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Let's Grow: Investigating the Relationship Between Houseplants and Mental Health in College Students

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ABSTRACT

Let's Grow: Investigating the Relationship Between Houseplants and Mental Health in College Students

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This literature review explores the potential mental health benefits of houseplants for college students, a population increasingly affected by anxiety and depression. With traditional mental health services strained and often inaccessible, simple and low-cost alternatives are urgently needed. This review examines whether the presence and interaction with houseplants can improve psychological well-being, specifically symptoms of anxiety and depression. Drawing from ten peer-reviewed studies, this review finds a generally positive association between houseplants and mental health, though results vary. Notably, the duration of exposure appears to have little effect, while setting and autonomy in plant interaction are more influential. Interactions in personalized residential settings tend to yield better outcomes than those in structured settings. However, methodological inconsistencies, small sample sizes, and potential p-hacking raise concerns about replicability and generalizability. This review highlights key gaps in the research, including a lack of clinical populations and long-term studies, and calls for more rigorous, transparent research. If substantiated, incorporating houseplants into campus environments may represent a practical and inclusive strategy to support student mental health and resilience.

KEYWORDS: houseplants, mental health, college students, ecotherapy

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INTRODUCTION

Imagine if we could alleviate a national health crisis by simply giving people plants. It may sound like a goofy concept, but this literature review seeks to explore that very possibility: Do houseplants improve the mental health of college students? With anxiety and depression rates among college students at historic highs, identifying simple, scalable, and inclusive mental health interventions has never been more urgent. College students often face a unique blend of stressors, including academic pressure, financial instability, and social transition, all while living in environments that often lack exposure to nature. Houseplants offer a potential solution that is both low-cost and accessible, bringing a touch of nature indoors.

Ecotherapy, which involves intentional engagement with natural environments, has already demonstrated effectiveness in reducing symptoms of anxiety and depression. However, it remains unclear whether houseplants, a more passive, small-scale form of nature exposure, can offer comparable psychological benefits. This question is increasingly relevant given the rise in houseplants ownership among young adults, particularly during the COVID-19 pandemic. Despite the popularity of this trend, research on the specific mental health effects of indoor plants remains limited and fragmented.

This literature review will critically examine existing research on the relationship between houseplants and mental health in college students, with a focus on symptoms of depression and anxiety. Studies will be evaluated for methodological rigor, relevance, and consistency in outcomes, with particular attention paid to the context and nature of plant interaction. Gaps in the current literature will be identified, including the

underrepresentation of college students as a distinct developmental group, the lack of studies involving clinically diagnosed populations, and limited exploration into the mechanism behind houseplants' potential therapeutic effects. In the conclusion, I will propose directions for future research, including the need for longitudinal designs to assess long-term outcomes, greater use of standardized outcome measures to improve comparability across studies, and the inclusion of clinically diverse samples, including those who have diagnosed mental health disorders. Additionally, future work should investigate how specific variables, such as autonomy in plant care, may mediate the psychological effects of plant-based interventions.

As campuses search for convenient, budget-friendly mental health strategies, this line of research may hold valuable insights. If proven effective, houseplants could become an integral part of student wellness programs, offering not just aesthetic or symbolic value, but real psychological support.

BACKGROUND

Mental health on college campuses has become a growing topic of concern over the past decade. A recent national survey highlights a troubling trend: anxiety and depression are increasing among college students at historic rates (Flannery, 2023). The survey included responses from more than 90,000 students across 133 U.S. campuses and revealed that 15 percent of students had seriously considered suicide, the highest rate in the survey's history (Flannery, 2023). Additionally, 44 percent reported symptoms of depression, 37 percent experienced anxiety, and nearly a third felt "so depressed that they couldn't function" (Flannery, 2023). Mental health struggles have reached a point where

four in ten students recently considered withdrawing from college due to emotional stress (Flannery, 2023).

The impact of mental health extends beyond personal well-being. It directly affects students' academic performance. Kivlighan and colleagues (2021) found that psychological distress is a critical predictor of college success and retention. Their research showed that students who received counseling experienced greater improvements in GPA post-treatment. Interestingly, academic distress alone was not a significant factor in GPA change, emphasizing that clinical psychological distress plays a more influential role in academic outcomes (Kivlighan, 2021). These findings highlight the crucial point that addressing mental health is not only about supporting student well-being; it is also essential for their academic success and long-term retention.

