The Prognostic value of trait anger in treatment of methamphetamine dependence

Melissa R. Claire
BA(Psych)(Hons)

Thesis submitted for the fulfillment of the award of
Doctor of Philosophy

School of Medicine & Public Health

March 2012
Statement of Originality

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. I give consent to this copy of my thesis, when deposited in the University Library**, being made available for loan and photocopying subject to the provisions of the Copyright Act 1968.

**Unless an Embargo has been approved for a determined period.

Signed: __________________________________________

Melissa Claire

Date: __________________________________________
Acknowledgement of Authorship and Collaboration

I hereby certify that the work embodied in this thesis has been done in collaboration with other researchers and contains published papers/scholarly work of which I am a joint author. My contribution to the joint publications/scholarly work includes the acquisition of data, analysis and interpretation of data, drafting and revising manuscripts for publication as per listed below.

Publications arising from the clinical trial


These publications are presented separately as Appendices.

Signed: ____________________________________________

Melissa Claire

Date: ____________________________________________
Acknowledgements

First and foremost I would like to acknowledge and thank my PhD supervisors
Associate Professor Kypros Kypri and Professor Catherine D’Este for their constant
support, their expertise and their invaluable guidance. It was a privilege to have been
supervised by them and I can not thank them enough for their kindness and
consideration through what became a very difficult journey.

I would also like to extend my gratitude to Professor Michael Hensley who provided a
much needed sense of humanity at a critical point in this journey.

My thanks also to Terry Lewin for his encouragement and assistance during the early
stages of this thesis, to Dr Sylvie Lambert and Dr Patrick McElduff for their valuable
comments during the final stages of this research.

This thesis would not have been possible without the patients who volunteered their
time and who willingly shared their experiences in the hope of further understanding
methamphetamine addiction, anger, aggression and violence.

A special thank you also to Dr Anthony Schwarzer for his medical expertise and care,
enabling me to keep working on my thesis.

I wish to thank my parents for their unrelenting support, encouragement and countless
hours of child-care. Thank you to family and friends who have also offered their time
and kindness throughout this time. Finally, to my beautiful son Jack, you are precious
beyond belief and there are no words to describe the joy that you have given me.
Dedication

This thesis is dedicated to my beautiful son Jack.

This thesis traversed several unexpected pathways that inevitably made the journey longer than expected and at times quite arduous. However, at a critical point in this journey my son, in utero, and I survived and that is truly a miracle.

“Take the first step in faith. You don't have to see the whole staircase, just take the first step”. Martin Luther King, Jr.
Table of Contents

CHAPTER 1  METHAMPHETAMINE FORMS, PATTERNS OF USE AND DEPENDENCE .......... 1
1.1  TERMINOLOGY .......................................................................................... 1
1.2  FORMS OF METHAMPHETAMINE..................................................................... 1
1.3  PATTERNS OF USE ...................................................................................... 2
1.4  DEPENDENCE AND WITHDRAWAL .................................................................. 7
1.5  PREVALENCE ............................................................................................. 9
   1.5.1  A BRIEF HISTORY OF GLOBAL TRENDS ...................................................... 9
   1.5.2  RECENT GLOBAL TRENDS ........................................................................ 11
   1.5.3  PREVALENCE OF METHAMPHETAMINE USE IN AUSTRALIA ................. 12
1.6  RISK FACTORS ......................................................................................... 15
1.7  SUMMARY ............................................................................................... 19

CHAPTER 2  ANGER AND AGGRESSION ......................................................... 21
2.1  DEFINITIONS .......................................................................................... 21
   2.1.1  ANGER ...................................................................................................... 21
   2.1.2  HOSTILITY ................................................................................................. 21
   2.1.3  AGGRESSION ............................................................................................... 22
   2.1.4  VIOLENCE .................................................................................................. 22
   2.1.5  PATHWAYS FROM ANGER TO AGGRESSION AND VIOLENCE ...................... 23
2.2  ANGER, AGGRESSION AND SUBSTANCE USE ............................................. 23
   2.2.1  DEVELOPMENTAL FACTORS ....................................................................... 27
2.3  CRIMINAL BEHAVIOUR ............................................................................... 28
2.4  CO-MORBIDITY .......................................................................................... 29
2.5  METHAMPHETAMINE USE, ANGER AND AGGRESSION ............................... 32
2.6  CONCLUSION .......................................................................................... 35
CHAPTER 3 AN ASSESSMENT OF THE PSYCHOMETRIC PROPERTIES OF THE STAXI-2

