: 7 May 2024

Accepted: 10 May 2024

Published: 11 May 2024



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## 1. Introduction

### 1.1. Background

The use of garden landscapes as a means for escape and therapy has been used since ancient times [1]. Gardens benefit all populations of people, and this has been documented for the general public [2]. In the past century, gardens for therapy have been built adjacent to hospitals, rehabilitation centers, nursing homes, and facilities that serve specific populations of concern, such as military service members (MSVMs) [3–5]. This ability to have access to nature, whether in a forest setting, or a garden built to replicate a forest setting, has been shown to produce benefits in providing restorative effects to attention and alleviating stress among civilian populations from being in proximity to plants [6]. This is especially true when considering the effects of therapy gardens on human recovery and well-being. Therapeutic gardens are unique in the landscape design elements offered. For example, most therapeutic gardens offer scheduled activities throughout growing seasons, accessible greenspace facilities, ample plant material, and opportunities

for people and plant interactions [7]. Research suggests these active and passive interactions with plants and therapeutic gardens help individuals enhance community engagement; poverty mitigation; skills acquisition; improve nutrition, attention and physical activity; and decrease levels of stress, anxiety, depression, isolation length of hospital stays, pain, and medication use. [8–15]. Utilizing the rules for garden landscaping and the current rules for therapeutic gardens could help in the creation of garden landscapes that are therapeutic and intended for specific populations, such as military service members (MSVMs).

### *1.2. Military Service Members Interactions with Outdoor Landscapes*

MSVMs often have a unique relationship with the outdoor landscapes in which they operate. From training exercises to combat deployments, their experiences in these environments can have a profound impact on their physical, mental, and emotional well-being [16,17]. One aspect of this relationship is the way in which service members learn to navigate and interact with the landscape. They must not only learn to move through rugged terrain and harsh environments, but MSVMs must also learn how to read and interpret the landscape to gain a tactical advantage. These skills can involve identifying key features such as terrain elevation, vegetation cover, and potential threats, as well as understanding how weather patterns and seasonal changes can impact their operations [16,17]. As a result, military service training may affect a military service member's approach to, interaction with, and preferences for certain landscapes. It is also important to note that preferences could be related to personality characteristics that may align with those who enter military service.

Due to many factors, landscape design elements in gardens vary greatly from region to region, climate, topography, plant variety and height, proximity to urban areas, and enclosed and open spaces [18–20]. Appleton's prospect-refuge theory posits that humans, as a species, prefer environments that offer a balance of prospect and refuge. "Prospect" refers to an open line of sight or an opportunity to observe, while "refuge" refers to a place of shelter where one can hide from predators. This theory suggests that our environmental preferences are influenced by our evolutionary history and the survival strategies of our ancestors [19]. All of these factors may influence plant selection, perceptions of a landscape, and appearance and, as a result, may affect the characteristics of garden landscapes [18,20]. There is also the aspects of age, gender, ethnicity, culture, living location and personality having an impact on preferences [21–24]. For some, the natural beauty of a landscape provides a sense of calm and respite from the stresses of military life. For others, the harsh and unforgiving nature of an outdoor landscape can be a constant reminder of the dangers they faced and the sacrifices they made during their military service [25,26]. MSVMs were trained to look at an outdoor landscape and determine possible dangers and/or places of cover. Locations within this environment could pose as defensible or indefensible [17]. While the environment plays a large role in plant and landscape appearance, the aesthetics, design, and elements within the garden landscape can also affect garden landscape preferences. Therefore, these elements and factors must be considered prior to design for specific audiences. Few studies have been conducted on the concept of creating gardens for targeted populations, but numerous studies explored how different populations perceived landscapes [21–23,27,28]. Overall, the relationship between MSVMs and outdoor landscapes is complex and multifaceted, and it is an important aspect of MSVMs' overall experience in and outside of the military [17,25,29].

In addition, it is critical to remember that, as a result of their service, MSVMs often struggle with physical and mental health issues [30,31]. One promising solution for improving MSVMs' well-being is access to therapeutic gardens [3,9,32]. Therapeutic gardens provide a peaceful and calming environment for MSVMs to connect with nature and engage in physical activity [33,34]. Therefore, it is essential for gardens to be optimized to best facilitate and aid in therapeutic activities and serve as a non-stressful environment for recovery, respite, or rest. There is no available information on MSVMs' preferences for landscapes or landscape elements, which is vital information, as more therapy gardens

targeting MSVMs are being installed. Therefore, through an online survey, the objectives of this research were to ascertain which landscape design elements in gardens were more appealing to MSVMs and analyze if there was a difference in preferences for landscape design elements in gardens by MSVMs when compared to civilian populations.

