Environment and Social Psychology (2024) Volume 9 Issue 4
doi: 10.54517/esp.v9i4.2209

RESEARCH ARTICLE

Plant purchasers perceptions of mental health and optimism for the future

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ABSTRACT

Increasing concern regarding mental health has gripped the world since the COVID-19 Pandemic began. Research has well-documented the benefits plants bring to human life, including improved physical and mental well-being. Improved mental health may be related to physical activity as well as a positive outlook for the future. The objective was to assess the relationship between future consequence concerns and physical activity with mental health. Mental and physical health scales were employed in an online survey on the Qualtrics platform recruiting subjects from the Toluna survey panel. Results show a greater focus on future consequences and physical activity were related to improved mental health. Greater mental health was related to plant expenditures and the number of types of plants purchased. Implications for live plant marketers are that physically active, future-focused individuals are more likely to buy more types of plants and spend money on those plants compared to individuals who are less future-focused and physically active. Imagery including physically active and arguably happy persons may help potential customers better relate to products offered for sale.

keywords: physical health; motivation; plant purchasing; benefits of plants; human-environment interaction

1. Introduction

Mental health has become an increasingly important issue in society. Mental health can be defined as "the degree to which one's behavior and personality are centered on hope and motivated by positive goals" which is the opposite of mental illness[1]. Globally, there has been a dramatic rise in anxiety globally due to the COVID-19 Pandemic[2]. In 2019, nearly 20% of U.S. adults (50 million people) were experiencing mental illness with 4.9% experiencing severe mental illness[3]. With the prevalence of mental illness, it is not surprising that mental health has come to the forefront of people's minds and corrective actions are being explored including plant therapy and nature walks[4,5].

Evidence clearly indicates there is a positive relationship between interacting with plants and improved mental health[4,6]. Recent review articles by Hall and Knuth[6–9] and Hall and Dickson[10] summarize the research documenting the emotional, mental, and physiological benefits associated with plants. Potential emotional and

ARTICLE INFO
Received: 26 October 2023 | Accepted: 5 December 2023 | Available online: 18 January 2024

CITATION
Knuth MJ, Rihn AL, Behe BK, Hall CR. Plant purchasers perceptions of mental health and optimism for the future. *Environment and Social Psychology* 2024; 9(4): 2209. doi: 10.54517/esp.v9i4.2209

mental benefits include anxiety and stress reduction[11–23], attention deficit recovery[17,24–28], fractals and visual responses[29], decreased depression[30–32], enhanced memory retention[24,33,34], greater happiness and life satisfaction[17,23,35–37], mitigation of PTSD[38–40], increased creativity[41–43], enhanced productivity and attention[44–49], reduced effects of dementia[50], and improved self-esteem[36,51]. Physiological benefits include better sleep, increased birthweights, decreased incidence of diabetes, decreased ocular discomfort, enhanced immunity, improved circadian functioning, improved rehabilitation from illnesses, decreased likelihood of cardiovascular and respiratory disease, decreased mortality, improved digestive functioning, decreased susceptibility to allergies, and improved cognitive development[7,10]. Interestingly, the medical community has started to prescribe nature to improve mental health[5]. Together, these studies demonstrate the positive influence of plants on human well-being both physically and mentally. These benefits can arguably improve the perception of value some consumers may have for purchasing live plants. With over 185 million Americans, equating to 71.5 million households and half the population, engaging in horticultural activities, from vegetable and herb gardening to lawn care to houseplants to cut flower arranging, these plant benefits apply widely and greatly to many people[52,53].

Another interesting component of mental health is that mental health is positively correlated with envisioning future possibilities and actions. In fact, the actions people take (or fail to take) in the present determine the outcome of the future[54]. As such, there is potential to incorporate perceptions of the future into mental health studies to gain a deeper understanding of how future considerations impact mental health. Given the connection between plants and the natural environment, including a pro-environmental consideration of future consequences scale could provide information on the future dimension of mental health. To date, the consideration of future consequences scale proposed by Joireman et al.[55] has only been used to address eco-friendly plant production[56]. The scale facilitates measurement of the extent of future versus immediate consequences influencing consumers' pro-environmental behavior[55,57] and purchases[56]. Given that mental health aligns with positive future perspectives, there may be a relationship between the consideration of future or immediate consequences, overall mental health, and potentially plant benefit perceptions.