3.1 THE MEASUREMENT OF ANGER

3.2 SCALE VALIDITY

3.2.1 CONTENT VALIDITY

3.2.2 FACE VALIDITY

3.2.3 CRITERION VALIDITY

3.3 FACTOR ANALYSIS

3.3.1 THE COMMON FACTOR MODEL

3.3.2 EXPLORATORY FACTOR ANALYSIS

3.3.3 CONFIRMATORY FACTOR ANALYSIS

3.3.4 FACTOR ANALYSIS AND CONSTRUCT VALIDITY

3.3.5 FACTOR EXTRACTION

3.3.6 FACTOR ROTATION

3.3.7 SIMPLE FACTOR STRUCTURE

3.3.8 ITEM LOADINGS AND FACTORS

3.3.9 DESCRIBING FACTORS

3.4 SCALE RELIABILITY

3.4.1 THE VALIDITY AND RELIABILITY OF ANGER MEASURES

3.5 DEVELOPMENT OF THE STAXI

3.5.1 STAXI SCALES AND SUBSCALES

3.5.2 RELIABILITY AND VALIDITY OF THE STAXI

3.6 THE STAXI-2

3.6.1 THE STAXI-2 SCALES AND SUBSCALES

3.6.2 VALIDITY AND RELIABILITY OF THE STAXI-2

3.6.3 STUDIES THAT HAVE EXAMINED THE VALIDITY AND RELIABILITY OF THE STAXI-2
3.7 STUDY AIMS .............................................................................................................. 76

3.8 METHOD .................................................................................................................. 77

3.8.1 DEVELOPMENT OF THE STUDY .......................................................................... 77

3.8.2 RECRUITMENT ..................................................................................................... 77

3.8.3 CRITERIA FOR INCLUSION AND EXCLUSION ....................................................... 77

3.8.4 PROCEDURE ......................................................................................................... 78

3.8.5 INTERVIEW SCHEDULE .................................................................................... 78

3.9 STATISTICAL METHODS ......................................................................................... 79

3.9.1 DESCRIPTION OF THE SAMPLE ........................................................................... 79

3.9.2 EXPLORATORY DATA ANALYSIS ......................................................................... 79

3.9.3 CONSTRUCT VALIDITY ....................................................................................... 81

3.9.4 FACTOR ANALYSIS ............................................................................................ 82

3.10 RESULTS .................................................................................................................. 87

3.10.1 THE SAMPLE ....................................................................................................... 87

3.10.2 ASSESSMENT OF NORMALITY ........................................................................... 87

3.10.3 SAMPLING ADEQUACY .................................................................................... 88

3.10.4 CONSTRUCT VALIDITY ...................................................................................... 88

3.10.5 PRINCIPAL AXIS FACTORING OF SIX SELECTED FACTORS WITH AND WITHOUT OBLIQUE ROTATION ............................................................................................................. 92

3.10.6 RELIABILITY ANALYSIS .................................................................................... 99

3.11 DISCUSSION ............................................................................................................ 102

3.11.1 ASSESSMENT OF DISTRIBUTION OF ITEMS ..................................................... 102

3.11.2 CONSTRUCT VALIDITY ..................................................................................... 104

3.11.3 RELIABILITY ..................................................................................................... 116

3.11.4 STRENGTHS AND LIMITATIONS OF THE STUDY ............................................. 117

3.12 CONCLUSION .......................................................................................................... 118
CHAPTER 4 TRAIT ANGER AS A PROGNOSTIC INDICATOR FOR METHAMPHETAMINE TREATMENT OUTCOME

4.1 INTRODUCTION

4.2 METHODS

4.2.1 STUDY DESIGN

4.2.2 RECRUITMENT

4.2.3 PATIENTS

4.2.4 PROCEDURE

4.2.5 DATA COLLECTION SETTINGS AND LOCATIONS

4.2.6 MEASURES

4.2.7 RANDOMISATION

4.2.8 THE INTERVENTION

4.3 STATISTICAL METHODS

4.3.1 PARTICIPANT RECRUITMENT AND FOLLOW-UP

4.3.2 TREATMENT OUTCOME

4.3.3 TRAIT ANGER AS AN EFFECT MODIFIER FOR TREATMENT OUTCOME

4.3.4 SAMPLE SIZE/POWER

4.3.5 ETHICAL APPROVAL

4.4 RESULTS

4.4.1 PARTICIPANT FLOW

4.4.2 COMPARISONS OF THOSE WHO DID AND DID NOT COMPLETE THE STAXI-2 AT BASELINE (153 VS. 61) AND BASELINE CHARACTERISTICS OF THE ANGER STUDY PATIENTS