Despite rising demand, many college counseling centers are struggling to keep up. In 2019, 90 percent of campus counseling centers reported increases in the number of students seeking services before the pandemic exacerbated demand even further (Flannery, 2023). As waitlists have grown longer, many institutions have turned to off-campus and online counseling options. These outsourced services are often more cost-effective and provide quicker access for students (Siler, 2024). However, awareness and accessibility of these services remain major challenges. Siler (2024) found that students were significantly more likely to be aware of and use on-campus counseling compared to outsourced alternatives, even though satisfaction levels were similar across both. This suggests that simply offering resources is not enough. Students must be aware of and able to easily access them for the services to be effective.

In light of these limitations, alternative and complementary approaches to student mental health have gained interest, one of which is ecotherapy. Ecotherapy, also known as nature-based therapy, is a therapeutic practice that uses interaction with the natural environment to support mental health. It can include activities such as gardening, hiking, forest bathing, and mindfulness in outdoor settings.

There is now emerging literature supporting the psychological benefits of these interventions within the general population. For example, Coventry and colleagues (2021) conducted a meta-analysis on nature-based outdoor activities and found that they were effective at reducing depression and anxiety symptoms, improving mood, and enhancing overall affect. Interventions that lasted eight to twelve weeks, with session lengths ranging from 20 to 90 minutes, had the strongest outcomes (Coventry, 2021). These benefits applied to both individuals with clinical mental health diagnoses and those without (Coventry, 2021).

We can also note how Keali'i and colleagues (2024) added further nuance by identifying ecotherapy's ecobiopsychosocial effects. Their review of the effects of ecotherapy on various aspects of life found reduced anxiety symptoms across age groups and increased prosocial behavior (Keali'i, 2024). Keali'i (2024) defines ecotherapy as guided interactions with nature "aimed at achieving preventative and restorative medical effects." Participants in ecotherapy reported not only psychological relief, but also biological improvements, such as lower stress hormone levels and enhanced neuroplasticity (Keali'i, 2024). Importantly, Keali'i and colleagues (2024) advocate for ecotherapy to be used as a complement rather than a replacement for traditional therapies.

And, in a comparative analysis, Rueff and colleagues (2023) examined the effectiveness of ecotherapy versus cognitive behavioral therapy for anxiety and depression. Reuff (2023) defines ecotherapy as an umbrella term that includes "different types of nature-based methods" to improve psychological well-being. They found that while both therapies were similarly effective in the short term for depression, cognitive behavioral therapy remained superior for treating anxiety (Rueff, 2023). However, ecotherapy still outperformed no treatment and showed the strongest results when conducted in immersive natural environments, such as forests, rather than in more artificial green spaces like city parks (Rueff, 2023). This finding raises an important question about the intensity of nature exposure and how much "nature" is enough to see mental health benefits.

These results raise a key question that we can ask about college students: if ecotherapy can be beneficial, can even small-scale interventions, such as keeping houseplants, provide measurable improvements in students'depression and anxiety symptoms? As campuses explore more accessible, low-cost interventions, it is worthwhile to examine the potential of nature exposure to offer a practical avenue to support student mental health.

While ecotherapy and the broader psychological benefits of nature exposure have been widely studied in recent years, houseplants as a distinct subset of that category remain underexplored. Research on nature and mental health tends to emphasize outdoor environments such as parks, forests, or gardens, while indoor plant interaction receives comparatively little empirical attention, despite being a more accessible form of nature for many urban residents.

In studies that do address houseplants in the student population, the focus often leans toward cognitive outcomes and results, such as attentional ability or academic performance, rather than emotional and psychological well-being, including stress, mood regulation, and anxiousness. This is a critical gap, especially given the high prevalence of mental health challenges in college populations. Moreover, although college students are frequently represented in psychological research more broadly, they are not well represented in the literature on plant interaction. Many studies on houseplants or nature-based interventions involve broader adult samples or older adults, leaving young adults in higher education an underserved and under-examined group in this context. Again, this issue is particularly concerning considering that college students are navigating key developmental challenges including identity formation, autonomy, and the pressure of academic and social transitions. The mental health of the college population is different than that of the general population because of these unique challenges that they face, necessitating that they be studied solitarily. Nevertheless, this study will search for and evaluate what studies are available.

Given the increasing mental health challenges facing college students and the growing interest in nature-based interventions, this literature review seeks to explore the potential relationship between the presence of, and caring for, houseplants and mental health outcomes in the college population. Specifically, I will investigate whether small-scale, accessible forms of ecotherapy, such as incorporating houseplants into residence halls or study spaces, can offer measurable benefits for student well-being. By examining existing research, I hope to identify which types of interventions are most effective and whether houseplants represent a viable, low-cost supplement to traditional mental health

support. Ultimately, the goal is to inform how colleges might better integrate therapeutic, nature-based strategies into students' everyday environments in order to promote psychological wellness and academic success.