The combination of age and gender and the resulting mental health associated vary depending on the source. For example, Currin et al.[58] reports that older men suffer from much higher amounts of negative mental health and disorders than other age and gender groups. Conversely, Kiely et al.[59] indicates that older women are more likely to experience common mental disorders (i.e., depression and anxiety) than older men and that this gap in mental health is smaller than in younger age groups. Yet, older women are more likely to have a positive attitude regarding seeking help with their attitude than other age/gender groups, which is the first step to improving mental health status[59–61]. Additionally, younger adults and males often report more negative attitudes towards mental health treatment[62–64]. Interestingly, education and mental health have been found to be strongly, inversely related while income had no effect[65,66].

Positive physical health measures are also promoted by being around plants, greenspaces, and engaging in plant-related activities[7]. Potential physiological benefits of plants include better sleep[67–71], decreased diabetes[11,72–75], enhanced immunity[76,77], lower cardiovascular disease risk and blood pressure[78–81], obesity reduction[82–89], and increased physical activity[16,90–101]. In fact, people who live closely to green space have a 40% less likelihood to be overweight[102] as well as community gardeners having lower odds of being overweight or obese than similar people who are non-gardeners[103]. Engaging in this physical activity in greenspace had an increase in vitality which is described as "rejuvenation" and "recovery from mental fatigue"[76,104].

Relatedly, studies have documented a positive relationship between mental health and physical activity[105,106]. People who exercise and maintain their physical health typically exhibit better mental health[22].

One driver of exercise is often consideration of personal health in the present and future[55,107]. Again, due to the positive relationship between physical activity to promote future health and given that mental health focuses on future optimism, inclusion of physical activities in research addressing mental health is important.

It Is well documented that people of color and those in non-privileged socio-cultural positions have disproportionality worse mental health than white people[108–110]. This can also extend to physical health measures which is correlated with socioeconomic position[111]. Yet, how plant therapy and the influence of interacting with plants has on people of color is largely uninvestigated. Dennis and Behe[112] investigated the role of ethnicity in satisfaction and delight in plant purchases. They found that white individuals found significantly more satisfaction and less regret regardless of their income than Black, Asian, or Hispanic individuals. On average, Black individuals participated less in garden-related activities than persons of other ethnic backgrounds.

Purchase behavior is defined as the "way that people behave when they buy things, such as what they buy, where and when they shop, and how much they spend"[113]. Purchase behavior has been studied across fields of marketing include brand loyalty[114], technology[115], source credibility[116], online and ecommerce[117], risk assessment in purchasing[118,119] and more. Behavior is a result of consumer knowledge and perceptions[120].

Plant purchasing behavior is purchase behavior specifically for live plants and allied products such as seeds, pots, potting media or compost, tools, fertilizer, and supporting equipment. Half the population of the United States, 185 million Americans, engaging in horticultural activities in 2022[52,53]. The average American plant purchaser spent $ 616 on plants and allied products in 2022, up from previous years of $542 in 2021 and $503 in 2019. The intention to purchase plants by consumers is predicted to increase in 2023 and 2024, whether online or in-store[52]. The largest increases in plant purchasing categories from 2021 to 2022 were in vegetables and herbs, even over flower purchasing and lawn care.

The primary objective of this research Is to assess the relationship between participants' mental health, plant purchasing behavior, physical activity, and how future consequences may influence these factors. Given that mental health is positively correlated with future possibilities[1] and that actions taken can determine future outcomes[54], one would anticipate that people who are engaging more with plants would have a more positive present mental health and have a greater futuristic outlook (H1). To test this hypothesis, researchers used the current and future consequences scale which was incorporated into prior research to investigate current versus future outlooks on environmentalism[55]. Additionally, given that physical health is a benefit of interacting with plants[121,122]. A second hypothesis is that there is a positive relationship between physical activity, consideration for future consequences, engaging with plants, and mental health (H2). To test this hypothesis, a physical activity scale developed by Heesch et al.[123] was used.