4.4.3 CHARACTERISTICS OF THE SAMPLE BASED ON TREATMENT STATUS

4.4.4 COMPARISONS OF THOSE WHO COMPLETED BOTH THE STAXI-2 AT BASELINE AND THE FOLLOW-UP ASSESSMENT (N=111) WITH THOSE WHO DID NOT (N=42)

4.4.5 TREATMENT OUTCOME AND TREATMENT GROUP
4.4.6 Baseline Trait Anger and Treatment Outcome ........................................... 146

4.5 Discussion ...................................................................................................... 162
  4.5.1 Summary of Findings ........................................................................... 162
  4.5.2 Epistemological Framework ................................................................. 165
  4.5.3 Measurement .......................................................................................... 165
  4.5.4 Trait Anger and Treatment for Addiction ............................................... 167

Chapter 5 Conclusion ......................................................................................... 170

References ......................................................................................................... 177

Glossary ............................................................................................................ 204
Table of Tables

Table 1.1 Methamphetamine use, persons aged 14 years or older by age and sex, 2007 (AIHW, 2008, p.64) ...................................................................................................................... 13

Table 1.2. Frequency of methamphetamine use, recent users aged 14 years or older, by age, by sex, 2007 (percent) (AIHW, 2008, p64) ........................................................................ 13

Table 1.3. Form of methamphetamine used, recent users aged 14 years or older, by sex, 2007 (percent) (AIHW, 2008, p.65) ...................................................................................................................... 14

Table 3.1 Measures of validity .................................................................................................. 41

Table 3.2 Measures of reliability ............................................................................................ 58

Table 3.3 Description of the STAXI (1988) scales and subscales .......................................... 63

Table 3.4 Description of the STAXI (1988) and STAXI-2 (1999) state anger scales .......... 71

Table 3.5 Description of the STAXI (1988) and STAXI-2 (1999) trait anger scales .......... 72

Table 3.6 Description of STAXI (1988) and STAXI-2 (1999) anger expression scales .......... 73

Table 3.7 Description of the STAXI (1988) and STAXI-2 (1999) anger control scales .......... 74

Table 3.8 Patients' referral source and recruitment rates by location .................................. 87

Table 3.9 Principal Axis Factoring initial solution of STAXI-2 item scores ......................... 89

Table 3.10 Principal Axis Factoring initial solution of nine factors item loadings ............... 90

Table 3.11 Total variance explained from PAF initial solution before and after rotation .... 90

Table 3.12 Initial solution factor correlation matrix extraction of nine factors with oblique rotation ....................................................................................................................................... 91

Table 3.13 Structure matrix correlations for each factor after oblique rotation ................... 92

Table 3.14 Total variance explained by PAF extraction of six factors with oblique rotation .................................................................................................................................................... 93

Table 3.15 Factor correlation matrix extraction of six factors with oblique rotation ........... 94

Table 3.16 Factor loadings for the PAF six factor extraction with oblique rotation .......... 95

Table 3.17 Reliability analysis of the PAF six factor extraction oblique rotation by varimax .................................................................................................................................. 100