## 2. Materials and Methods

### 2.1. Experimental Population and Assessments

The authors developed the survey, and it was approved by the Texas Tech University (TTU) Institutional Research Board (IRB2020-363) in early 2020. The survey was deployed in April 2020, and the survey closed in October 2020 (178 days). The population of interest was identified as MSVMs. However, to determine if MSVMs had preferences that differed from civilians, both military and civilian populations were allowed to participate in the survey. A total of 404 participants attempted the survey, with 366 participants fully completing the survey. Of the total participants who completed the survey fully, 229 (62.6%) were MSVMs and 137 (37.4%) were civilians. Both military and civilian participants were recruited through advertisements on Texas Tech University’s online announcement platform (TechAnnounce), social media, and military participants specifically through the local Veteran’s Affairs clinic and organizations. Weekly announcements contained links for the survey and a brief description of the project. Other recruitment activities included emails sent through TTU’s Military & Veterans Program (MVP), social media posts, and flyers posted throughout the campus and facilities that MSVMs and civilians frequent. Participants were incentivized to participate by a USD 25 gift card drawing and the opportunity to sign up for more research projects.

### 2.2. Online Surveys

An online survey was administered through Qualtrics (XM, Provo City, UT, USA) asking for general demographic information for simplification (age, gender, ethnicity, military branch, military status, years of service, color blindness), and preferred garden elements. Preference questions were either “select all that apply” or rank-type questions, with images or words accompanying each question. Rank was used for landscape features and utilities, while “select all that apply” was used for leaf color, leaf type, turf, garden atmosphere, therapy garden attributes, building materials, and garden appearance. The word-based questions were influenced by common questionnaires provided by landscapers to residential clients and previous online surveys conducted with ranking and selecting all that apply [21,35]. The last part of the survey had five sets of each of the following paired image types: formal vs. wild, urban vs. natural, and prospect vs. refuge. Formal views had clean formal lines, with very little diversity of plant life, while wild views had nonformal dense vegetation views. Urban views were of built concrete landscape, with very little plant material, whereas natural views were of plant materials and very little built landscapes. Prospective views were of wide spaces out in nature with few buildings and plant life and unimpeded line of sight, while refuge views were of a tree-covered space with line of sight impeded. Photos were selected from online sources based on these descriptions and evaluated for pertinence before selection [36] (Table 1). Participants selected the image they preferred the most from the paired images. Paired images are displayed in Figure 1A–F.

**Table 1.** Picture selection description for paired view types.

View Type	Picture Description
Formal	Clean formal lines, with very little diversity of plant life and little color
Wild	Nonformal dense vegetation views with colorful wildflowers and grassy unkempt landscape with no real structure
Refuge	Views were of a tree-covered space with line of sight impeded

Table 1. Cont.

View Type	Picture Description
Prospect	Wide spaces out in nature with few buildings and plant life and unimpeded line of sight
Urban	Views of outdoor built landscapes, with very little plant material
Natural	View of plant materials and very little built landscapes

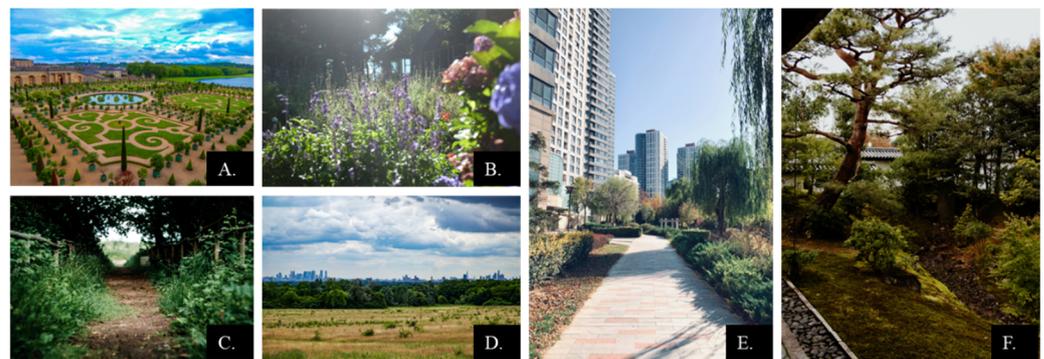


Figure 1. (A–F): (A) formal view [30], (B) wild view [31], (C) refuge view [32], (D) prospect view [33], (E) urban view [34], (F) natural view [35].

### 2.3. Data Analysis

After the survey closed, the responses were downloaded, organized, and analyzed. A weighted total was tallied for each of the features and utilities in Microsoft Excel (Microsoft Corporation, Redmond, WA, USA) to evaluate rankings. Survey reliability was calculated using a Cronbach's Alpha test with SPSS v. 29 (SPSS Inc., Chicago, IL, USA), and a score of 0.902 was observed, indicating high internal consistency. A Kolmogorov–Smirnov test was used to determine data normality. The K-S test indicated that data were not normally distributed, therefore non-parametric equivalent tests were chosen with relevant analyses. Using SPSS v. 29, a Friedman's rank test was conducted on ranked data (landscape utility, landscape feature) to determine differences between rankings of these landscape design elements by military and civilian populations. If differences were detected, a Kruskal–Wallis pairwise comparison test was conducted, and letters of separation were determined. A Chi-squared test was used in JMP 16 (JMP Statistical Discovery LLC, Cary, NC, USA) to compare differences between military and civilian populations' preferences for garden elements (leaf color and type, turf, garden atmosphere, garden form, building materials, and therapy garden attributes).