Results can help direct future green industry marketing endeavors through identifying positive relationships that can provide insights on consumer behavior and mental health. In turn, firms can use this information to encourage interacting with plants that may positively impact mental health. Findings can be incorporated into marketing and communication messages to consumers, enhancing the perceived value of plants they may buy.

2. Materials and methods

An online survey was conducted to assess consumer attitudes related to mental health, plant purchasing, physical activity, and consideration of future consequences. The survey consisted of mental health scales and questions, a physical activity question scale, current and future consequences scale, plant purchasing habit questions, and demographic characteristics. The survey was constructed using widely accepted market research

protocols for speed, accuracy, and human error reduction and was administered using Toluna, Inc. (Dallas, TX) survey panel which maintains a panel of several million persons[124–126]. Toluna, Inc. recruited individuals ≥ 18 years of age in the United States. Both the survey instrument and protocol were approved by a university institutional review board (XX University 2019-1754M Category: Exempt 2).

To maintain statistical power at 80% with an 95% confidence, 100 participants were required *a priori*. To maintain response validity, participants had to pass two attention check questions which were randomly placed in the survey. The sample consisted of 1,010 useful and complete responses with maintained power through the sample pool (**Table 1**). Data were analyzed using STATA Software (Version 16.0, College Station, TX).

Table 1. Demographic characteristics of the 1,010 participants as compared to the U.S. population[53,127].

Demographics	**Mean**	**Std. Dev.**	**U.S. Population[a]**
% Male	0.4948	0.4998	49.2%
Income (USD)	$67,001.72	$44,090.78	$64,994
Age (Years)	58.4	15.56	38.6
Educational (Years)	14.94	2.5	13.50
% White	84%	0.36	76.3%
% Black	9%	-	13.6%
% Asian	2%	-	6.3%
% Native American	2%	-	1.3%
% Other	3%	-	3%
% Hispanic	49%	0.5	19.2%
Population Density			
% Urban	33%	0.47	-
% Suburban	50%	0.49	-
% Rural	33%	0.41	-
Region			
% Northeast	22%	0.42	-
% Midwest	21%	0.41	-
% Southeast	24%	0.43	-
% Southwest	13%	0.34	-
% West	19%	0.39	-
Spending 2021	$134.07	$132.01	-
Number of Plant Types Purchased	2.54	2.15	-

2.1. Survey questions

The mental health related questions were a series of questions adopted from Watson and Clark[128] and adapted from Shanahan et al.[129]. Twenty questions were adopted from the PANAS-X Scales Manual for Positive and Negative Affect Schedule where 10 questions related to negative affect and 10 questions related to positive affect[128]. Participants were asked to rate on a five-point Likert scale (1 = Very slightly, not at all; 5 = Extremely) the extent they felt this way during the past 12 months. These questions were randomized to mitigate order bias. To use these questions in the analysis, the 10 negative affect questions were reverse-coded and the average of all 20 questions was taken to represent the average mental health measure of each participant. **Figure 1** displays the histogram of average mental health values across the sample pool. As the second portion of the mental health related questions, we adapted an outlook question from Shanahan et al.[129] about the

participants future state of being (i.e., looking ahead to 2022, do you think you'll be better off, worse off, or just about the same as now? 1 = Very slightly; 5 = Extremely). This question was adapted to gauge futuristic optimism, or lack thereof.

The current and future consequences 14-item scale was adopted from Joireman et al.[55]. In the literature, this scale is occasionally referred to as the "SGBE scale", which includes seven questions relate to current consequences and 7 questions relate to future consequences. Participants were asked to rate on a 7-point Likert scale (1 = Extremely Uncharacteristic; 7 = Extremely Characteristic) how well the statements described their views of the immediate and future consequences of their actions. These questions were randomized. To use these questions in the analysis, the seven current consequences questions were similarly reverse-coded, and the average was taken of all 14 questions to represent the average future consequence of each participant (**Figure 2**).

