

An Evaluation of the Cognition of Persons with Dementia after interaction with Natural Elements

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the study

The goal of this study was to determine if exposure to natural elements - operationalized as living plants - affected the cognition of persons with dementia. The intervention, or independent variable, was the installation of living plants in the interior of a residential memory care facility .

The study was an A B A B B design. Baseline testing (A1) was followed by five days with the intervention (B1), two days without the intervention (A2), another five days with the intervention (B2), and two additional days with the intervention (B3) .

setting



The memory care wing of Friends Home at Guilford, a retirement community located in Greensboro, NC .

participants

Eleven residents of Friends Home, ranging in age 72 to 98, diagnosed with moderate to moderately severe dementia .

independent variable

Pansies were chosen due to the association of blooms and food production



Fichus trees were used because of their visual similarity to food producing fruit and nut trees



schedule

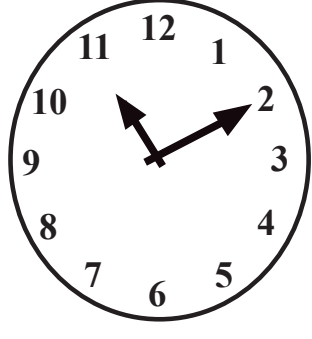
Day 1	A1
Intervention in place	
Day 2	
Intervention in place	
Day 3	
Intervention in place	
Day 4	
Intervention in place	
Day 5	
Intervention in place	
Day 6	B1
Day 7	
Day 8	A2
Intervention in place	
Day 9	
Intervention in place	
Day 10	
Intervention in place	
Day 11	
Intervention in place	
Day 12	
Intervention in place	
Day 13	B2
Intervention in place	
Day 14	
Intervention in place	
Day 15	B3

results & conclusions

The data in this study reveal some recurring patterns which may indicate that the presence of living, potted plants in the space affected the residents in positive ways. Generally, the percentage of cognitive scores increased following exposure to the plants and decreased after their removal even though the expectation of persons with dementia is that their cognitive and behavioral scores will decline over time. Yet in the brief period of this intervention, we observed that the participants' cognitive scores did not reliably decline and in fact, indicated some improvement, particularly when two participants who appeared to be experiencing rapid decline during the course of the study were excluded from the analysis (n=9). The consistency of

testing instruments

time and change



tell the time on an analog clock graphic

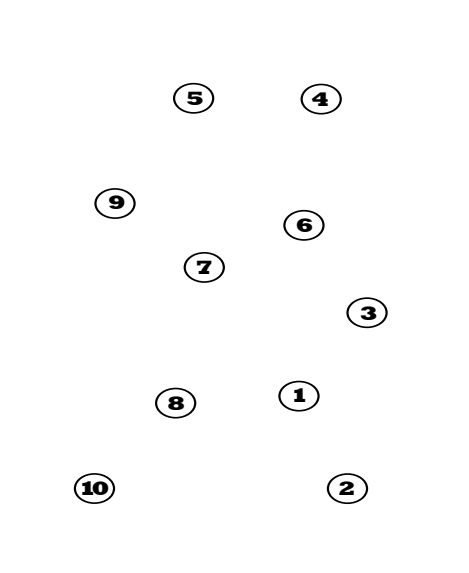


identify the penny, nickel, dime & quarter

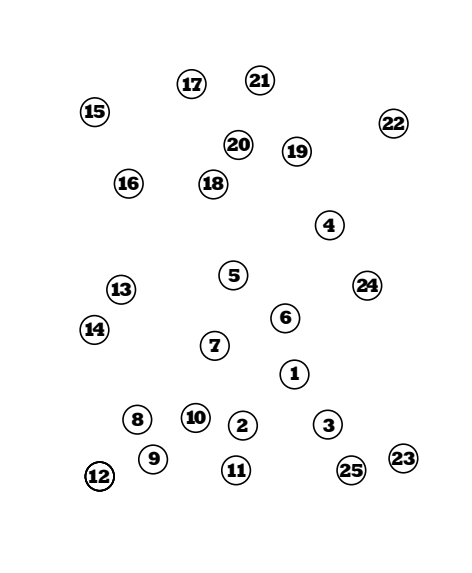


how many quarters make a dollar ?

