

The Restorative Effects of a Plant Enriched Environment on Employee
Performance in the Workplace

Bianca May

724049

University of the Witwatersrand



*A research proposal submitted in partial fulfilment of the requirements for the degree of MA
by Coursework and Research Report in the field of Organisational Psychology in the Faculty
of Humanities, University of the Witwatersrand, Johannesburg, 2018*

Supervisor: Professor Andrew Thatcher

MASTERS IN INDUSTRIAL PSYCHOLOGY – RESEARCH PROPOSAL COVER PAGE

Surname: May

First name/s: Bianca

Student number: 724049

Supervisor: Professor Andrew Thatcher

Title: The restorative effects of a plant enriched environment on employee performance in the workplace.

DECLARATION

I, Bianca May, know and accept that plagiarism (i.e., to use another's work and to pretend that it is one's own) is wrong. Consequently, I declare that

- The research proposal is my own work.
- I understand what plagiarism is, and the importance of clearly and appropriately acknowledging my sources.
- I understand that questions about plagiarism can arise in any piece of work I submit, regardless of whether that work is to be formally assessed or not.
- I understand that a proper paraphrase or summary of ideas/ content from a particular source should be written in my own words with my own sentence structure, and be accompanied by an appropriate reference.
- I have correctly acknowledged all direct quotations and paraphrased ideas/ content by way of appropriate, APA-style in-text references.
- I have provided a complete, alphabetized reference list, as required by the APA method of referencing.
- I understand that anti-plagiarism software (e.g. Turnitin) is a useful resource, but that such software does not provide definitive proof that a document is free of plagiarism.
- I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as his or her own work.
- I am aware of and familiar with the University of the Witwatersrand's policy on plagiarism.
- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work, or that I failed to acknowledge the source of the ideas or words in my writing.
- The word count (excluding the Reference List,etc) given above is correct.

Signed: _____ Bianca Kristi May _____

Date: _____ 04.06.2019 _____

Abstract

With the fourth industrial revolution, employees are having to change the way they work to accommodate new technological advances. This reliance on technology for employees to operate may cause strain and it has been suggested that working on a computer for an extended period of time can cause mental fatigue, which increases the need for psychological restoration. It is therefore important for organisations to design an effective working environment which enables employees to perform at optimum levels. In order to do so, examination of the employee's workspace and how their surroundings may impact them, and their performance levels are of growing interest. This is especially relevant to Industrial Psychologists, with concern regarding the effect of environmental influences such as indoor plants, on individual performance outcomes in the workplace. The *Attention Restoration Theory* was applied within the current study to examine the effect indoor plants had on the restorative needs of employees within a South African organisational context on performance. This study aimed to investigate the relationship of indoor plants on employee performance in a real-working context. Nature identity was also examined to investigate whether one's concern for the environment moderated the indoor plant to performance relationship. The current study aimed to provide evidence which served as a framework for the use of indoor plants in a South African organisational context on employee performance, as this has not been researched extensively with enough justification. In this quasi-experimental study, a sample of employees within the OPS department on two floors within the same organisation characterised the treatment, and contrast groups. The treatment group had indoor plants implemented into their workspace and served as the presence of plants group which was assessed over a period of a year. The contrast group had art pictures installed to counteract for any Hawthorne effects and served as the absence of plants group which was also assessed over the same period. After a settling period of 3 months, a survey was administered to the employees with 3 scales to assess perceived performance, work engagement, and nature identity with 40 responses. After a six-month waiting period, performance and error rate scores were obtained of every employee within the OPS department for each month of 2018 and yielded a sample of 130 employees. The results from the statistical analyses demonstrated no statistically significant effects on the performance outcomes. The result from the one-way ANCOVA's established that nature identity was not a moderator variable in the current study on the relationship between indoor plants and the

performance outcomes. The current study adds to literature regarding the impact of indoor plants on performance within a South African organisational context.

Key Words

Indoor plants, Performance, Perceived Performance, Work Engagement, Connectedness to Nature, Attention Restoration Theory

Acknowledgements

I would like to thank my supervisor Andrew Thatcher for his time and assistance throughout my post graduate studies.

I would also like to thank my friends and family for their continuous support, and love throughout my postgraduate journey. I would not have been where I am today with my father and mother and so to them, I owe everything. To the master's group of 2018, thank you for all the laughs, the encouragement and for making the year truly remarkable.