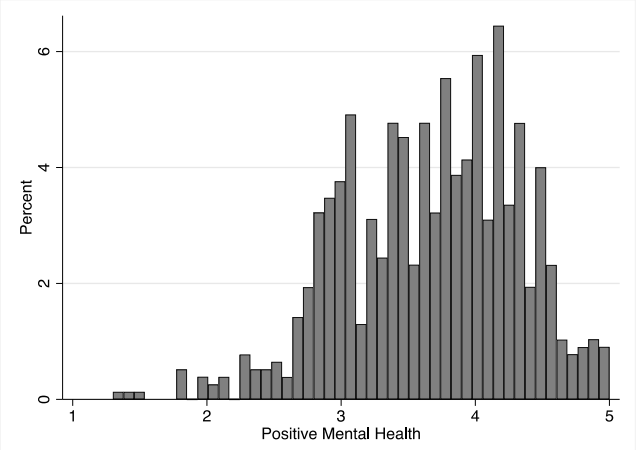

Figure 1. Average positive mental health values across the sample pool (1 = Very Slightly; 5 = Extremely).

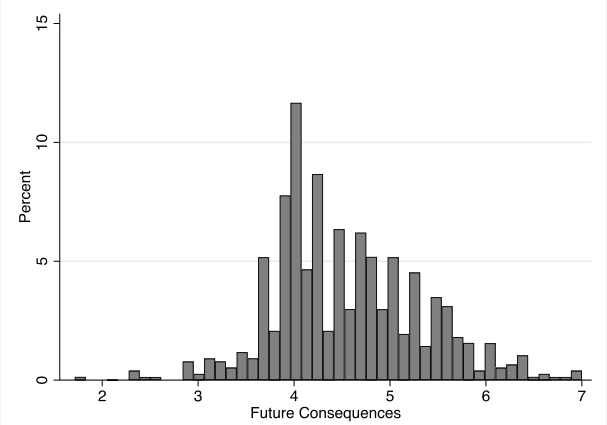

Figure 2. Average future consequence values across sample pool (1 = Extremely Uncharacteristic; 7 = Extremely Characteristic).

Questions related to physical health activity were adopted from Heesch et al.[123]. These questions relate to benefits of physical activity including feeling less depressed/bored, improving self-esteem, losing weight, building up muscle strength, feeling less tension and stress, improving health, or reducing risk of disease, doing better at my job, feeling more attractive, improving heart and lung fitness, gaining muscle, improving muscle tone, feeling better about my body, and increasing energy levels. The scale is unidimensional. However, after two questions were removed due to collinearity (Spearman's t = 0.77; t = 0.73; building up muscle strength and improving muscle tone), the resulting Cronbach's alpha for the scale was 0.9108.

Participants were asked to identify the plant types that they purchased in the past year. The 12 plant types included: annuals, vegetables, herbs, perennials, flowering shrubs, evergreen shrubs, fruit trees, evergreen trees, shade trees, flowering plants, foliage plants, and succulents. Participants selected which of the 12 plant types they had purchased in the past year. If they did not purchase any of the 12 plant types in the past year, the participant was excluded from the survey. The percentage of participants who purchased each of the 12 plant types is included in Appendix A, Table A1. The list was based on previous research of the most purchased plant types in the U.S.[130,131]. Additionally, participants indicated their plant expenditures (in dollars) and locations of purchase. Lastly, the socio-demographic questions included age, gender, household income, education level, number of adults and children in the household, and ethnicity.

2.2. Ordered logit model

In ordered logit models, an underlying score is estimated as a linear function of the independent variables and a set of cut points are estimated using maximum likelihood (Ch. 7)[132]. The latent variable (y_i^*) in an ordered logit ranges from $-\infty$ to ∞ and is expressed by:

$$y_i^* = \boldsymbol{x}_i\beta + \varepsilon_i \tag{1}$$

where $\boldsymbol{x}_i$ is the row vector of values for I observations, β is the column vector of structural parameters to be estimated, and ε_i is the random error term [132,133]. The latent variable is the mental health rating where 1=+ to 5=+, which is connected to the observed response category by:

$$y_i = \begin{cases} 1\ if\ k_0 = -\infty \le y_i^* < k_1 \\ 2\ if\ k_1 \le y_i^* < k_2 \\ \vdots\ \ \vdots \qquad \vdots \\ 5\ if\ k_4 \le y_i^* < k_5 = \infty \end{cases} \tag{2}$$

where crossing threshold (k) results in a category change. As a result, the probability of observing $y = j$ for x values can be expressed as:

$$\Pr(y = j|x) = \Pr\left(k_{j-1} \le y^* < k_j|\boldsymbol{x_i}\right) \tag{3}$$

where j = 1 to J (mental health rating between 1 and 5). The probability of a specific rating can be estimated by replacing y^* with $x\beta + \varepsilon$ which results in the probability of any observed outcome $y_i = j$ and can be expressed as:

$$\Pr(y_i = j|\boldsymbol{x}_i) = F\left(k_j - \boldsymbol{x}_i\beta\right) - F(k_{j-1} - \boldsymbol{x}_i\beta) \tag{4}$$

where F indicates the cumulative distribution function of ε (i.e., $Var(\varepsilon) = \pi^2/3$).

3. Results

3.1. Demographics

When comparing the sample to the U.S. population, the percentage of males, household income level, and percentage of white individuals was similar[127]. However, the age of the sample was slightly older than the general U.S. population and was more educated. The sample also spent less on lawn and garden products in 2021 than the average U.S. gardener[53]. The sample had slightly less black and Asian people than the U.S. Census, however the percentage of Native American and those who signify themselves as "Other" were similar to the U.S. Census[127].

A third of the sample is from urban areas, 50% are from suburban areas, and 22% are from rural areas. Approximately 20% of the sample are from each of the regions of the U.S., except for 13% that is from the Southwest region of the U.S. The average spending for plants and plant related products in 2021 was $134.07 (Std. Dev. = $132.01). The most purchased plant product type was annuals where 45% of the sample purchased

annuals in 2021, followed by vegetables (37%), herbs (31%), perennials (27%), and potted flowering plants (23%). The least common type of plant purchased was evergreen trees (7%).

3.2. Ordered logit

Reported mental health was positively influenced by future consequences of the person's actions (supporting hypothesis 1) as well as optimism about the year to come (**Table 2**). This result is in line with Wilkins et al.[54] who found that mental health is positively correlated with imagining future possibilities and actions. Additionally, participants who had a higher (more positive) mental health score spent slightly more on plants and purchased more types of plants than participants who had a lower (more negative) mental health score. This means that the more plant types that a consumer purchases, the more likely they were to have better mental health. As shown through numerous studies, plants have historically been proven to provide positive mental, emotional, and physiological benefits to human beings .

Table 2. Ordered logit model estimates assessing the impact of consumer attitudes, plant purchasing behavior, and physical activity perceptions on mental health.

Mental	**Coef.**	**St. Err.**	**z**	**P > |z|**
Future consequences	0.257	0.01	24.86	0.0000
Optimism for future	0.242	0.01	19.44	0.0000
Plant Spending 2021	0.001	0.00	11.45	0.0000
Number of plant types purchased	0.051	0.00	11.47	0.0000
Demographics				
Age	0.046	0.00	78.52	0.0000
Income	0.000	0.00	17.79	0.0000
Ethnicity (White = 1; Black/Asian/Native/Other = 0)	−0.309	0.02	−14.71	0.0000
Hispanic	−0.131	0.02	−8.61	0.0000
Education (Years)	−0.080	0.00	−22.60	0.0000
Male	−0.132	0.02	−8.24	0.0000
Physical activity				
Feel less depressed and/or bored	−0.126	0.01	−15.20	0.0000
Improve self-esteem	0.167	0.01	15.33	0.0000
Meet new people	0.134	0.01	17.29	0.0000
Lose weight	−0.199	0.01	−22.70	0.0000
Feel less tension and stress	−0.031	0.01	−2.63	0.0080
Improve health or reduce risk of disease	0.208	0.01	16.60	0.0000
Do better at my job	0.096	0.01	11.06	0.0000
Feel more attractive	−0.079	0.01	−8.60	0.0000
Gain muscle	0.103	0.01	9.31	0.0000
Feel better about my body	0.030	0.01	2.38	0.0170
Increase energy levels	0.139	0.01	11.00	0.0000
/cut105	9.919	0.10	9.72	10.1138
Likelihood	−217,199.76			
n	1010			
LR Chi2	12,218.5			
Prob Chi2	0.0000			
Pseudo R2	0.0274			

