IDENTIFYING MOOD- AND AGE-RELATED DIFFERENCES IN ATTENTIONAL BIASES IN DYSPHORIA: AN EYE TRACKING STUDY

A thesis presented in partial fulfilment of the requirements for the degree of Doctor of Clinical Psychology at Massey University, Palmerston North, New Zealand.

Jodi Field
2013
To Steve, Oscar, and Felix

I love you all the love in the world
ABSTRACT

Previous research has indicated that individuals who experience depression selectively attend to negative information for greater periods of time than non-depressed individuals. This negative bias may reflect difficulty disengaging from negative stimuli that is not seen in non-depressed individuals. While there has been a high level of researcher interest in this arena, no studies have investigated the presence of a negative bias in older adults. Accordingly, the present study employed eye tracking techniques to investigate differences in negative biases between dysphoric ($n = 27$; 14 younger adults; 13 older adults) and non-dysphoric ($n = 29$; 14 younger adults; 15 older adults) participants by presenting competing emotionally valenced stimuli. In an additional stage of the experiment, the presence of an interpretation bias was investigated whereby participants rated the previously viewed images for perceptions of ‘mood’. Results from the eye tracking task were mixed, with partial support being found for a negative bias in dysphoric participants. Similarly, partial support was found for the hypothesis that non-dysphoric participants would attend to positive stimuli for greater periods of time than dysphoric participants. No age-related differences were found in the non-dysphoric group when attending to sad and happy images. However, when attending to sad images, younger dysphoric participants showed greater average glance durations than older dysphoric participants. Results from the rating task were also mixed. No evidence of a negative interpretation bias was found in the dysphoric group. Similarly no evidence of a positive interpretation bias was found in the non-dysphoric group. Consistent with previous research, older non-dysphoric participants provided more positive ratings for happy images compared to younger non-dysphoric participants. Although overall results are not consistent with previous research, methodological issues in the present study may go some way to explain these inconsistencies. Limitations in using eye tracking techniques on older adults offer one possible explanation. Further, the sub-clinical level of dysphoria in the present sample suggests that negative biases are most evident at severe, clinical levels of depression.
ACKNOWLEDGMENTS

My most sincere thanks belong to the wonderfully altruistic people who volunteered to participate in this research. At the risk of stating the obvious, without you all, this research would not have been possible. I enjoyed meeting with you all, and was genuinely warmed by the interest shown in this study.

Thank you does not seem like a good enough response for the gratitude I feel towards Associate Professor John Podd. As my primary supervisor you have endured a pretty relentless intrusion from me, for which your incredibly speedy responses are the envy of many students. I cannot thank you enough for your patience, encouragement, support, and dedication to not just this project, but to previous work, and in assisting me to “get that piece of paper”. I admire your pragmatic approach, your quick wit, your student-focussed passion, and your ‘to-the-point’ feedback. You kept me on track, motivated, and most importantly, you believed in me, making sure I believed in myself too (which was no easy task at times!). And so, I thank you.

Further thanks belong to Dr Stephen Hill who spent countless hours assisting me, mostly with statistics. What can I say? Without you I would still be staring at SPSS wondering how to enter data! Your patience with me was commendable, and, believe it or not, I actually think I started to master SPSS. I cannot thank you enough for your open-door policy, always finding time to see me without prior arrangement, and for your incredible ability to make things understandable. Like John, you kept me motivated and believing I could do this, infused with your kind nature and great sense of humour.

Thanks also go to Dr Duncan Babbage as clinical supervisor of this research. While you left part way through, your contribution was highly valuable. In the early stages, you often provided a different take on certain aspects of the study, adding important clinical insight. For this, I thank you, and wish you all the very best in your future endeavours.

To John and Stephen: I can honestly say I will miss our meetings. We always managed to get off topic – discussions of avocado oil, wine, house building, pool cleaning, lawn...
mowing—oh, the list goes on. But I always learned something, leaving those meetings with a new perspective and bolstered commitment to carry on. But most importantly, there was always some good giggle that came out if it—the small things I sometimes needed when writing a thesis! You both have a wonderful ability to approach these meetings in a collegial manner, which meant I felt relaxed, valued, and engaged. I can unequivocally say I had the best supervisory team that a student could wish for.