## 3. Results

### 3.1. Demographics

Of the 404 respondents that attempted the survey, only 366 had 100% completion rates. The remaining 38 respondents partially completed the survey. Non-completed surveys were removed from the data set. The responses were divided into military and civilian respondents, and demographics were further analyzed. There were 229 military respondents and 137 civilian respondents. Most military respondents were male, between the ages of 25–30, Caucasian, in active duty, in the Army branch of the military, and had three to five years of service (Table 2). Of the military respondents, a similar percentage of active duty and honorably discharged people were represented in the survey. Civilian participants were also predominantly Caucasian males between the ages of 25–30 (Table 3).

**Table 2.** Descriptive demographic statistics for military participants.  $n = 229$ .

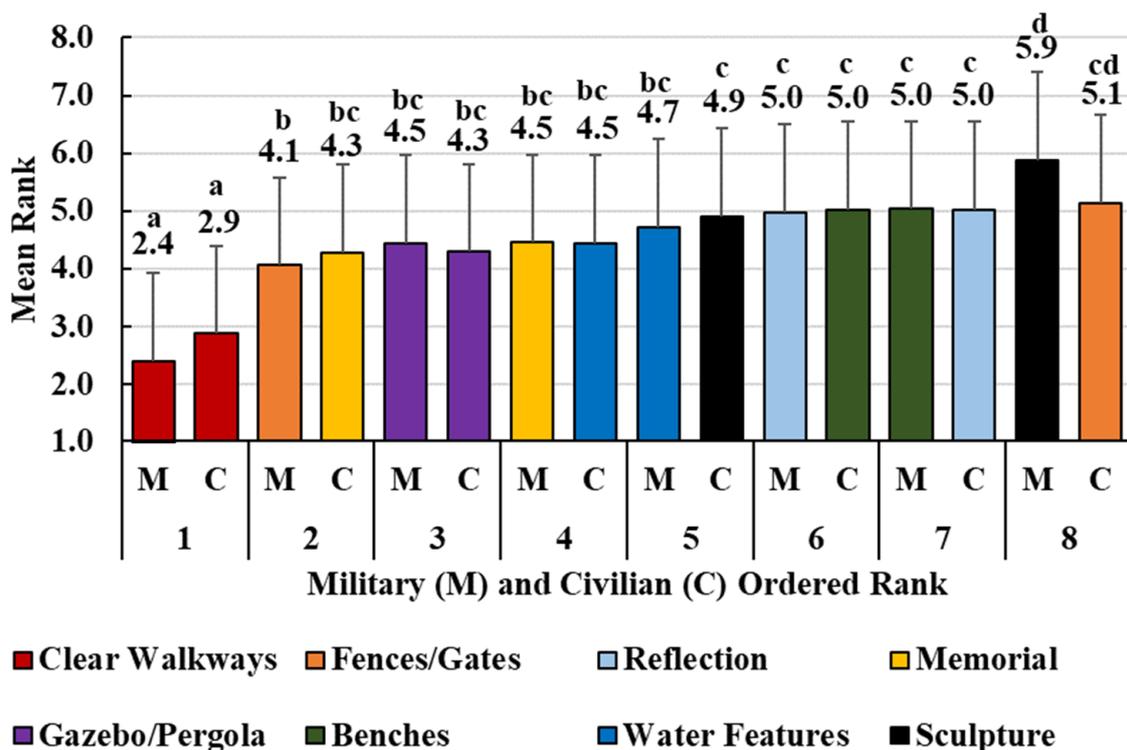
Variable		Frequency	Percentage
<b>Gender</b>	Male	190	83.0
	Female	39	17.0
<b>Age</b>	18–24	22	9.6
	25–30	123	53.7
	31–40	62	27.1
	41–50	12	5.2
	51–60	3	1.3
	>61	8	3.5
<b>Ethnicity</b>	Caucasian (White)	202	88.2
	Mexican/Hispanic	11	4.8
	African American	3	1.3
	Pacific Islander	2	0.9
	Asian	3	1.3
	Native American	5	2.2
	Multiracial	3	1.3
<b>Military branch</b>	Army	89	38.9
	Air Force	22	9.6
	Marines	51	22.3
	Coast Guard	20	8.7
	Navy	47	20.5
<b>Military status</b>	Active duty	91	39.7
	Reserve	8	3.5
	Honorable discharge	80	34.9
	Retired	49	21.4
	Dishonorable discharge	1	0.4
<b>Years of service</b>	1–2 years	22	9.6
	3–5 years	138	60.3
	6–10 years	56	24.5
	11–20 years	4	1.7
	>20 years	9	3.9

**Table 3.** Descriptive demographic statistics for civilian participants.  $n = 137$ .

Variable		Frequency	Percentage
<b>Gender</b>	Male	94	68.6
	Female	43	31.4
<b>Age</b>	18–24	26	19.0
	25–30	69	50.4
	31–40	37	27.0
	41–50	4	2.9
	51–60	1	0.7
	>61	0	0.0
<b>Ethnicity</b>	Caucasian (White)	123	89.8
	Mexican/Hispanic	1	0.7
	African American	3	2.2
	Pacific Islander	0	0.0
	Asian	3	2.2
	Native American	5	3.6
	Multiracial	2	1.5