Being older and being female led to a more positive mental health score. This is in line with the results from Currin et al.[58] and Kiely et al.[59] where older, female individuals were more likely to have a positive attitude towards seeking mental health assistance. Additionally, being a person of color did as well. When cross-checking ethnicity with optimism for the future and future consequences, individuals were more likely to be optimistic and forward thinking if they were non-white. Yet, they spent less on annual plant purchases ($91 versus $141; $t = -33.04$, $P = 0.0000$) and purchased less types of plants (2.26 categories versus 2.58 categories; $t = -12.98$, $P = 0.0000$). (Full table available in Appendix A, Table A2). Individuals from the Hispanic community were less likely to have a positive mental health in this experiment which is in line with past literature on mental health[108–110]. Further investigation is needed to estimate if there is a relationship between plant purchasing, ethnicity, and potential influence on mental health outcomes. Due to the size of the sample of non-white individuals, conclusions cannot be statistically verified due to low power. Having a higher income also led to a more positive mental health which is different than Araya et al.[65] where income was not associated with mental health. Having lower education led to a higher positive mental health score which is in line with Araya et al.[65] and Jiang et al.[66] where education and common mental disorders where inversely related.

Past literature has shown that physical activity is related to positive mental health[105]. Within this study, these physical health activities influence mental health ratings positively: improved self-esteem, improved health, and reduced risk of disease, doing better at my job, gaining muscle, feeling better about my body, and increased energy levels. These physical health benefits influence mental health ratings negatively: feel less depressed/bored, lose weight, feel less tension and stress, and feel more attractive. The findings here support the hypothesis 2 that performing some physical activity can improve mental health. Within this experiment, the participants had to have purchased a plant within the past 12 months. It could be theorized that some of the physical activity from gardening and plant related activities could be contributing to the positive mental health scores. This is correlated through the positive relationship between the number of plant categories purchased (more plants) and the physical activity improving mental health scores. Additionally, some physical activity, including plant therapy and nature walks, are directly physical and mental treatments with plants[4,5]. Together, these results demonstrate the positive influence of plants on human well-being both physically and mentally.

4. Discussion

Mental health has been propelled to the forefront of concerns by many adults, especially since the onset of the COVID-19 pandemic. The resulting economic pressures have negatively affected many people's mental health and created new barriers for people already suffering from mental illness and substance use disorders. During the pandemic, about 4 in 10 adults in the U.S. have reported symptoms of anxiety or depressive disorder, a share that has been largely consistent, up from one in ten adults who reported these symptoms from January to June 2019. A Kaiser Family Foundation Health Tracking Poll[134] found that many adults are reporting specific negative impacts on their mental health and well-being, such as difficulty sleeping (36%) or eating (32%), increases in alcohol consumption or substance use (12%), and worsening chronic conditions (12%), due to worry and stress over the coronavirus. As the variants of COVID linger on, ongoing and necessary public health measures expose many people to experiencing situations linked to poor mental health outcomes, such as isolation and job loss.

Consumers have historically shown an inclination to purchase plants to enhance their quality of life, meaning they will purchase items that positively influence their social, physical, psychological, cognitive, environmental, and spiritual well-being. Plants in native and improved landscapes (and indoor environments often referred to as *interiorscapes*) have been documented to influence each of the quality-of-life constructs.

Previous literature by the authors summarized the emotional and mental health benefits associated with plants, including reduced anxiety and stress, attention deficit recovery, fractals, and visual response, decreased depression, enhanced memory retention, greater happiness and life satisfaction, mitigation of post-traumatic stress disorder (PTSD), increased creativity, enhanced productivity and attention, reduced effects of dementia, and improved self-esteem as well as the physical benefits of better sleep, increased birthweights, decreased incidence of diabetes, decreased ocular discomfort, enhanced immunity, improved circadian functioning, improved rehabilitation from illnesses, decreased likelihood of cardiovascular and respiratory disease, decreased mortality, improved digestive functioning, decreased susceptibility to allergies, and improved cognitive development.

The present study sought to relate concern for future consequences combined with physical activity on mental health perceptions of plant purchasers. The former study had not been utilized with investigations that did not relate to purchases, such as the present study. Within this study, purchasing behavior is used as a proxy for activity with plants. Results indicate that physical activity and a focus on future consequences are related to better mental health. Additionally, more positive mental health was related to both greater plant expenditures, i.e., purchasing behavior, and types of plants purchased.

