

University of Groningen

## Emotion, self and psychopathology

Zhang, Liwen

**IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.**

### *Document Version*

Publisher's PDF, also known as Version of record

### *Publication date:*

2016

[Link to publication in University of Groningen/UMCG research database](#)

### *Citation for published version (APA):*

Zhang, L. (2016). *Emotion, self and psychopathology: Neural correlates of emotion regulation and self-reflection in mood disorders and schizophrenia*. [Thesis fully internal (DIV), University of Groningen]. University of Groningen.

### **Copyright**

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

### **Take-down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

*Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.*

# **EMOTION, SELF AND PSYCHOPATHOLOGY**

Neural correlates of emotion regulation and self-reflection  
in mood disorders and schizophrenia

Liwen Zhang

**Cover design:** Liwen Zhang

**Lay-out:** Ridderprint BV, the Netherlands

**Printing:** Ridderprint BV, the Netherlands

**Paranymphs:**

Leonie Bais

Nicky Klaasen

Publication of this thesis was financially supported by the University of Groningen, University Medical Center Groningen and the Research School of Behavioral and Cognitive Neurosciences.



university of  
 groningen



umcg



**ISBN:** 978-94-6299-408-9 (printed version)

**ISBN:** 978-94-6299-409-6 (digital version)

Copyright © 2016 Liwen Zhang

All rights reserved, no part of this publication may be reproduced or transmitted in any form or by any means without permission of the author.



university of  
 groningen

# Emotion, self and psychopathology

Neural correlates of emotion regulation and self-reflection in mood disorders and schizophrenia

## PhD thesis

to obtain the degree of PhD at the  
 University of Groningen  
 on the authority of the  
 Rector Magnificus Prof. E. Sterken  
 and in accordance with  
 the decision by the College of Deans.

This thesis will be defended in public on

Monday 26 September 2016 at 14.30 hours

by

**Liwen Zhang**

born on 17 March 1988  
 in Chongqing, China

**Supervisor**

Prof. A. Aleman

**Co-supervisors**

Dr. E.M. Opmeer

Dr. H.G. Ruhé

**Assessment Committee**

Prof. G. Northoff

Prof. W.A. Nolen

Prof. O.M. Tucha

## Contents

<b>Chapter 1</b>	General introduction	7
<b>Part I</b>	Emotion regulation	21
<b>Chapter 2</b>	Distinct temporal dynamics of brain activation in bipolar disorder and schizophrenia during emotion regulation	23
<b>Chapter 3</b>	Altered frontal-amygdala effective connectivity during effortful emotion regulation in bipolar disorder	45
<b>Chapter 4</b>	Structural brain correlates associated with suicidal risk in major depressive disorder: A voxel-based morphometry study	71
<b>Part II</b>	Self-reflection	87
<b>Chapter 5</b>	Brain activation during self- and other-reflection in bipolar disorder with a history of psychosis: comparison to schizophrenia	89
<b>Chapter 6</b>	Altered functional connectivity during self- and close other-reflection in patients with bipolar disorder with past psychosis and patients with schizophrenia	115
<b>Chapter 7</b>	General discussion	141
<b>Appendices</b>	Reference list	158
	Samenvatting (Dutch summary)	177
	English summary	185
	Curriculum vitae	192
	Publication list	193
	About the cover	194
	Acknowledgments	195