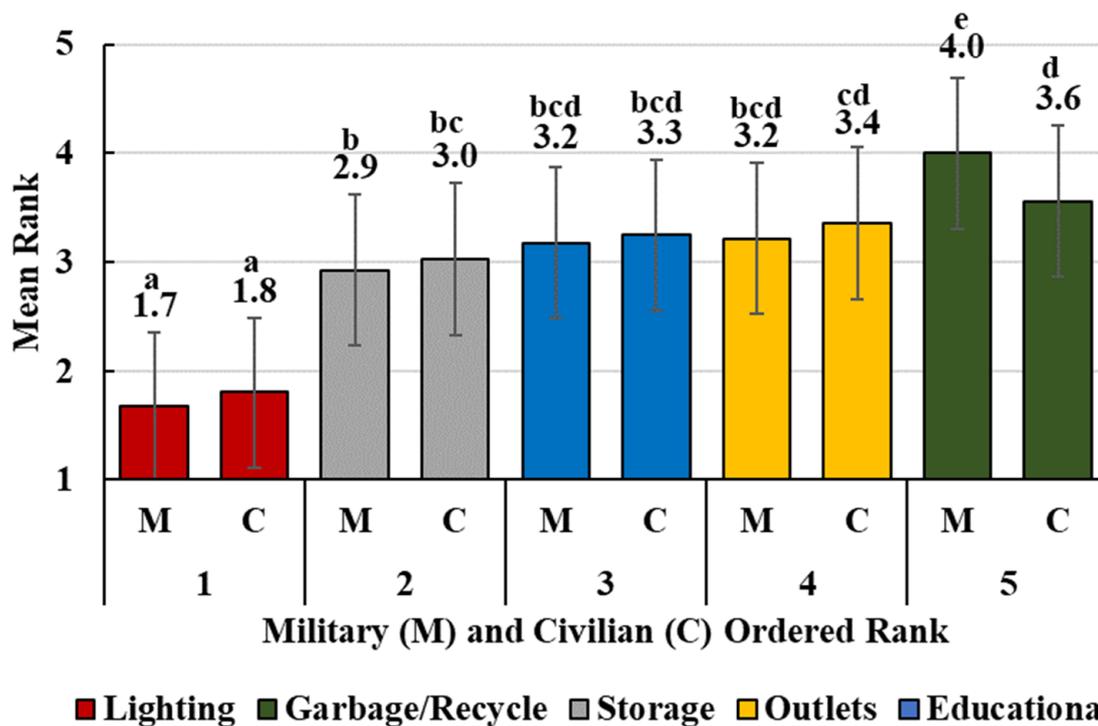
### 3.2. Ranking Landscape Features and Utilities

In the assessment of landscape features, both military and civilian populations ranked clear walkways as the number one feature within a garden (Figure 2). While the military mean rank for clear walkways was slightly higher than the civilian mean rank, there was no statistical difference in mean ranking between respondent groups (mean rank for military = 2.41, mean rank for civilian = 2.87,  $p$ -value  $\leq 0.060$ ). The sculpture feature ranked at eight for military, while civilians ranked sculptures at five. There were significant differences in sculpture mean rankings between each respondent group (mean rank for military = 5.88, mean rank for civilians = 4.91,  $p$ -value  $\leq 0.001$ ). A prominent difference between respondent groups' preferences was seen in fences and gates features. Military respondents ranked fences and gates landscape features at rank two, while civilians ranked them at rank eight. Analysis indicated that was a significant difference between military mean rank for fences and gates at 4.06 and civilians at 5.14 ( $p$ -value  $\leq 0.001$ ) (Figure 2).



**Figure 2.** Landscape feature mean rank and ordered rank of military and civilian respondents. Clear walkways were overall ranked at first for both military and civilians ( $p$ -value =  $\leq 0.060$ ). Bars indicate standard deviation from the mean. Different lowercase letters indicate significant differences between categories at  $p$ -value of  $\leq 0.05$ . If values share the same lowercase letter, then there is no difference.

Rankings of landscape utilities were also similar between military and civilian populations, with no difference between respondent group rankings. Despite differences in the mean ranks (mean rank military = 1.67, mean rank for civilians = 1.80,  $p$ -value  $\leq 0.393$ ) (Figure 3), both populations ranked lighting as the most important utility in the garden. Additionally, each population ranked storage, education, electrical outlets, and garbage/recycle utilities as ranks two to five, respectively. Military population data indicated that military respondents preferred garbage/recycle utility less than civilians (mean rank military = 4.00, mean rank for civilians = 3.56,  $p$ -value  $\leq 0.004$ ).



**Figure 3.** Landscape utilities mean rank and ordered rank of military (M) and civilian (C) respondents. Only the garbage/recycling utility score was significantly different between both respondent groups ( $p$ -value  $\leq 0.004$ ). Bars indicate standard deviation from the mean. Different lowercase letters indicate significant differences between categories at  $p$ -value of  $\leq 0.05$ . If values share the same lowercase letter, then there is no difference.

### 3.3. Preferences of Garden Elements

Both military respondents and civilians preferred a combination of different leaf types ( $p$ -value  $\leq 0.043$ ). Evergreen leaf-types were highly selected in both populations (evergreen = military 53%, civilians 47%) (Table 4). The only difference in selection of the leaf types was for deciduous leaf types (military = 49%, civilian = 38%,  $p$ -value  $\leq 0.031$ ) (Table 4). The lowest leaf-type category selected was protective structured leaves, with only 4% of military and 3% of civilians selecting this leaf type ( $p$ -value  $\leq 0.842$ ).