Ryan's self-determination theory is a psychological framework that focuses on human motivation and the factors that support or hinder it (Ryan, 2009). According to self-determination theory, optimal psychological functioning and well-being are achieved when three basic psychological needs are met for autonomy, competence, and relatedness (Ryan, 2009). This theory is particularly relevant for college students: a group navigating the shift from the externally structured environment of high school to the more self-directed and often isolating responsibilities of adult life. During this transition, developing autonomy is thought to be not only developmentally appropriate but also psychologically protective, as it promotes resilience and internal motivation (Ryan, 2009).

For college students, meeting these three needs has been shown to enhance intrinsic motivation, academic performance, and overall well-being (Ryan, 2009). When these needs are unmet, students may experience increased stress, disengagement, and a higher likelihood of withdrawal or mental health challenges (Ryan, 2009). This makes self-determination theory a valuable lens through which to understand interventions that can support student mental health. While not traditionally associated with self-determination theory, environmental factors such as the presence of houseplants may contribute indirectly by enhancing students' sense of autonomy through plant care routines. Understanding the psychological needs outlined in self-determination theory is

especially critical in light of the growing mental health crisis on college campuses and will be used as a theoretical lens to interpret variation in studies' findings.

METHODS

This study uses a systematic approach to investigating the prior literature on the relationship between houseplants and mental health in college students. For the purpose of this literature review, the term *mental health* refers specifically to symptoms associated with depression and anxiety, such as mood disturbances, feelings of anxiousness, stress, and lack of motivation. Broader cognitive functions or psychiatric conditions beyond anxiety and depression were not included, as current data indicate that these specific issues represent the most pressing mental health challenges among the college student population (Flannery, 2023).

Two major academic databases were used to identify relevant peer-reviewed literature: Google Scholar and Academic Search Complete. Initially, the searches were restricted to articles published after 2021 to ensure contemporary relevance. However, there was not enough research completed in this time frame, so the search was opened to any date. The Google Scholar search used the search terms "houseplants and mental health or depression or anxiety and college students," yielding 4,560 results. From these, a refined selection was made based on title and abstract relevance. A second search using Academic Search Complete was made with the terms "depression or depressive disorder or depressive symptoms or major depressive disorder or anxiety and college students and plants." This yielded 10 results. Articles were then screened for duplicates and relevance.

The independent variable is the presence of and interaction with houseplants, which may range from passive exposure to active engagement. The dependent variable is mental health, operationalized through reported levels of depression and anxiety symptoms. These definitions were used to guide the selection and interpretation of the studies included in this review.

Study inclusion criteria included population, purpose, and research question. The research must have been conducted on college students. It had to include being in the presence of and/or caring for indoor plants as the independent variable; any studies examining other types of ecotherapy or nature-based therapy were excluded because that is not the purpose of this literature review. In addition, research had to be assessing the relationship between houseplants and mental health. Specifically, anxiety and depressive symptoms were the focal points, so any articles examining other cognitive factors like ability to focus were excluded from the review. After applying these criteria, ten studies remained: six experiments and four observational studies. These were analyzed with attention to key variables such as time spent interacting with plants, the conditions and nature of the interaction, and the reported mental health outcomes. Study publication dates ranged from 2002 to 2025.

Understanding the types of studies used in this review is essential for interpreting their findings and limitations. Experiments, particularly randomized controlled trials, are widely regarded as the gold standard in psychological research (D'Onofrio, 2020). This is largely due to their ability to limit the influence of confounding variables. A confounding variable is a third variable not considered as part of the study that may influence the dependent and independent variables, potentially skewing the results (D'Onofrio, 2020).

Because observational studies lack random assignment, they are more susceptible to confounding (D'Onofrio, 2020). This is problematic in mental health research, where it may not be possible to fully control (via regression-based techniques) for countless potentially relevant confounders. Moreover, observational studies often face issues of reverse causation where it may be unclear if the independent variable affects the dependent variable or vice versa (D'Onofrio, 2020). It can be difficult to know whether having houseplants improves mental health or whether individuals with better mental health are more likely to have plants. These methodological limitations make it difficult to draw firm conclusions from observational data alone.

Despite these limitations, observational studies can still provide valuable insights and help identify patterns worth exploring in more controlled settings. Experimental studies, by contrast, are better suited to testing hypotheses about causality because they allow for more control over variables and eliminate some of the ambiguity inherent in observational designs (D'Onofrio, 2020). This review analyzes both types of study, each with their own strengths. Experiment studies are better for assessing causality, while observational studies allow for assessment of real-world experiences outside a laboratory context. While observational research can point to correlations, experiments are essential for confirming whether houseplants can cause improvements in anxiety and depression symptoms. Thus, by comparing and synthesizing findings from both types of research, this literature review aims to clarify the extent to which houseplants serve as an effective mental health intervention for college students.