Table of Contents

Declaration	
Abstract	
Key words	
Acknowledgments	
Chapter 1: Introduction and Literature Review	1
1.1 Introduction.....	1
1.2 Literature Review.....	2
1.2.1 Introduction.....	2
1.2.2 The Biophilia Hypothesis in support of indoor plants in the workplace	2
1.2.3 The psychological benefits of indoor plants in the workplace	4
1.2.4 The Attention Restoration Theory and indoor plants in the workplace.....	6
1.2.5 Nature identity and indoor plants in the workplace	9
1.2.6 The South African context of indoor plants in the workplace	12
1.2.7 Error rates, performance and indoor plants in the workplace.....	14
1.2.8 Work engagement and indoor plants in the workplace.....	22
1.2.9 Inconclusive results relating to indoor plants in the workplace.....	25
1.2.10 Art pictures in the workplace	27
1.3 Research Aims	28
1.4 Hypotheses.....	29
1.4.1 Main Hypotheses	29
1.4.2 Subsequent Hypotheses	29
Chapter 2: Methodology	29
2.1 Introduction.....	29
2.2 Research Design.....	30
2.3 Sample and Sampling	31
2.4 Procedure	32
2.5 Instrumentation	35

i. Biographical Details Questions	35
ii. Perceived Performance Scale	36
iii. Connectedness to Nature Scale.....	36
iv. Utrecht Work Engagement Scale – Shortened Version (UWES-9)	36
v. Plants in the Workplace Scale.....	38
vi. Art Pictures in the Workplace Scale	39
vii. Performance.....	40
2.6 Materials	43
i. Plant Type and Specifications.....	43
ii. Art Picture Type and Specifications	45
2.7 Data Analyses	46
i. Measurement Level.....	47
ii. Random Sampling	47
iii. Independence of Observations.....	47
iv. Normal Distribution.....	47
v. Homogeneity of Variance	48
2.7.1 Indoor plants (IV) and performance (DV)	48
2.7.2 Indoor plants (IV), perceived performance, and work engagement (DV's).....	50
2.7.3 Indoor plants (IV), performance (DV), and nature identity (moderator).....	51
2.7.4 Indoor plants (IV), perceived performance, work engagement (DV's), and nature identity (moderator)	52
2.8 Ethical Considerations	52
Chapter 3: Results.....	55
3.1 Introduction.....	55
3.2 Descriptive Statistics.....	57
3.2.1 Descriptive statistics for overall performance data.....	58
3.2.2 Descriptive statistics for floor one performance data	59
3.2.3 Descriptive statistics for floor two performance data	61
3.2.4 Descriptive statistics for overall survey data	62

3.2.5 Descriptive statistics for first-floor survey data.....	64
3.2.6 Descriptive statistics for second-floor survey data	65
3.3 Reliability Tests	66
3.4 Test of Normality.....	67
3.5 Analyses.....	70
3.5.1 Paired samples t-test	70
3.5.2 Independent samples t-test on perceived performance and work engagement.....	76
3.5.3 Analysis of Covariance (ANCOVA)	78
Chapter 4: Discussion	82
4.1 Introduction.....	82
4.2 Discussion of Results.....	83
4.2.1 The relationship between the presence of indoor plants on performance.....	83
4.2.2 The relationship between the presence and absence of indoor plants on perceived performance	93
4.2.3 The relationship between the presence and absence of indoor plants on work engagement	97
4.2.4 The role of nature identity on the relationship between the indoor plants and performance, perceived performance, and work engagement	100
4.3 Limitations of the Study.....	102
4.4 Recommendations for Future Research	107
4.5 Theoretical and Practical Implications.....	110
Chapter 5: Conclusion	111
Reference List.....	113
Appendices.....	124
Appendix A: Participant Information Sheet for the treatment group	124
Appendix B: Participant Information Sheet for the contrast group.....	126
Appendix C: Letter Requesting Access.....	128
Appendix D: Draft E-mail to Employees	129