**Table 4.** Percent of military and civilian respondents across all garden element variables with Chi-square  $p$ -values. \*  $p$ -value =  $\leq 0.05$  \*\*  $\leq 0.001$ .

Variable	Selection	% Military	% Civilian	Chi-Square $p$ -Value
Leaf type	Evergreen	53%	47%	0.227
	Deciduous	49%	38%	0.031 *
	Broad leaf	39%	41%	0.692
	Small leaf	38%	46%	0.136
	Palm-like	31%	28%	0.519
	Soft feel	25%	32%	0.092
	Protective structures	4%	3%	0.842
Leaf color	Light green	36%	41%	0.983
	Green	33%	31%	0.999
	Orange	31%	28%	0.999
	Blues and greys	24%	28%	0.998
Turf preference	Turf	53%	55%	0.708
	Both	34%	34%	0.673
	No turf	13%	11%	0.962

Table 4. Cont.

Variable	Selection	% Military	% Civilian	Chi-Square <i>p</i> -Value
<b>Building materials</b>	Flagstone	81%	88%	0.152
	Gravel	71%	63%	0.11
	Marble	57%	69%	0.03 *
	Slate	52%	49%	0.454
	Limestone	48%	49%	0.868
	Wrought iron	45%	33%	0.026 *
	Boulders	42%	39%	0.634
	Mulch	34%	25%	0.094
	Brick	26%	28%	0.707
	Concrete	21%	49%	0.0001 **
	Steel	13%	4%	0.086
	Copper	9%	5%	0.49
<b>Garden forms</b>	Rustic	76%	79%	0.597
	Curves	74%	83%	0.096
	Tier/Steps	68%	57%	0.038 *
	Informal	59%	68%	0.015 *
	Hidden	53%	46%	0.152
	Rectangles	48%	46%	0.98
	Formal	39%	51%	0.023 *
Sunken	27%	20%	0.228	
<b>Garden atmosphere</b>	Relaxed	71%	88%	0.001 **
	Energizing	64%	62%	0.748
	Nourishing	55%	66%	0.045 *
	Secret/Private	52%	43%	0.112
	Uplifting	51%	38%	0.014 *
	Spiritual	47%	46%	0.825
	Serene	40%	34%	0.27
	Exciting	33%	25%	0.116
	Social	26%	36%	0.043 *
	Playful	22%	34%	0.027 *
	Sheltered	21%	21%	0.897
	Open	18%	7%	0.038 *
<b>Garden attributes</b>	Raised beds	56%	50%	0.289
	Add fragrance	50%	55%	0.385
	Provide exercise	46%	47%	0.868
	Provide shade	45%	35%	0.047 *
	Add soft sounds	45%	55%	0.05 *
	Sanctuary space	44%	41%	0.592
	Grow food	43%	41%	0.713
	Reduce noise	41%	40%	0.797
	Create privacy	41%	18%	0.001 **
	Attract wildlife	36%	41%	0.331
	Add texture	34%	50%	0.002 *
	Reduce wind	29%	33%	0.44
	Provide cut flowers	28%	27%	0.792
	Low maintenance	10%	12%	0.65
	Low water use	8%	5%	0.598

Light green leaf color was preferred the most by both military and civilian respondents, with green, orange and blue/grey leaf colors showing similar percentages of participant preferences (24–33%). There were no differences between the preferences of military and civilian groups for leaf color; the various categories and leaf colors were preferred similarly across both respondent groups ( $p$ -value =  $\leq 0.317$ ).

Military participants and civilians each preferred to have turf within the garden landscape (53% military, 55% civilians), with both (no turf and turf) chosen by 34% of

respondents, and the selection of “no turf” chosen the least often by both populations (<13% military, <11% civilians). Furthermore, there was no difference between the respondent populations in selections of turf ( $p$ -value =  $\leq 0.781$  both (Table 4). However, there was a difference between the turf categories (turf, no turf, both) ( $p$ -value =  $\leq 0.001$ ).

The preferences for various building materials varied between respondent populations. However, both populations similarly preferred flagstones above all other building materials, with no difference (Table 4; civilians 88%, military 81%,  $p$ -value  $\leq 0.152$ ). Military respondents preferred wrought iron more than civilians (civilians 33%, military 45%,  $p$ -value  $\leq 0.026$ ). Civilians also preferred concrete (civilians 49%, military 21%;  $p$ -value  $\leq 0.0001$ ), and marble (civilians 69%, military 57%,  $p$ -value  $\leq 0.003$ ) more than military respondents.