For the development of the computer programme needed for this study, I owe an enormous amount of gratitude to Malcolm Loudon. It took tremendous patience for you to withstand my technically illiterate ramblings, and even when I did not know myself what was needed, you still managed to produce exactly the right thing. Furthermore, you were always happy to pass on your knowledge ensuring all technical aspects needed for this study were covered.

A myriad of other people were significant in this study. I would like to thank the following people for their contributions. Dr Nasreddine and Tina Brosseau for permission to use the MoCA. Paul Dickson for advice on conditions affecting eye movements and the supply of the eye chart. Dr Jo Taylor for providing insight into selecting psychometric measures and for always availing herself to me in my wider clinical training. Dr Natasha Tassell for providing cultural advice. For providing me with an avenue to recruit participants, I would like to thank the following people and organisations: Christine Zander from Manawatu SF, Mark Rainier and the staff from Student Counselling Services at Massey University, Dr Shane Harvey and the staff at Massey University’s Psychology Clinic, Jude Campbell, Palmerston North Library, Probus, RSA, Age Concern, Grey Power, and Senior Net.

Although the aforementioned thanks predominantly relate to the research component of my doctoral training, the clinical component cannot be overlooked. I had the great fortune during my internship to be supervised by Vicki Graham. I cannot thank you enough for your gracious ability to coach me and inspire me. Not only did you teach me overtly what it is to be a clinical psychologist, but you also modelled this to me in an aspiring manner. Additional supervisors of note during my internship are Guy Breakwell and Robyn Girling-Butcher. Guy, you had a canny ability of putting me on the spot, and while I still feel the physiological indicators of nervousness rising as I think back to those times, I am also incredibly grateful that you pushed me to come up
with answers to my questions and for making me think just that wee bit harder. Robyn, you stepped up and helped out when you didn’t have to and I will be forever grateful that you did. But more importantly, I thank you for your ongoing backing and your never-faltering support towards me and the other students in the clinical programme.

During pre-internship placements, I received a wealth of learning opportunities from field supervisors and clinical staff at Massey University’s Psychology Clinic. So it is with many thanks that I express my gratitude to Robyn Boyd, Jan Dickson, Kirsty Ross, and Maria Berrett. Also, to Annette Ross for your ongoing interest in my research and clinical training, and for the wonderful pre-exam shoulder massages!

My learning has also been facilitated by other Doctor of Clinical Psychology students, both past and present, and I thank you all for your support, assistance, and valued friendship. Anita, thank you for being a good friend and sturdy support. I’m still working on getting ‘bloviate’ into my thesis. But now that I’ve written it, does that count? Ange, it’s been a long time coming since those undergrad papers. What a pleasure it has been to travel this road alongside you…well, until babies came along! Rif, you’ve listened at length to many of my trials and tribulations, and I am incredibly grateful to call you my friend. To my ‘TAG’ buddies: Mel 1 and Mel 2, Amber, Liz, and Laura – thank you all for your support, advice, guidance, and most importantly, keeping me accountable.

It is without doubt that I survived my internship relatively unscathed because I was privileged to share the experience with wonderful fellow interns! In particular I thank Edwin, Raewyn, and Kara for continually showing support and encouragement. I will forever cherish the unique bond that can only come from experiencing an internship together, and look forward to our planned annual reunions…with plenty of piña coladas!

I wish to acknowledge my friends and family. To Bronwyn and Cath, I thank you for being the best of friends a girl could ever want. Even through geographical divide, you have both been constant sources of support, kindness, and love, all washed down with lashings of great humour. To Mum and Dad, I thank you for always believing in me and allowing me to take risks, make mistakes, and learn from them. I thank you
both for instilling in me a strong work ethic, perfectionist traits, and a ‘dare to dream’ attitude. To Kim – a big sister with a big heart, who would walk heaven and earth for me. I cannot thank you enough for always being there, through thick and thin. To Tony, for always bringing a wicked sense of humour to every occasion. And to the most amazing nieces ever: Kayla, Issy, and Hope. You girls always make me smile, impress me with your talents, and humble me with your humility. To Pete and Linda, thank you for being ‘like family’. I am truly grateful for the unwavering support and interest, not just in my studies, but in all things ‘Field’. You really are the ‘bees-knees’!