Table 3.18 Reliability analysis of STAXI-2 scales and subscales ........................................ 101
Table 4.1 Assessment instruments included in the Anger Study ........................................... 124
Table 4.2 Description of variables selected for the general linear models ......................... 136
Table 4.3 Comparisons between patients who completed the STAX-2 at baseline and those who did not (n=214) ................................................................................................................. 141
Table 4.4 Comparisons of patients who completed baseline STAXI-2 by treatment group (n=153) ...................................................................................................................................... 144
Table 4.5 Description of patients by completion of follow-up assessment ....................... 145
Table 4.6 Comparisons between percent abstinent and changes in methamphetamine use by treatment group for patients who completed baseline STAXI-2 and follow-up (n=111) 146
Table 4.7 Comparisons between high trait anger at baseline and methamphetamine abstinence among patients who completed the STAXI-2 at baseline and follow-up (n=111) .................................................................................................................................................. 147
Table 4.8 Comparison of baseline trait anger, methamphetamine abstinence and change in methamphetamine use, among patients who completed the STAXI-2 at baseline and follow-up................................................................................................................................... 148
Table 4.9 Parameter estimates for Model 1* variables in the equation predicting methamphetamine change scores ................................................................................................................................. 149
Table 4.10 Parameter estimates for Model 2* variables in the equation predicting methamphetamine change scores ........................................................................................................................................... 154
Table 4.11 Model 3* variables in the equation predicting methamphetamine abstinence 158
Table 4.12 Model 4* variables in the equation predicting methamphetamine abstinence 160
### Table of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Volavka’s Intergenerational Transmission Model of Violence</td>
<td>25</td>
</tr>
<tr>
<td>4.1</td>
<td>Patient flow diagram: recruitment and attrition</td>
<td>139</td>
</tr>
<tr>
<td>4.2</td>
<td>Line of best fit for Model 1 variables in the equation predicting methamphetamine change scores</td>
<td>151</td>
</tr>
<tr>
<td>4.3</td>
<td>Histogram of residual values for Model 1</td>
<td>152</td>
</tr>
<tr>
<td>4.4</td>
<td>Normal quantile-quantile plot of residual values from Model 1</td>
<td>152</td>
</tr>
<tr>
<td>4.5</td>
<td>Scatterplot of Model 1 standardised residuals against predicted values</td>
<td>153</td>
</tr>
<tr>
<td>4.6</td>
<td>Graph of Model 2 variables in the equation predicting methamphetamine change scores</td>
<td>155</td>
</tr>
</tbody>
</table>
Table of Appendices

**APPENDIX 1 Diagnostic Criteria for Amphetamine Withdrawal** ....................... 212

**APPENDIX 2 Spielberger’s (1999) Factor Loadings Eight-Factor Solution**

- Normal Adults Ages 16 Years and Older By Gender STAXI-2 57 Items .............................................................. 213

**APPENDIX 3 Spielberger STAXI-2 Cronbach Alpha Coefficients** ............... 216

**APPENDIX 4 Information Flyer** ................................................................. 218

**APPENDIX 5 Initial Screening Instrument** ................................................... 219

**APPENDIX 6 Written Consent** ................................................................. 221

**APPENDIX 7 Frequency Distributions of Scores to Each STAXI-2 Scale and Subscale** ........................................................................................................ 222

**APPENDIX 8 Histograms of Baseline Responses to the 57 Items of the STAXI-2** .......................................................... 234

**APPENDIX 9 Sampling Adequacy: KMO Index and Bartlett’s Test of Sphericity** ........................................................................................................ 235

**APPENDIX 10 Construct Validity: Cattell’s Scree Test from the PAF Initial Solution of Nine Factors Without Rotation** ................. 236

**APPENDIX 11 Item Communalities: PAF Initial Solution of Nine Factors Without Rotation** .......................................................... 237

**APPENDIX 12 Total Variance Explained: PAF Initial Solution of Nine Factors Without Rotation** .......................................................... 238
APPENDIX 13 FACTOR MATRIX OF PAF INITIAL SOLUTION OF NINE FACTORS WITHOUT ROTATION .................................................................239

APPENDIX 14 CONSTRUCT VALIDITY: PAF INITIAL SOLUTION OF NINE FACTORS WITH PROMAX OBLIQUE ROTATION .................................................................240

APPENDIX 15 FACTOR CORRELATION MATRIX: PAF INITIAL SOLUTION OF NINE FACTORS WITH PROMAX OBLIQUE ROTATION .................................................................241

APPENDIX 16 STRUCTURE MATRIX: PAF INITIAL SOLUTION OF NINE FACTORS PROMAX OBLIQUE ROTATION .................................................................242

APPENDIX 17 PATTERN MATRIX: PAF INITIAL SOLUTION OF NINE FACTORS PROMAX OBLIQUE ROTATION .................................................................243

APPENDIX 18 CONSTRUCT VALIDITY: CATTELL’S SCREE TEST PAF OF SIX FACTOR EXTRACTION WITHOUT ROTATION .................................................................244

APPENDIX 19 KAISER-MEYER-OLKIN MEASURE OF SAMPLING ADEQUACY AND BARTLETT’S TEST OF SPHERICITY: PAF OF SIX FACTOR EXTRACTION WITHOUT ROTATION .................................................................245