RESULTS

The findings from the reviewed studies reveal a mixed but generally positive relationship between houseplants and mental health among college students. While not all results were conclusive, a trend toward beneficial effects is evident. Of the six experimental studies evaluated, three demonstrated statistically significant improvement in mental health outcomes, specifically related to anxiety and depression following interaction with houseplants. The remaining three experiments reported no measurable effect. In contrast, all four observational studies indicated a positive association between the presence of houseplants and improved emotional well-being. In the following section these studies are examined in detail to explore potential discrepancies in findings, identify common themes, and consider how variables such as duration of exposure, type of interaction, and study design may influence outcomes.

TIME SPENT WITH PLANTS

The study results indicate that the amount of time spent with plants does not matter to their influence on mental health. Across the studies, participants spent anywhere from 15 minutes to several weeks interacting with plants; yet, the time spent with them did not alter the mental health outcomes observed. Five of the studies were conducted on participants where the plants are a part of their living space; the other half of the studies were of more short term, task-based interactions. Studies by Abigail (2016), Shibata (2002), Rozi (2025), Bogerd (2021), Shibata (2004), Dzhambov (2021), Wallsten (2022), Goopio (2023), Dill (2024), and Kelley (2017) consistently find that exposure time, whether brief or prolonged, had no significant impact on the mental health outcomes. For instance, in experiments by Abigail (2016), Rozi (2025), and Bogerd (2021), participants

were exposed to plants for varying lengths of time. Despite these differences in exposure duration, there was no observed difference in the effect on mental health outcomes.

In line with these findings, experiments by Shibata (2004, 2002) and Kelley (2017), which found a positive effect of plants on mental health, showed no significant correlation between the duration of exposure and the degree of mental health improvement. Specifically, Shibata (2004) noted that even minimal exposure to plants led to reductions in levels of stress and anxiety, while Kelley (2017) found similar benefits regardless of whether participants interacted with plants for just a few minutes or over a longer period.

Further supporting these findings, observational studies conducted by Dzhambov (2021), Wallsten (2022), Goopio (2023), and Dill (2024) also found that the presence of houseplants positively influenced mental health, regardless of the time spent with them. These studies highlight the broader trend that merely the presence and proximity to plants appears to have a beneficial effect, regardless of direct interaction time. In Dzhambov's (2021) observational study, for example, participants who had indoor plants reported lower levels of anxiety and stress even when they did not actively engage with the plants on a daily basis. Similarly, Wallsten (2022) found that people who simply had plants in their environment reported improvements in mood and overall mental well-being, irrespective of how long they spent taking care of the plants.

The duration of exposure to plants does not appear to play a significant role in the observed benefits. Both experimental and observational research show consistent results indicating that even brief or minimal exposure to plants can have positive mental health outcomes, underscoring the importance of incorporating greenery into living and working

spaces for improved psychological well-being. Moreover, these results suggest that the mental health benefits that come from plants may be more related to environmental factors, such as the calming aesthetic of greenery and quality of interaction, rather than the amount of time spent interacting with the plants.

PLANT LOCATION

Where participants interacted with plants appears to influence whether those interactions had a positive effect on mental health. Specifically, plant interaction in public or communal spaces such as lounges or library study rooms was not found to significantly improve participants' mental health (Abigail, 2016; Bogerd 2021). These findings suggest that the environmental context may play a crucial role, possibly due to the distractions, social dynamics, or impersonal nature of such settings that could inhibit the potential calming effect of plant presence.

On the other hand, several studies reported positive mental health outcomes when plants were present in environments conducive to focused or personal engagement. For example, experiments by Shibata (2002, 2004) and Kelley (2017) involved participants completing specific tasks, such as cognitive assessments, in the presence of plants. In these cases, the presence of greenery was associated with reduced stress, improved mood, and greater task engagement. These findings imply that task-oriented settings, when paired with plant exposure, may enhance mental health by providing a soothing backdrop.

Further supporting this pattern, observational studies by Dzhambov (2021), Wallsten (2022), Goopio (2023), and Dill (2024) showed consistent mental health benefits when plants were part of the participant's residential environments. Notably,

these benefits occurred regardless of whether participants actively tended to the plants or simply had them present in their surroundings. Ranging from residence hall dorm rooms to houses, the studies support the idea that plants can have a positive passive effect on college students' mental health.