And last, but by no means, least, my darling boys. Steve, the most wonderful husband on the planet. I cannot thank you enough for everything. You have been my rock, never once faltering and always, always backing me 100%. You have never once resented my decision to become a psychologist, in fact, quite the opposite. You are incredibly proud of me, and the achievements I have made, and I know, without doubt, that if I had not walked this path with you, those achievements would be few. To my Oscar-boy, you really are my sunshine. You have graced us with your presence for five years now, and I cannot recall my life without you. I adore your quick-wit, your compassion for others, and your sense of intrigue. My darling Felix-poppet, how much we have been through in the nine months since you were born. You are my happy bubba, constantly smiling and giggling away. Nothing seems to faze you. I continue to be delighted by your developments, as I see more and more of your personality shining through. Oscar and Felix, you are both without a doubt my greatest achievement. Each day you surprise me, astound me, intrigue me, humour me, and make me so very proud.
TABLE OF CONTENTS

Dedication ................................................................. iii
Abstract .................................................................. v
Acknowledgments .................................................... vii
Table of Contents .................................................... xiii
List of Tables ........................................................... xvii
List of Figures .......................................................... xix
Glossary of Terms ..................................................... xxiii

Dysphoric and Non-dysphoric ........................................... xi
Younger Adults and Older Adults .............................. xxi
Late-life Depression and Late-onset Depression ............ xxi
Eye Tracking ............................................................ xxi
Sad Images .................................................................. xxi
Happy Images .......................................................... xxii
Threatening Images .................................................. xxii
Neutral Images .......................................................... xxii

Acronyms ............................................................... xxiii
AIM .............................................................................. xxiii
ANOVA ........................................................................ xxiii
BDI ............................................................................... xxiii
CES-D ........................................................................... xxiii
DAH ............................................................................... xxiii
DASS-21 ....................................................................... xxiii
DOAT ............................................................................. xxiii
DSM-5 .......................................................................... xxiii
HADS ............................................................................ xxiii
MoCA ............................................................................ xxiii
SPSS ............................................................................. xxiii
SST ................................................................................. xxiii

Preface ............................................................... xxv

CHAPTER ONE - DEPRESSION ......................................................... 1
Depressive Symptomology ............................................. 1
Affective Symptoms ...................................................... 2
Cognitive Symptoms .................................................... 2
Behavioural Symptoms ............................................... 3
Physiological Symptoms ............................................. 3
Depressive Symptoms in Older Adults ......................... 4
Diagnosing Depression in Older Adults ......................... 4
Prevalence and Incidence ............................................. 6
Gender Differences in Depression ................................. 7
Wider Implications of Depression ................................. 8
Theories of Depression ............................................... 9
Beck’s Cognitive Theory ................................................ 9
Beck’s Cognitive Theory Adapted for Late Life ................ 11
Differential Activation Hypothesis ................................. 11
Diathesis-Stress Model .............................................. 12
The Effects of Depression on Attention .......................... 13
CHAPTER SIX – RESULTS ...................................................................................... 63
Overview of the Data Analysis ..................................................................................... 63
Statistical Analysis ........................................................................................................... 63
Reported Results ............................................................................................................ 63
Median Split ................................................................................................................... 64
Eye Tracking Stage ......................................................................................................... 65
Rating Stage ................................................................................................................... 65
Eye Tracking Data ............................................................................................................ 66
Percentage of Total Time ................................................................................................. 67
Planned Analysis ............................................................................................................. 67
Total Time Spent Looking at Sad Images ....................................................................... 67
Total Time Spent Looking at Happy Images ................................................................... 68
Summary of Results for the Percentage of Total Time ................................................... 69
Fixation Frequency .......................................................................................................... 70
Planned Analysis ............................................................................................................. 70
Fixation Frequencies When Looking at Sad Images ...................................................... 71
Fixation Frequencies When Looking at Happy Images .................................................. 72
Summary of Results for Fixation Frequencies ................................................................ 73
Average Glance Duration ............................................................................................... 73
Planned Analysis ............................................................................................................. 74
Average Glance Durations When Looking at Sad Images ............................................. 74
Average Glance Durations When Looking at Happy Images ......................................... 76
Summary of Results for Average Glance Durations ...................................................... 76
Rating Data .................................................................................................................... 77
Mood Rating ................................................................................................................... 77
Planned Analysis ............................................................................................................ 78
Mood Rating for Sad Images ......................................................................................... 78
Mood Rating for Happy Images ...................................................................................... 79
Summary of Results for Mood Ratings .......................................................................... 79
Further Exploration ......................................................................................................... 80