Together, the influence of positive relationship of plant purchasing activities and physical activities improve mental health. Encouraging individuals to utilize greenspaces and engage in community gardens in urban and suburban space, like 33% and 50% of the participants in this study reside in, can be a beneficial way to gain physical activity with plants. Emphasizing the physical health benefits and, consequently, mental health that will be gained by caring for plants can be incorporated into marketing messaging online and in print advertisement, and in-store signage. For example, participants who report greater mental health also report feeling improved self-esteem, meeting new people, increased energy levels, and feeling better about my body, and improved health through physical activity. These types of messages through pictures or language can be utilized to communicate the plant benefits to consumers.

Plant retailers can capitalize on this information by providing a broad assortment of plant types in their location—purchasing more plant types is causal to more positive mental health. Providing displays on how to incorporate plants into small spaces, such as patio gardens, for urban consumers or mock-up designs for vegetable or flower gardens for suburban or rural consumers can help consumers with their future garden plans.

Successful product differentiation exists when customers, under conditions of competitive supply and faced with a range of choices, perceive those products being offered for sale do not have the same (equal) value and they are prepared to pay unequal (usually higher) levels of price in acquiring as many of the available offerings as they wish. Customers (both end consumers and business-to-business) generally trade off five major attributes in deciding about what products to buy and from whom to buy them from, including quality, price, service, convenience, and selection[135]. Value represents the tradeoff between the benefits derived from this varying mix of attributes relative to the sacrifices (dollars) made in getting them. Therefore, one key for enhanced profitability for firms in the green industry is to provide greater perceived value to customers for products through successful differentiation (i.e., emphasizing relevant benefits in the mind of the customer).

5. Conclusion

Plant marketers should incorporate these findings in their marketing and sales communication efforts. Text and imagery of physically active individuals should be more relatable to plant purchasers and potential purchasers. Consumers concerned about improving their mental health can turn to live plants as part of their regimen to improve their own mental well-being. Imagery of arguably happy individuals interacting with plants, as well as pointing to the research results, may spur consumers into additional plant purchases than planned.

The limitations of this study are few and include the typical biases from online panels and surveys, but these have mostly been accommodated by the methodologies used. However, further investigation into the types of benefits derived from plants is merited including the benefits' effects on ethnicity groups.

Author contributions

Conceptualization, MJK, ALR, BKB and CRH; methodology, MJK; validation, ALR, BKB and CRH; formal analysis, MJK; data curation, MJK and ALR; writing—original draft preparation, MJK, ALR, BKB and CRH; writing—review and editing, BKB and CRH; visualization, MJK; funding acquisition, BKB and CRH. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors declare no conflict of interest.

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Appendix A

Table A1. Percentage and standard deviation (Std. Dev.) of the 1,010 participants who purchased each of the 12 plant types.

Plant Type	**Percentage**	**Std. Dev.**
Annuals	45%	49%
Vegetables	37%	48%
Herbs	31%	46%
Perennials	27%	44%
Flowering shrubs	19%	39%
Evergreen shrubs	9%	29%
Fruit trees	11%	31%
Evergreen trees	7%	25%
Shade trees	6%	24%
Potted flowering plants	23%	42%
Foliage plants	19%	38%
Succulents	19%	40%

Table A2. T-tests comparing of ethnicity groups, optimism for the future, future consequences, and purchasing of plant types.

Variable	**White Mean**	**Non-white Mean**	**T**	***P*-value**
Mental health	3.65	3.73	10.83	0.0000
Spending on plants	141.72	91.68	-33.05	0.0000
CFC	4.53	4.61	8.41	0.0000
Number of plant types purchased	2.26	2.58	-12.98	0.0000
	Black Mean	**Non-Black Mean**	**T**	***P*-value**
Mental health	3.80	3.65	-15.10	0.0000
	Native Mean	**Non-Native Mean**	**T**	***P*-value**
Mental health	3.86	3.66	-11.06	0.0000
	Asian Mean	**Non-Asian Mean**	**T**	***P*-value**
Mental health	3.45	3.67	11.82	0.0000