Taken together, these findings support the idea that the setting that plant interaction occurs in plays a significant role in determining its effect on mental health. Environments that are more personal and emotionally open may enhance the therapeutic potential of plants. In contrast, more communal and structured environments may dilute those effects, especially if the interaction feels forced or externally directed.

Interestingly, one experiment conducted by Rozi (2025) found no mental health improvement even in a residential environment. However, a key factor in this study was the nature of the plant interaction; participants engaged in highly structured and guided activities with their plants. One interpretation of this result, based on Ryan's (2009) theory of self-determination is that highly structured interactions possibly diminish the autonomy typically associated with positive mental health. Research participants were given specific directions every time they were supposed to take care of their plants, leaving almost no room for personal choices. This finding suggests that not just the location, but also the type of interaction, can mediate outcomes.

NATURE OF INTERACTION

The nature of interaction with houseplants was also found to significantly influence their impact on mental health outcomes. A clear pattern emerges from the studies: when engagement with plants is overly structured, the mental health benefits are

absent. In contrast, more organic, autonomous interactions tend to foster psychological well-being.

One notable finding comes from Rozi (2025), whose experiment showed no measurable improvement in mental health among participants. As was previously mentioned, a key detail in this study was the highly structured interaction with plants, where participants were given specific instructions on how to engage. According to Self-Determination Theory, autonomy is a fundamental psychological need (Ryan, 2009). Intrinsic motivation and psychological well-being are closely tied to feeling in control of one's own choices, which can be especially important for college students as they transition from high school to adult life (Ryan, 2009). When students are given the freedom to choose how they engage with plants, the activity may affirm their independence and promote emotional regulation (Ryan, 2009). Drawing upon this theoretical perspective, Rozi's study may, by prescribing specific actions, have limited participants' sense of ownership in their plant care routine, reducing the potential for psychological benefit. Instead of fostering a calming, self-directed interaction, plant care became another task participants had to complete, undermining its therapeutic potential.

Similarly to Rozi, both Bogerd (2021) and Abigail (2016) find no significant improvements in mental health when participants were exposed to plants in academic work settings. In these studies, plants were placed in environments like study rooms and lounges where participants were studying or completing assignments. These environments may have limited participants' ability to view the plants as a source of relaxation.

In contrast, Shibata (2002, 2004) found that participants experienced improved mood and reduced stress when plants were present while they completed a specific, low-stakes task. These experiments allowed participants to passively benefit from the plants as they accomplished their task. Further support for this comes from observational studies by Dzhambov (2021), Wallsten (2022), Goopio (2023), and Dill (2024), which consistently found that students who had plants in their personal living spaces reported better mental health outcomes. These settings allowed participants to decide when and how they engage with their plants, reinforcing their sense of agency and autonomy. The plants became part of their daily routines and contributed to a sustained psychological impact.

The results suggest that houseplants do not automatically improve mental health. Instead, the benefits are shaped by the context and structure of interaction. When engagement is autonomous, plants are likely to act as a buffer against stress, anxiety, and depression. Overly structured tasks, by contrast, may negate these effects, highlighting the importance of not just the presence of plants, but the freedom with which individuals engage with them.

GAPS IN THE LITERATURE

A significant gap in the literature is research regarding individuals with clinically diagnosed mental illnesses. None of the studies reviewed for this paper focused exclusively on participants with formal diagnoses of conditions like major depressive disorder or generalized anxiety disorder. As such, the findings may not be generalizable to those who might stand to benefit the most from plant-based interventions. Without clinical sampling, it is difficult to know whether the mild improvements in mood or stress

reported in general samples would extend to those experiencing more severe or chronic symptoms.

Furthermore, the mechanisms behind the benefits of houseplants are not thoroughly researched. While it is broadly accepted that interacting with nature has psychological benefits, the specific attributes of indoor plants that contribute to well-being remain unclear. Is it because of the aesthetic presence, a placebo effect, or the idea of nurturing another living thing? Few studies delve into this question.

One likely reason for these gaps is the recent resurgence in houseplant popularity, particularly among younger adults. Demand skyrocketed during the COVID-19 pandemic as people spent more time indoors with houseplants offering a tangible, low-stakes connection to nature and other life. Although this trend has generated interest in the topic, much of the literature emerging post-2020 is shaped by the unique psychological and environmental conditions of the pandemic. Research conducted during lockdowns may not generalize well to typical college settings, as students were not attending classes, engaging in regular social activities, or navigating campus life as usual. Thus, many findings may be contextually constrained and not fully applicable to a post-pandemic college experience.