CHAPTER SEVEN – DISCUSSION ....................................................................... 81
Synopsis of the Present Study’s Aims .......................................................................... 81
Findings from the Eye Tracking Stage .......................................................................... 81
Viewing of Sad Images .................................................................................................... 81
Viewing of Happy Images ............................................................................................... 85
Age-related Differences when Viewing Happy Images ............................................... 87
Findings from the Rating Stage ..................................................................................... 89
Rating of Sad Images ....................................................................................................... 89
Rating of Happy Images ................................................................................................. 90
LIST OF TABLES

CHAPTER FIVE
Table 5.1: Age (years) and Gender Across Experimental Groups and Stages .......46

CHAPTER SIX
Table 6.1: Means and Standard Deviations for CES-D Scores for Each Experimental Stage .................................................................65
Table 6.2: Means and Standard Deviations for Percentage of Total Time, Fixation Frequency, and Average Glance Duration ..........................................................66
Table 6.3: Independent $t$-tests for Percentage of Total Time for Happy Images ....69
Table 6.4: Independent $t$-tests for Fixation Frequencies for Sad Images ..............71
Table 6.5: Independent $t$-tests for Fixation Frequencies for Happy Images...........73
Table 6.6: Independent $t$-tests for Average Glance Durations for Sad Images .......75
Table 6.7: Means and Standard Deviations for Mood and Threat Ratings .............77
## LIST OF FIGURES

**CHAPTER TWO**  
**Figure 2.1:** Graphical Overview of Two Neural Visual Pathways .........................16

**CHAPTER FIVE**  
**Figure 5.1:** Example of an Experimental Slide Showing Four Image Types and Quadrant Placement .......................................................................................51  
**Figure 5.2:** Example of the Rating Stage Slide Presentation Including the Rating Scales ........................................................................................................................................51

**CHAPTER SIX**  
**Figure 6.1:** Mean Percentage of Total Time for Each Image Type ........................67  
**Figure 6.2:** Mean Percentage of Total Time for Sad Images by Age and Mood ....68  
**Figure 6.3:** Mean Percentage of Total Time for Happy Images by Age and Mood ..68  
**Figure 6.4:** Mean Fixation Frequency for Each Image Type .................................70  
**Figure 6.5:** Mean Fixation Frequencies for Sad Images by Age and Mood ........71  
**Figure 6.6:** Mean Fixation Frequencies for Happy Images by Age and Mood ..........72  
**Figure 6.7:** Mean Average Glance Duration for Each Image Type ........................74  
**Figure 6.8:** Mean Average Glance Duration for Sad Images by Age and Mood ....75  
**Figure 6.9:** Mean Average Glance Duration for Happy Images by Age and Mood .76  
**Figure 6.10:** Mean Mood Ratings for Each Image Type ........................................78  
**Figure 6.11:** Mean Mood Ratings for Sad Images by Age and Mood .....................79  
**Figure 6.12:** Mean Mood Ratings for Happy Images by Age and Mood .................79
GLOSSARY OF TERMS

Dysphoric and non-dysphoric
The terms ‘dysphoric’ and ‘non-dysphoric’, when applied to this study’s participants, are used as categorical identifiers only. These terms in no way suggest that participants met criteria for clinical depression. These terms merely reflect the groups of participants whose CES-D scores were either above or below the cut-off score at the time of testing.