APPENDIX 20 ITEM COMMUNALITIES: PAF SIX FACTOR EXTRACTION WITHOUT ROTATION .................................................................246

APPENDIX 21 TOTAL VARIANCE EXPLAINED: PAF SIX FACTOR EXTRACTION WITHOUT ROTATION .................................................................247

APPENDIX 22 FACTOR MATRIX: PAF SIX FACTOR EXTRACTION WITHOUT ROTATION .................................................................248

APPENDIX 23 CONSTRUCT VALIDITY: TOTAL VARIANCE EXPLAINED FROM PAF SIX FACTOR EXTRACTION WITHOUT ROTATION .................................................................249
APPENDIX 24 Factor Correlation Matrix: PAF Six Factor Extraction with Oblique Rotation .......................................................... 250

APPENDIX 25 Structure Matrix: PAF Six Factor Extraction with Oblique Rotation ........................................................................... 251

APPENDIX 26 Pattern Matrix: PAF Six Factor Extraction with Oblique Rotation ................................................................................. 252

APPENDIX 27 Reliability Analysis Using the PAF Six Factor Extraction with Oblique Rotation ................................................................. 253

APPENDIX 28 Reliability Analysis Using Spielberger’s (1999) STAXI-2 Structure .................................................................................. 256

APPENDIX 29 Reliability Analysis of the 57 Items from the STAXI-2 .................................................................................................. 259


APPENDIX 33 Model 1. Variables in the Equation Predicting Methamphetamine Change Scores: Baseline Trait Anger, Treatment Group Status, Interaction Term .................................................................................................................. 264

APPENDIX 34 Model 1 Variables in the Equation Predicting Methamphetamine Change Scores: Baseline Trait Anger, Treatment Group Status, Non Interaction Term .................................................................................................................. 266
APPENDIX 35 Model 2 Variables in the equation predicting methamphetamine change scores: baseline high trait anger, treatment group status, interaction term .......................................................... 267

APPENDIX 36 Model 2 Variables in the equation predicting methamphetamine change scores: baseline high trait anger, treatment group status, non interaction term ................................................... 269

APPENDIX 37 Model 3 Final Step(12) Variables in the equation predicting methamphetamine abstinence: baseline trait anger, treatment group status, interaction term ............................................... 270

APPENDIX 38 Model 3 Final Step(12) Variables in the equation predicting methamphetamine abstinence: baseline trait anger, treatment group status, non interaction term ......................................... 273

APPENDIX 39 Model 4 Final Step(12) Variables in the equation predicting methamphetamine abstinence: baseline high trait anger, treatment group status, interaction term ............................... 275

APPENDIX 40 Model 4 Final Step(12) Variables in the equation predicting methamphetamine abstinence: baseline high trait anger, treatment group status, non interaction term ........................ 278
Abstract
Methamphetamine is a potent stimulant with high abuse potential and is the second most widely used illicit drug in the world, after cannabis. The prevalence of methamphetamine use in Australia is among the highest in the world with an estimated 1.1 million people (6% of those aged 14 years and over) reporting lifetime use. Nearly all users of methamphetamine experience withdrawal and aggression is a common sequela. Methamphetamine use is a risk factor for a wide range of negative consequences including physical, neurological and psychiatric illness, property crime and violence. The relationship between methamphetamine use, anger and violence is complex and moderated by a range of individual, social and environmental factors. Treatment for methamphetamine use may be hindered by a propensity for anger in patients. This study utilises data from a randomised controlled trial of cognitive behaviour therapy for methamphetamine users to: (1) assess the reliability and validity of a measure of anger (the STAXI-2) in an Australian clinical sample of methamphetamine users; and (2) test the hypothesis that trait anger is prognostic of methamphetamine treatment outcome. A high level of internal consistency and factor analysis established the reliability and validity of the scale in this population group. A series of multivariate statistical models was developed to test whether trait anger upon entry to treatment is prognostic of treatment outcome. Contrary to the hypothesis, patients high in trait anger at baseline did no worse in treatment than patients with low trait anger; that is, trait anger did not modify the effect of treatment. These findings show that the STAXI-2 is a valid measure of anger in this population group and that high levels of trait anger should not be considered a barrier to the delivery of effective treatment to patients with methamphetamine use disorders.