Study	Method	Significant Effect?	Sample Size	Plant Location
Effects of indoor plants in the reduction of stress (Abigail, 2016)	Experiment	No	52	Study Lounge
Can Nurturing a Houseplant Promote College Students' Mental Wellbeing? (Rozi, 2025)	Experiment	No	12	Living Space
Greening the room (Bogerd, 2021)	Experiment	No	445	Study Room
Effects of indoor foliage plants on human stress response and mood (Shibata, 2002)	Experiment	Yes	146	Task Room
Does greenery experienced indoors and outdoors provide an escape and support mental health during the COVID-19 quarantine? (Dzhambov, 2021)	Survey	Yes	323	Living Space
Effects of an indoor plant on creative task performance and mood (Shibata, 2004)	Experiment	Yes	90	Task Room
The effects of greenhouse activities on psychological stress, depression, and anxiety among university students who served in the U.S. Armed Forces (Kelley, 2017)	Experiment	Yes	-	Task Room
Houseplants as mental health supports for dorm occupants during the lockdown period at Portland State University (Wallsten, 2022)	Interviews	Yes	4	Living Space
Plant parenting (Goopio, 2023)	Interviews	Yes	16	Living Space
A Grounded Theoretic Analysis of College Students' Attitudes Regarding Indoor Plants and Pets as Moderators of Daily Stressors (Dill, 2024)	Interviews	Yes	5	Living Space

Table 1

DISCUSSION

While the research on this topic is somewhat limited, there is evidence of a generally positive connection between houseplants and mental health outcomes. Out of six experiments reviewed, half reported beneficial effects of houseplants, while the other half found no significant relationship. However, the survey and all three interviews conducted support the idea that houseplants are positively associated with improved psychological well-being. Several factors appear to influence these outcomes, including environmental context and nature of interaction, although time spent does not.

Across nearly all studies, the amount of time participants spent with houseplants did not significantly alter mental health outcomes. Whether houseplants were a part of the participant's everyday living space or integrated into a short-term environment, the length of exposure did not predict benefits. For example, Shibata (2004) found that even minimal exposure to plants reduced stress and anxiety. Observational studies by Dzhambov (2021) and Wallsten (2022) further support this, showing that participants experienced reduced anxiety simply by having plants in their environment, regardless of how often they interact with them. These findings suggest that the presence of houseplants, rather than the duration of interaction, are key to its psychological benefits.

The setting in which plant interaction occurred appeared to have a more consistent influence on mental health outcomes. Studies that placed participants in academic settings like study rooms or library lounges generally did not find improvements in mental health (Abigail, 2016; Bogerd, 2021). These environments may have introduced distractions of lack that diluted any calming effect from the plants. In contrast, studies conducted in residential settings or focused environments, such as those by Shibata (2002, 2004) and Wallsten (2022), were more likely to report positive mental health

outcomes. Observational studies further supported the result that personal living spaces, like dorms and apartments, provided an emotionally conducive environment where houseplants had a passive yet meaningful impact.

Perhaps the most important factor influencing outcomes appeared to be how participants interacted with the plants. Research by Rozi (2025) found no improvement in mental health, likely because participants followed highly structured, externally directed plant care routines. According to Self-Determination Theory, autonomy is a core human need that influences mental health (Ryan, 2009). When interactions were too prescribed, they seemed to undermine the potential therapeutic value of the plants. On the other hand, studies that allowed self-directed interactions like that of Dzhambov (2021) and Goopio (2023) showed more consistent mental health benefits. This pattern suggests that autonomy in plant care enhances the emotional benefits by promoting ownership, relaxation, and agency, particularly important for college students navigating independence.

P-HACKING

P-hacking refers to the practice of manipulating data analysis or experimental design in ways that artificially produce statistically significant results, often without reflecting a real or meaningful effect (Head, 2015). It encompasses a variety of strategies, such as selectively reporting certain variables, choosing to stop data collection once a desired result is achieved, or retrospectively excluding outliers to alter outcomes (Head, 2015). Although these methods may seem harmless, they distort the scientific process by increasing the risk of Type I errors where researchers conclude that an effect exists when it does not (Head, 2015).

False positives are a particularly prevalent issue in the field of psychology, where the pressure to publish statistically significant findings can encourage questionable research practices. Head and colleagues (2015) provide compelling evidence that prestigious journals disproportionately publish studies with positive results. As a result, researchers may be incentivised to engage in p-hacking to achieve the desired results. For instance, studies that yield null results are less likely to be published unless researchers can identify at least one significant outcome (Head, 2015). Conversely, those reporting benefits of houseplants might have engaged in subtle forms of p-hacking to produce more compelling narratives. This is especially relevant considering the new surge in nature-based mental health interventions following the COVID-19 pandemic. With increasing public curiosity, researchers may feel additional pressure to report confirmatory findings that align with the general belief that plants are good for you.