Younger adults and older adults
These terms are applied for categorical simplicity. Typically, the term ‘younger adults’ refers to adults who are of working age, while ‘older adults’ refers to those of retirement age. When used in discussion of the present study’s participants, ‘younger adults’ refers to those participants aged between 19 and 39 years, while ‘older adults’ refers to those participants aged between 69 and 80 years.

Late-life depression and late-onset depression
Late-onset depression refers to the experience of depression with onset of symptoms occurring for the first time in late life (usually quantified as 60 years or older). This is distinctly different from late-life depression, which refers to the experience of depression by those aged 60 years or older, irrespective of previous depressive episodes that may have occurred in earlier adulthood, adolescence, or childhood.

Eye tracking
The term eye tracking is used in the current study to refer to use of an eye-gaze system to track how long and how often participants spent looking at images presented on a computer screen rather than to track eye movements or ascertain time spent inspecting individual elements within the images.

Sad images
The term ‘sad’ in relation to the experimental images is an umbrella term deemed to best engender a sense of sadness in the viewer, or the perception that the depicted scene displays sadness, sorrow, or mourning. These images could also be described as
‘negative’ in nature, though not in a fear-provoking manner (which would be the case for the threatening images).

Happy images
‘Happy’ images consist of those images considered to elicit a sense of joy, pleasure, or happiness in the viewer, or images that depict scenes of laughter, pleasant social interactions, and optimism. These images could also be described as ‘positive’ in nature.

Threatening images
‘Threatening’ images portray scenes that evoke a sense of threat or fear in the viewer, or that can typically be described as violent, aggressive, or frightening.

Neutral images
‘Neutral’ images are images considered to evoke little emotional response from the viewer, or images that depict items of little emotional regard.
## ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIM</td>
<td>Affect Infusion Model</td>
</tr>
<tr>
<td>ANOVA</td>
<td>Analysis of Variance</td>
</tr>
<tr>
<td>BDI</td>
<td>Beck’s Depression Inventory</td>
</tr>
<tr>
<td>CES-D</td>
<td>Centre for Epidemiologic Studies Depression Scale</td>
</tr>
<tr>
<td>DAH</td>
<td>Differential Activation Hypothesis</td>
</tr>
<tr>
<td>DASS-21</td>
<td>Depression Anxiety and Stress Scale – Short Form</td>
</tr>
<tr>
<td>DOAT</td>
<td>Deployment-of-attention Task</td>
</tr>
<tr>
<td>DSM-5</td>
<td>Diagnostic and Statistical Manual of Mental Disorders 5th Edition</td>
</tr>
<tr>
<td>HADS</td>
<td>Hospital Anxiety and Depression Scale</td>
</tr>
<tr>
<td>MoCA</td>
<td>Montreal Cognitive Assessment</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for the Social Sciences</td>
</tr>
<tr>
<td>SST</td>
<td>Socioemotional Selectivity Theory</td>
</tr>
</tbody>
</table>
PREFACE

Depression, aging, and eye tracking! One could ask why, or even how, this became a topic of interest. In reality, the coming of age of this topic was somewhat serendipitous. It started with a conversation between myself and Associate Professor John Podd, with whom I had previously worked (although on completely unrelated topics). I can’t recall the exact nature of the conversation other than there was some mention of the School of Psychology’s recent acquisition of an eye tracking device, which John was keen to put to good use. As John has a keen interest in research pertaining to older adults and the effects of aging, and I had developed a curiosity in psychogeriatrics from an undergraduate paper I had completed a few years earlier, it seemed pertinent to include aging in our investigation. But aging, eye tracking, and what? A few psychological conditions were considered and quickly dismissed for logistical and ethical reasons. The idea of depression was raised, for which John was none too keen! He was already researching older adults and depression, and finding the recruitment of older depressed adults to be a difficult task. But I persevered and (extremely naively) put to John that I would be able to do the impossible and recruit the required number of clinically depressed participants. It is at this point that I can say, he was right; I was wrong. But I cannot state that I regret not listening. While I may not have recruited the necessary depressed participants, I believe I learned a great deal about depression and aging, which I will firmly carry with me into my clinical practice. But there was another reason for which I was so insistent about investigating depression in older adults. A very personal reason…