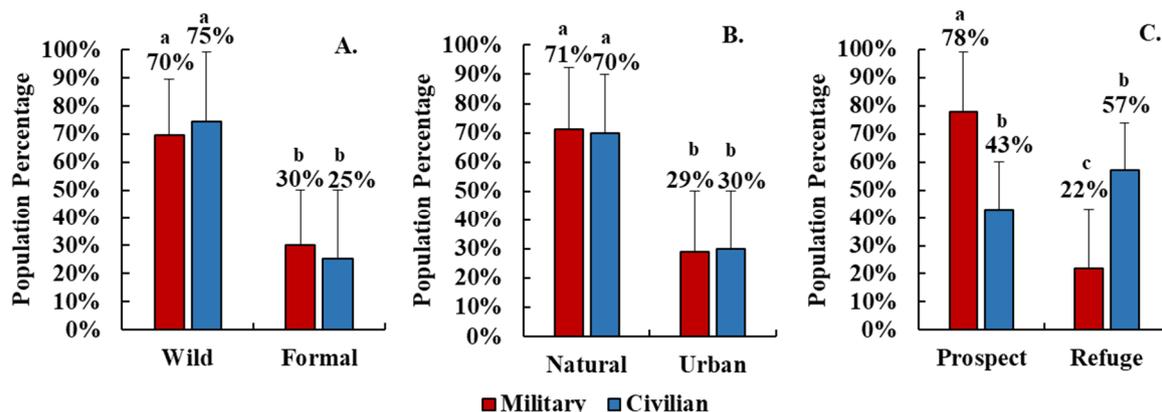
Garden forms preferred by military respondents were sunken, hidden, tiers/steps, and rectangles (Table 4), with tier/steps showing a significant difference between respondent groups (tier/steps = civilians 57%, military 68%,  $p$ -value  $\leq 0.038$ ). Civilians preferred rustic, informal, formal, and curved more than military respondents, with informal and formal garden forms showing differences (formal = military 39%, civilians 51%  $p$ -value  $\leq 0.023$ ; informal = military 59%, civilians 68%,  $p$ -value  $\leq 0.015$ ). Both rustic (military 76%, civilians 79%,  $p$ -value  $\leq 0.597$ ) and curved (military 74%, civilians 83%,  $p$ -value  $\leq 0.096$ ) garden forms were preferred most by each respondent group, and these were not different when the groups were compared (Table 4).

For the garden atmosphere, military respondents preferred secret/private, energizing, uplifting, spiritual, open, exciting, and serene atmospheres in gardens (Table 4). Of all these garden atmospheres, only uplifting (military 51%, civilian 38%,  $p$ -value  $\leq 0.014$ ), and open (military 18%, civilian 7%,  $p$ -value  $\leq 0.038$ ) were different between groups, with open preferred the least by both groups. Civilians preferred gardens that were relaxed (military 71%, civilians 88%  $p$ -value  $\leq 0.001$ ), social (military 26%, civilians 36%  $p$ -value  $\leq 0.043$ ), nourishing (military 55%, civilians 66%,  $p$ -value  $\leq 0.045$ ), and playful (military 22%, civilians 34%,  $p$ -value  $\leq 0.027$ ). Furthermore, each group wanted gardens to exude a relaxing atmosphere, with civilians expressing the greatest preference for this garden atmosphere (military 71%, civilians 88%;  $p$ -value  $\leq 0.001$ ).

Of the therapy garden attributes that were preferred by military respondents, privacy (military 41%, civilians 18%,  $p$ -value  $\leq 0.001$ ) and shade (military 45%, civilians 35%,  $p$ -value  $\leq 0.047$ ) differed from civilians (Table 4). Of the therapy attributes preferred by civilian participants, only texture (military 34%, civilians 50%,  $p$ -value  $\leq 0.002$ ) and soft sounds (military 45%, civilians 55%,  $p$ -value  $\leq 0.05$ ) differed, with civilians preferring those attributes more. Low water use (military 8%, civilians 5%,  $p$ -value  $\leq 0.598$ ) and low maintenance (military 10%, civilians 12%,  $p$ -value  $\leq 0.650$ ) were chosen as the least important therapy garden attributes by each respondent group, and raised beds were preferred the most by both respondent groups (military 56%, civilians 50%,  $p$ -value  $\leq 0.289$ ).

### 3.4. Preference of Views

In the three categories of landscape views, there were similarities in preferences for wild versus formal view and natural versus urban views (Figure 4A,B). Only prospect versus refuge views showed differences in choices between populations (Figure 4C). Both military and civilians preferred wild views more than formal views (military 70%, civilian 75%;  $p$ -value  $\leq 0.174$ ). Additionally, when comparing natural versus urban views, military and civilian respondents chose natural (military 71%, civilians 75%,  $p$ -value  $\leq 0.355$ ) as their most preferred view (Figure 4B). For the last view pairing, respondents were shown prospect and refuge views. The military population preferred prospect views (prospect 78%, refuge 22%,  $p$ -value  $\leq 0.001$ ), while the civilian population preferred refuge views (prospect 43%, refuge 57%,  $p$ -value  $\leq 0.001$ ), resulting in a difference between the two respondent groups ( $p$ -value  $\leq 0.001$ ; Figure 4C).



**Figure 4.** (A–C). Evaluation of view pairing comparisons for (A) wild vs. formal, (B) natural vs. urban, and (C) prospect vs. refuge between military and civilian populations. Bars indicate standard deviation. Different lowercase letters indicate significant differences between categories at  $p$ -value of  $\leq 0.05$ . If values share the same lowercase letter, then there is no difference.