trail-making



draw or point to the numbers in sequence



two options of difficulty are offered

attention section of montreal cognitive assessment

identify when the administrator says the letter A

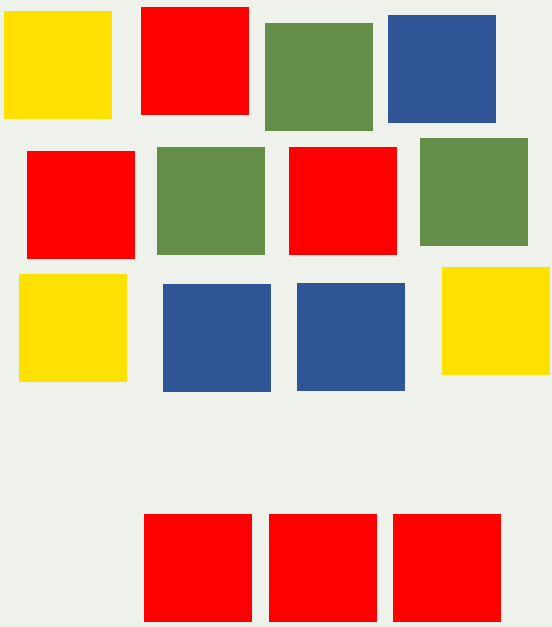
F V A C M N A A J K L B A F A K D E A A A J A M O F A A

color identification & shape

1 identify the colors



2 select all of the red squares from the twelve squares on the table and place them in a row





results on the cognitive measures over the course of the study could be indicative of a positive result of the intervention.

Studies with psycho-evolutionary theory show us that persons with dementia receive physiological and psychological benefits from connecting with nature; this study indicates that there may be cognitive benefits as well. Therefore, designers should include natural elements in the design of the interior environment and provide views of exterior natural spaces to enhance the quality of life for those persons with dementia.

theory

the biophilia hypothesis

Humans have an innate emotional affiliation for life and life-like processes. Edward O. Wilson

Wilson suggested that our evolutionary biology predisposes us to be attracted to biological elements that, in the past, helped us to survive. For instance, a flowering tree indicates that it will soon produce fruit. A positive reaction to flowers, which would signal a potential food source, would be an adaptive benefit (Kellert & Wilson, 1993) .

psycho-evolutionary theory

Living in a man-made environment devoid of natural elements creates stress, the process by which "an individual responds psychologically, physiologically, and often with behaviors, to a situation that challenges or threatens well-being." Roger Ulrich

The physiological response to stress which allows us to cope with challenging events can deplete energy and cause fatigue. Many studies have shown that humans demonstrate positive physiological and psychological responses after exposure to natural elements (Ulrich et al., (2008) .

attention restoration theory

Contact with nature restores attention, promotes recovery from mental fatigue and the restoration of mental focus. Rachel & Stephen Kaplan

Attention is divided into two componets, directed and involuntary. Studies have shown that many populations demonstrate improved cognitive function after directed attention is allowed to rest because of interactions with natural elements (Kaplan and Kaplan, 1989) .

Test Period Comparisons n = 11		scores improved	scores unchanged	scores declined	difference
B1 minus A1	1st exposure to plants, 5 days baseline	28.8%	48.8%	22.5%	6.3%
A2 minus B-1	no plants in place for 2 days 1st exposure to plants, 5 days	13.8%	61.3%	25.0%	-11.2%
B2 minus A2	2nd exposure to plants, 5 days no plants in place for 2 days	21.5%	57.0%	21.5%	0%
B3 minus A2	third exposure to plants, 7 days no plants in place for 2 days	21.1%	60.6%	18.3%	3.2%

Test Period Comparisons n = 9		scores improved	scores unchanged	scores declined	difference
B1 minus A1	1st exposure to plants, 5 days baseline	27.8%	51.4%	20.8%	7%
A2 minus B-1	no plants in place for 2 days 1st exposure to plants, 5 days	15.3%	62.5%	22.2%	-6.9%
B2 minus A2	2nd exposure to plants, 5 days no plants in place for 2 days	29.2%	51.4%	19.4%	9.8%
B3 minus A2	third exposure to plants, 7 days no plants in place for 2 days	26.6%	57.8%	15.6%	11%