I have some very good friends whose father sadly committed suicide in late life. It was an event that left them, among other things, with a number of unanswered questions and an incessant need to understand why he did what he did. This is often the case with suicide – it simply does not make sense to those left behind. I remember a conversation I had whereby my friend said, “I just want to know why he did it”. I had no answer; I did not know. I could not provide my friend with some, albeit momentary, reprieve from his pain. Suicide is a permanent solution to a temporary problem. It is difficult to understand for those of us who have no inkling to engage in this kind of behaviour, who see the future looking that much brighter. But I wanted to
understand it better for myself so I could help people, like my friend, understand it too, even if this understanding was ever so slight.

It would seem sensible that suicide should then become the focus of any future research. But to me, researching suicide was a bit like putting an ambulance at the bottom of the cliff. If I wanted to understand why people suicided, I needed to understand the risk factors associated with suicide, none so great as depression. And that is what I did - depression, aging, and eye tracking. It took some twists and turns, but what follows is the product of several years work trying to understand the differences in how older and younger adults may experience depression. Of course, I do not think for a minute that this research holds the key to why people suicide. Nor does it help me respond to my friend’s desire to understand his father’s death any better. But, what I do know is researching depression has taught me that there are distinct differences in the way older and younger adults present with depression. The current ways of responding to these differences by medical and mental health practitioners may not be identifying the true extent of depression in this older cohort, which means many are going either undiagnosed or misdiagnosed. And with that, I truly believe that every piece of research conducted in the area of aging and depression adds value to our knowledge base, aiding us to understand, interpret, assess, diagnose, and treat depression in older adults in a manner that is beneficial to this cohort, and ultimately reducing the number of future suicides.

Remaining lost are the words I needed to find to help my friend understand his father’s death. But gained is the knowledge I now have that will aid me in helping others not reach such depths of depression as to find a similar fate. I still don’t know why people suicide, but I do have a greater understanding of what they experience leading up to that point. It is here that the ambulance is firmly planted at the top of the cliff, in a proactive position, where it needs to be. And in understanding what those experiences of depression are like, it is through the experiential looking glass of Andrew Solomon, reflecting on a tree in a forest that had become encapsulated by vine, that others may come to see the desperation, despair, and unrelenting torment experienced in clinical depression:

*My depression had grown on me as that vine had conquered the oak; it had been a sucking thing that had wrapped itself around me, ugly and more alive than I. It had had*
a life of its own that bit by bit asphyxiated all of my life out of me. At the worst stage of major depression, I had moods that I knew were not my moods: they belonged to the depression, as surely as the leaves on that tree’s high branches belonged to the vine. When I tried to think clearly about this, I felt that my mind was immured, that it couldn’t expand in any direction. I knew that the sun was rising and setting, but little of its light reached me. I felt myself sagging under what was much stronger than I…Its tendrils threatened to pulverize my mind and my courage and my stomach, and crack my bones and desiccate my body. It went on gluttoning itself on me when there seemed nothing left to feed it.

I was not strong enough to stop breathing. I knew then that I could never kill this vine of depression, and so all I wanted was for it to let me die. But it had taken from me the energy I would have needed to kill myself, and it would not kill me. If my trunk was rotting, this thing that fed on it was now too strong to let it fall; it had become an alternative support to what it had destroyed. In the tightest corner of my bed, split and racked by this thing no one else seemed to be able to see, I prayed to a God I had never entirely believed in, and I asked for deliverance…the very worst pain is the arid pain of total violation that comes after the tears are all used up, the pain that stops up every space through which you once metered the world, or the world, you. This is the presence of major depression (2001, pp. 18-19).