#### 4. Discussion

So that military therapeutic gardens can incorporate targeted landscape design elements prior to construction, in this study, we sought to identify landscape design elements that appealed to MSVMs in comparison to the general civilian populace. This data could be promising for creating more multifunctional garden spaces for each population.

A common theme of this study was to investigate respondents' preferences in enclosed, private spaces and attributes in gardened landscapes. It was notable that MSVMs selected garden elements that increased privacy, such as fences and gates, private atmospheres, or other similar attributes; this pattern was not reflected in civilians' selections. Civilian preferences indicated that privacy elements were less desirable than others for this population. This theme indicates that MSVMs may prefer gardened landscapes to be fenced-in and private, or to have the illusion of contained space, with boundaries or protection. In comparable studies on broader vulnerable populations, research found that having fenced-in gardens was important to the safety, refuge, and privacy of those who visited [37]. Many times, in therapeutic garden designs, gardens are meant for privacy and to encourage reflection and relaxation among the general population [38]. There has been limited research conducted on MSVM-specific garden design, so general design principles with adaptations for physical needs have been used in military therapy gardens. However, to our knowledge, there is no specific information regarding privacy elements for MSVMs. Furthermore, MSVMs often spend time in fenced-in and private bases during deployment or reserve duty. Fences for therapeutic gardens are also often used among populations, such as elderly patients with Alzheimer's who require a safe and contained environment [38,39]. This may also indicate that MSVMs desire to have a garden area that is dedicated for their use, or has fewer interactions with non-military people who have not had experiences similar to those of MSVMs [40].

In general, landscape design elements were ranked and preferred similarly by the two respondent groups. However, each respondent group wanted a variety of leaf colors, sizes, and textures within a garden. In similar studies, respondent groups indicated a preference for a variety of leaves within garden landscapes that were, in fact, evergreen and dense, with complex vegetation [41–43]. Our research suggests a color change between seasons is desired by respondents. Similarly to this study's findings, a preference for turfed landscapes additionally coincides with other studies indicating, overall, that U.S. residents prefer to have turf in their landscapes [24,44–47]. However, a preference for turf is not widespread throughout the world, and urbanized and suburban areas tend to be the primary areas that boast wide swaths of turf [47]. Culture plays a large role in outdoor landscape preferences and expectations, and our findings might be specifically characteristics of the U.S. military.

Based upon responses from group participants, throughout this study, a need for heterogeneity within garden landscapes became evident. Studies among different populations of interest have shown that personal preferences and backgrounds may influence landscape choices, which may diminish overall population representations of these preferences. Because this study was released by an institution in the southern high plains (a dry, grassy, largely flat and treeless landscape), even though participants were widespread, associations with this geographic location could have affected their preferences [48]. A study by Twedt et al. (2016) [49] found that their participants did not like the extremes of either a formal or informal location, and participants preferred gardens with formal and informal elements throughout. Garden landscape preferences can also be affected by career, education, or knowledge related to landscapes [23]. According to Zheng et al. (2011) [23], student fields of study had an effect on whether students liked an area that was wild or neat, with those who studied agricultural economics, horticulture, and the social sciences preferring neat (formal) landscapes and wildlife environmental students wanting more wild (informal) landscapes. Additionally, Twedt et al. (2016) [49] observed landscapes that were completely formal were detrimental to the mental health of visitors to a garden. These findings coincide with those found in this experiment, which support preferences for less-formal landscapes, yet landscapes that are not completely devoid of formality and neatness throughout.

In stark contradiction to a preference for garden landscapes that were fenced in and/or private, MSVMs also desired prospective views within their landscapes. This may seem to conflict with MSVMs' desire for a protected environment, but an enclosed space with fenced boundaries can also have open lines of sight. An understanding of the MSVM's thought process, training, and prospect–refuge theory could offer some explanation [25,50]. Military members have been taught to read a landscape during their training and determine if there could possibly be a threat within the area they occupy [25]. MSVMs' choice of the prospective view may indicate MSVMs are not comfortable with seeing enclosed spots because of what could possibly be within the enclosed area [17,25]. Additionally, MSVMs' preference aligns with previous research studying the prospect–refuge theory [51], which reported participants preferring prospect views. Gatersleben and Andrews (2013) [51] suggested outdoor landscapes that are high in opportunities for overlook-type views and low in refuge views were more restorative and less stress-inducing than others. However, based on the findings from this survey and other studies, it is best to have a healthy mixture of both prospect and refuge, due to some of the military respondents choosing refuge views as their preferred views [23,52]. MSVMs in this study were only looking at photos of a view out in the distance, and not what was surrounding the MSVM. According to Appleton (1975) [19], creating environments that provide an enclosed space, with outward views that are unobstructed, is best for most populations of people. Essentially, these are spots where people can hide, yet are able to observe those who come and go in a space [50]. Ultimately, gardens for MSVMs must serve their needs for structure, respite, and privacy, while allowing for clear lines of sight. These findings also indicate that the plant and landscape materials selected for MSVMs can be like those chosen for civilians, which could allow multifunctional spaces that also target MSVMs' preferences.