The consequences of p-hacking go beyond academic inaccuracy. False positives mislead future research efforts and shape therapeutic interventions that lack scientific backing. In the mental health field, this can have the real-world consequences of diverting resources to ineffective treatments or giving individuals false hope about the benefits of interventions that may be ineffective in reality (Head, 2015). P-hacking also leads to experiment replication issues. For one, because of the ways studies are published there is very little incentive to replicate research to confirm results (Head, 2015). Even when research is replicated, the studies with positive results often receive more attention than those with false outcomes (Head, 2015). In light of this, it is critical to interpret the existing findings with caution. The inconsistencies in the experimental results underscore the need for more rigorous research methods.

LIMITATIONS

While this literature review presents encouraging findings about the potential of houseplants to improve mental health among college students, several limitations should be acknowledged. First and foremost, the body of research is still relatively small and inconsistent with only a limited number of studies specifically examining the college student population. Many reviewed studies relied on small sample sizes or short-term interventions, which may not accurately capture long-term effects or broader generalizability.

Secondly, observational studies, which made up a significant portion of the research, are inherently limited in their ability to determine causality. As noted earlier, it is difficult to discern whether plants lead to improved mental health or whether individuals with better mental health are simply more inclined to keep plants. Additionally, experimental designs varied widely in terms of control, exposure length, and outcome measurement, further complicating direct comparisons and synthesis of findings.

Lastly, the role of confounding variables such as social support, sleep quality, academic pressure, or preexisting mental health conditions was not consistently addressed across studies. These factors could significantly influence outcomes and may obscure the true effect of houseplants on mental well-being.

CONCLUSION

The findings of this literature review suggest that houseplants may serve as a promising, low-cost supplement to traditional mental health interventions for college students. While the duration of exposure appears less important, the location of plant interaction and the degree of autonomy in engagement play crucial roles in determining their psychological impact. When students interact with plants in personalized and self-directed ways, especially in their own living environments, they may experience greater reductions in anxiety and depression symptoms.

However, limitations in current research, including inconsistent methodologies and potential publication bias, call for cautious interpretation. There is a clear need for more rigorous, diverse, and theory-driven research to substantiate these findings and explore underlying mechanisms. Future studies should prioritize standardized outcome measures, longitudinal designs, and inclusion of clinically diagnosed populations to ensure the validity and practical applicability of interventions.

For research on houseplants and mental health in particular, future studies should aim to improve replicability by using larger and more diverse samples and reporting all tested variables and conditions. Researchers should also consider conducting longitudinal studies that track plant exposure and psychological well-being over time to better understand the influence of personal and environmental variables beyond plant presence alone. Moreover, exploring the mechanisms behind why houseplants affect mental health would reduce ambiguity in interpretation. Addressing these gaps will clarify the role that houseplants play in supporting mental health, but also ensure that interventions based on these findings are effective. As public interest in ecotherapy continues to grow, it is

essential that the science supporting these trends is grounded in replicable, transparent, and honest research practices.

As campuses look for scalable, inclusive strategies to support student well-being, houseplants offer a unique blend of accessibility, affordability, and potential psychological benefit. If further validated, this approach could become an important component of mental health programming, promoting not only academic success but also emotional resilience among students navigating one of life's most formative stages.

References

Abigail, J. (2016). Effects of indoor plants in the reduction of stress. University of British Columbia. Retrieved from https://open.library.ubc.ca/soa/cIRcle/collections/undergraduateresearch/18861/items/1.0342817

Bogerd, N., Dijkstra, S. C., Koole, S. L., Seidell, J.C., & Maas, J. (2021). Greening the room: A quasi-experimental study on the presence of potted plants in study rooms on mood, cognitive performance, and perceived environmental quality among university students. Journal of Environmental Psychology, 73. https://doi.org/10.1016/j.jenvp.2021.101557

Coventry, P. A., Brown, J., Pervin, J., Brabyn, S., Pateman, R., Breedvelt, J., Gilbody, S., Stancliffe, R., McEachan, R., & White, P. (2021). Nature-based outdoor activities for mental and physical health: Systematic review and meta-analysis. SSM - Population Health, 16, 100934. https://doi.org/10.1016/j.ssmph.2021.100934

Dill, L. (2024). A Grounded Theoretic Analysis of College Students' Attitudes Regarding Indoor Plants and Pets as Moderators of Daily Stressors. *Honors Projects*. 1001. https://scholarworks.bgsu.edu/honorsprojects/1001