Appendix E: Biographical Details Questions.....	130
Appendix F: Perceived Performance Scale	131
Appendix G: Utrecht Work Engagement Scale	132
Appendix H: Connectedness to Nature Scale.....	133
Appendix I: Plants in the Workplace Scale: First floor with plants implemented	134
Appendix J: Art Pictures in the Workplace Scale: Second floor with the art pictures added.....	135
Appendix K: Permission from Organisation.....	136
Appendix L: Floor Plan of the First Floor with Plants added	137
Appendix M: Floor Plan of the Second Floor with Art Pictures added.....	138
Appendix N: Pilot Study for the Plants in the Workplace Scale	139
Appendix O: Pilot Study for the Art Pictures in the Workplace Scale.....	142
Appendix P: Ethical Clearance	145
Appendix Q: Images of the first floor prior to implementation of the indoor plants.....	146
Appendix R: Images of the first-floor post installation of the indoor plants	147
Appendix S: Images of the second floor prior to implementation of the art pictures.....	148
Appendix T: Images of the second-floor post installation of the art pictures.....	149
Appendix U: Histograms	150
Appendix V: Histograms for Normality	151
Appendix W: Histograms paired samples t-test.....	154
Appendix X: Means of Performance Scores (First-Floor).....	155
Appendix Y: Volume Inflows 2018.....	156
Appendix Z: Employee Proximity to the Indoor Plants.....	157
Appendix AA: Total Error Rate Numbers for First-Floor Employees	158

List of Tables

Table 1: Table of Abbreviations for Key Variables.....	56
Table 2: Sample breakdown for Performance Data.....	58
Table 3: Sample demographic characteristic for performance data: Gender.....	58
Table 4: Sample demographic characteristic for performance data: Age in years	58
Table 5: Sample demographic characteristic for performance data: Ethnicity	59
Table 6: Sample breakdown for the first floor on performance	60
Table 7: Sample breakdown for the second floor on performance	61
Table 8: Sample breakdown for performance overall.....	62
Table 9: Sample breakdown for Survey Data	62
Table 10: Sample demographic characteristic for survey data: Gender	62
Table 11: Sample demographic characteristic for survey data: Age in years.....	63
Table 12: Sample demographic characteristic for survey data: Ethnicity	63
Table 13: Sample demographic characteristic for survey data: Tenure.....	63
Table 14: Descriptive Statistics for Plants in the Workplace Questionnaire Item 5	65
Table 15: Cronbach Alpha's for all scales used in the current research study	66
Table 16: Tests of normality, skewness and kurtosis	68
Table 17: Paired samples t-test descriptive statistics for performance.....	70
Table 18: Paired samples t-test results for performance.....	70
Table 19: Paired samples t-test descriptive statistics for error rate	71
Table 20: Paired samples t-test results for error rate	71
Table 21: Paired samples t-test descriptive statistics for performance – contrast group	72
Table 22: Paired samples t-test results for performance – contrast group.....	72
Table 23: Paired samples t-test descriptive statistics for error rate – contrast group	73
Table 24: Paired samples t-test results for error rate – contrast group	73
Table 25: Independent samples t-test descriptive statistics - performance.....	74
Table 26: Levene's test for homogeneity of variance - performance	74
Table 27: Independent samples t-test results - performance	74
Table 28: Independent samples t-test descriptive statistics – error rate.....	75
Table 29: Levene's test for homogeneity of variance – error rate	75
Table 30: Independent samples t-test results – error rate	75

Table 31: Independent samples t-test descriptive statistics – perceived performance.....	76
Table 32: Levene’s test for homogeneity of variance - perceived performance	76
Table 33: Independent samples t-test results – perceived performance	76
Table 34: Independent samples t-test descriptive statistics – work engagement.....	77
Table 35: Levene’s test for homogeneity of variance – work engagement	77
Table 36: Independent samples t-test results – work engagement.....	78
Table 37: Descriptive statistics for ANCOVA – perceived performance.....	79
Table 38: Levene’s test for homogeneity of variance – perceived performance.....	79
Table 39: ANCOVA for group and CNS to work engagement	80
Table 40: Descriptive statistics for ANCOVA - work engagement	80
Table 41: Levene’s test for homogeneity of variance – work engagement	81
Table 42: ANCOVA for group and CNS to work engagement.....	81

List of Figures

Figure 1: Sample pictures of troughs with the plants selected for the current study	44
Figure 2: Selection of plants to be utilised in the current study	44
Figure 3: Selection of pictures to be utilised in the current study	46