## 5. Limitations

While the results may offer many inferences from the data, there are limitations. This survey was offered online in the form of photos and words, not as an in-person landscape. Many factors affect preference when visiting a garden in person, including the weather and time of day [53]. Photos of garden landscape elements can only tell participants so much, and allow for limited understanding of how a population would prefer the elements of a two-dimensional image in comparison to those encountered in an open and real garden landscape [54]. Photos were also acquired from online sources with differing photographers and skill levels, where the lighting, time of day, and parameters all differed greatly. Ways to offset this problem in future research are to visit the locations of these photos, use the

same photographer, capture settings at the same time of day, and focus on the framing of the photo to have the same depth perception.

Words are also subjectively interpreted by individuals in a population. Some of the “select all” questions that were used in the survey were word-based options that did not accompany pictures. What a respondent perceived to be a small-leaf or broad-leaf plant could be completely different to another person, and respondents were not asked to provide examples of their choices. Furthermore, it is likely that not all phrases were understood the same way by the survey respondent population. There were times when horticultural terms, such as deciduous, evergreen, or protective structures, were used. Terms could be perceived differently based on the education and experience of each individual respondent. These different perceptions of words could also extend to the meanings of different terms that were used to describe the atmosphere of a garden.

The focus throughout the whole study was to analyze the differences and variations between MSVMs and civilians. We did not look further into collected and uncollected mediators and moderators, which could be relevant future research aspects. While respondents may not have a choice of where they live (due to military orders or a respondent having to move to a location for a job), where people are living (rural or urban locations) or where they grew up may tell researchers about how respondent preferences are or were shaped. Different locations include a wide range of plant life and topographic features, and they could easily have influenced respondents’ choices of their preferred landscape and the elements within it. Research indicates that culture, background and environment can have effects on respondent preferences [21]. For example, many U.S. residents prefer lawns in their landscapes because much of the population reside in urban areas where grassy lawns are common [24]. However, in a study by Byoung-Eyang and Kaplan (1990) [55], an individual’s culture and background did not affect their landscape preferences. Respondents’ landscape preferences varied from person to person. Mediators like happy or sad feelings, or the garden specifics, could have reminded them of a better time. Moderators such as age, gender, physical or mental health, and ethnicity were not looked at closely, and could have affected the data. For gender-skewness, most of our military respondents were male. A higher population of males is common in the United States military forces, with the U.S. Department of Defense reporting 82.5% males make up the whole of military service members [56]. However, it is not known why there were more male civilians in comparison to female civilians for the surveys. Furthermore, a large percentage of our military population were honorably discharged and in active duty; however, their mental and physical health status were not surveyed and, therefore, we cannot determine if those factors affected the answers given. Approximately 25% of active and honorably discharged military members have been diagnosed mental health issues while 53% of recently discharged and 38% of active duty MSVMs have been diagnosed with physical health issues [56]. Thus, all of these factors could play an influential role in the preferences of landscape elements and be included in future research studies on MSVMs specifically.

## 6. Conclusions

Preferences among MSVMs and civilian populations for landscape elements and therapy gardens have some commonalities, but to serve MSVMs as a target population, additional factors must be considered. Military respondents did display unique preferences that differed from civilians’ choices in landscape features, utilities, views, and garden elements. Compared to civilians, individuals who served in the military tended to prefer spaces that offer more prospective views, with a greater inclination towards environments that are fenced in and enclosed. This is a glaring and important finding that further presented differences among these two groups. Therefore, it is worthwhile to establish therapy gardens that contain these elements and consciously incorporate elements that MSVMs deem to be important with a focus on heterogeneity. However, one garden landscape will not meet the needs of everyone. If landscapers and urban planners wish to cover a wide range of unique and diverse people, such as MSVMs, it is advisable to

use a variety of garden landscape elements and not only one therapeutic garden type. To support the use of therapeutic gardens for MSVMs, more resources and funding should be allocated to develop and maintain these spaces. Urban planners and mental health facility planners should also consider the cost-effectiveness of incorporating greenspaces too. While initial costs for therapeutic gardens will be higher, the long-term effects, such as increase in biodiversity, decreased facility stay and improved mental and physical health of facility employees, are proven benefits, and will counter-act those initial costs [57–60]. Overall, therapeutic gardens have the potential to significantly improve the health and well-being of MSVMs. By building therapeutic garden spaces specifically for MSVMs, landscapers can support those who have served our country and help them lead happier, healthier lives.

**Author Contributions:** Conceptualization, C.R.S. and A.T.; methodology, C.R.S., A.T., M.M. and C.S.L.; validation, C.R.S. and A.T.; formal analysis, C.R.S., A.T. and C.S.L.; investigation, A.T. and C.R.S.; resources, A.T.; data curation, A.T. and C.R.S.; writing—original draft preparation, A.T. and C.R.S.; writing—review and editing, M.M., C.S.L. and T.M.; supervision, C.R.S. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research did not receive any specific grants from funding agencies in the public commercial, or not-for-profit sectors.

**Data Availability Statement:** Data is available upon request. To request data, please send an email to the corresponding author, Catherine Simpson.

**Acknowledgments:** The authors would like to thank the university military and veterans' program for help in dispersing the survey to military service members.

**Conflicts of Interest:** The authors declare no conflicts of interest.

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