The role of sleep in ethnic inequalities in health: Cardiovascular disease and risk factors
Anujuo, K.O.

Citation for published version (APA):
Anujuo, K. O. (2018). The role of sleep in ethnic inequalities in health: Cardiovascular disease and risk factors

General rights
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), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: http://uba.uva.nl/en/contact, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.
INVITATION

You are cordially invited to attend the public defense of the doctoral thesis of KENNETH OKWUDILI ANUJUO titled THE ROLE OF SLEEP IN ETHNIC INEQUALITIES IN HEALTH: CARDIOVASCULAR DISEASE AND RISK FACTORS on Friday, September 21, 2018 at 12:00 in the Agnietenkapel, Oudezijds Voorburgwal 229-231, Amsterdam. Reception follows immediately after the defense in the reception area of the Agnietenkapel.

PARANYMPHS:
Ikenna Ebuenyi
i.d.ebuenyi@vu.nl
Ben Nieuwenhuizen
b.p.vannieuwenhuizen@amc.uva.nl

THE ROLE OF SLEEP IN ETHNIC INEQUALITIES IN HEALTH:
cardiovascular disease and risk factors

Kenneth Okwudili Anujuo
THE ROLE OF SLEEP IN ETHNIC INEQUALITIES IN HEALTH: CARDIOVASCULAR DISEASE AND RISK FACTORS

Kenneth Okwudili Anjuo
The role of sleep in ethnic inequalities in health: Cardiovascular disease and risk factors.

PhD thesis Academic Medical Center – University of Amsterdam.


© Kenneth O Anujuo

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the author or the copyright-owning journalists for published chapters.

Layout by Lize Jansen

Printing: Ridderprint BV, www.ridderprint.nl

The studies presented in this thesis were conducted at the Department of Public Health, Academic Medical Center, University of Amsterdam, the Netherlands. The research was mainly from the HELIUS study and partly from the ABCD study. The HELIUS study was funded by Academic Medical Center, Amsterdam, the Public Health Service of Amsterdam, the Dutch Heart Foundation (grant number: 2010T084), the Netherlands Organization for Health Research and Development (ZonMw) (grant number: 200500003), and the European Fund for the Integration of non-EU immigrants (EIF) (grant number: 2013EIF013). The ABCD study was funded by the Netherlands Organization for Health Research and Development (ZonMw) (TOP grant: 40-00812-98-11010).
THE ROLE OF SLEEP IN ETHNIC INEQUALITIES IN HEALTH:
CARDIOVASCULAR DISEASE AND RISK FACTORS

ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad van doctor

aan de Universiteit van Amsterdam

op gezag van de Rector Magnificus

prof. dr. ir. K.I.J. Maex

ten overstaan van een door het College voor Promoties ingestelde commissie,
in het openbaar te verdedigen in de Agnietenkapel

op vrijdag 21 september 2018, te 12:00 uur

door

Kenneth Okwudili Anujuo

geboren te Okohia, Nigeria
PROMOTIECOMMISSIE:

Promotor(es): Prof.dr. K. Stronks AMC – UvA
Copromotor(es): Dr. C.O. Agyemang AMC – UvA
Overige leden: Prof.dr. A.K. Groen AMC – UvA
Prof.dr. B.J.C. Middelkoop Universiteit Leiden
Prof.dr. S.A. Reijneveld Rijksuniversiteit Groningen
Dr. E.J. de Bruin Universiteit van Amsterdam
Dr. I.G.M. van Valkengoed AMC – UvA

Faculteit der Geneeskunde
In loving memory of my late parents: Simeon and Louisa Anujuo
## CONTENTS

**Chapter 1**  General introduction  9

**Chapter 2**  Ethnic differences in self-reported sleep duration in the Netherlands – the HELIUS study  27

**Chapter 3**  Ethnic differences in sleep duration at 5 years, and its Relationship with overweight and blood pressure  53

**Chapter 4**  Relationship between short sleep duration and Cardiovascular risk factors in a multi-ethnic cohort – the HELIUS study  73

**Chapter 5**  Relationship between sleep duration and arterial stiffness in a multi-ethnic population: the HELIUS study  99

**Chapter 6**  Contribution of short sleep duration to ethnic Differences in cardiovascular disease: results from a Cohort study in the Netherlands  123

**Chapter 7**  Association between depressed mood and sleep duration Among various ethnic groups – the HELIUS study  147

**Chapter 8**  General discussion  165

**Summary**  185

**Samenvatting**  191

**Acknowledgements**  197

**About the author**  201

**Lists of publications**  205

**Portfolio**  209