D'Onofrio, B., Sjolander, A., Lahey, B., Lichtenstein, P., & Oberg, A. (2020). Accounting for Confounding in Observational Studies. Annual Review of Clinical Psychology, 16, 25-48. https://www.annualreviews.org/content/journals/10.1146/annurev-clinpsy-032816-045030

Dzhambov, A. M., Lercher, P., Browning, M., Stoyanov, D., Petrova, N., Novakov, S., Dimitrova, D. D. (2021). Does greenery experienced indoors and outdoors provide an escape and support mental health during the COVID-19 quarantine. Environmental Research, 196, 110420. https://doi.org/10.1016/j.envres.2020.110420

Flannery, M. E. (2023). The Mental Health Crisis on College Campuses. National Education Association. https://www.nea.org/nea-today/all-news-articles/mental-health-crisis-college-campuses

Goopio, J. V. A., Goopio, G. A., Sumicad, R. P., Gomez, D. O., Gasalatan, N. L., & Diaz, K. N. B. (2023). Plant parenting: Its influences on the well-being of college students. Journal of Psychology and Behavior Studies, 3(2), 25–43. https://doi.org/10.32996/jpbs.2023.2.3

Head, M.L., Holman, L., Lanfear, R., Kahn, A.T., Jennions, M.D. (2015) The Extent and Consequences of P-Hacking in Science. PLoS Biol 13(3): e1002106. https://doi.org/10.1371/journal.pbio.1002106

Keali'i Jolie, A. L. (2024). A Systematic Review of the Ecobiopsychosocial Effects of Ecotherapy on Anxiety (Order No. 31239037). Available from ProQuest Dissertations & Theses Global. (3097835106). https://usd.idm.oclc.org/login?url=https://www.proquest.com/dissertations-theses/systematic-review-ecobiopsychosocial-affects/docview/3097835106/se-2

Kelley, R. J., Waliczek, T. M., & Le Duc, F. A. (2017). The effects of greenhouse activities on psychological stress, depression, and anxiety among university

students who served in the U.S. Armed Forces. HortScience, 52(12), 1834–1839. https://doi.org/10.21273/HORTSCI12372-17

Kivlighan, D. M., Schreier, B. A., Gates, C., Hong, J. E., Corkery, J. M., Anderson, C. L., & Keeton, P. M. (2021). The role of mental health counseling in college students' academic success: An interrupted time series analysis. Journal of Counseling Psychology, 68(5), 562–570. https://doi.org/10.1037/cou0000534

Patel, B. P. & Lewis, B. (2023). Responding to the Crisis in College Mental Health: A Call to Action. The Journal of Pediatrics, 257, 113390. 10.1016 https://jpeds.2023.02.036

Rozi, F. (2025). Can Nurturing a Houseplant Promote College Students' Mental Wellbeing?. Effat University Repository. http://hdl.handle.net/20.500.14131/1424

Rueff, M., Reese, G. (2023). Depression and anxiety: A systematic review on comparing ecotherapy with cognitive behavioral therapy. Journal of Environmental Psychology, 90. https://www.sciencedirect.com/science/article/pii/S0272494423001457?ref=pdf_download&fr=RR-2&rr=8151cb20a9822b03

Ryan, R. (2009). Self-determination Theory and Wellbeing. Wellbeing in Developing Countries, 1. https://www.welldev.org.uk/wed-new/network/research-review/Review_1_Ryan.

Shibata, S., & Suzuki, N. (2002). Effects of indoor foliage plants on human stress response and mood. Journal of Environmental Psychology, 22(3), 263–276. https://doi.org/10.1006/jevp.2002.0227

Shibata, S., & Suzuki, N. (2004). Effects of an indoor plant on creative task performance and mood. Scandinavian Journal of Psychology, 45(5), 373–381. https://doi.org/10.1111/j.1467-9450.2004.00419.x

Siler, A. J. H. (2024). Community College Student Perceptions of Awareness, Utilization, and Satisfaction with In-House and Outsourced Counseling Services (Order No. 31143688). Available from ProQuest Dissertations & Theses Global. (3040259306). https://usd.idm.oclc.org/login?url=https://www.proquest.com/dissertations-theses/community-college-student-perceptions-awareness/docview/3040259306/se-2

Wallsten, B. (2022). Houseplants as mental health supports for dorm occupants during the lockdown period at Portland State University. Anthós: The Undergraduate Journal of Portland State University, 11(1), Article 4. https://doi.org/10.15760/anthos.2022.11.1.4