Acknowledgments

I am deeply grateful to everyone who has taught, mentored, helped, and supported me over the last 4+ years.

I thank my academic advisor, Ciprian Crainiceanu. I thank you for all your advising, both related to my degree, but also job decisions and life generally. Your advice on all my projects has been essential. Thank you for advocating for me on every occasion, for supporting me to work at things that most interest me, and for your dedication. I look forward to applying what you have taught me in my next position and beyond.

I thank my academic co-advisor, Jacek Urbanek. Thank you for your wide scope of advice, your expertise, your pushing me to be curious. I appreciate the insane amount of time and effort you have put to help me grow as a researcher.

I thank my Thesis Committee Primary Readers: Vadim Zipunnikov and Jennifer Schrack, and Alternates: Jiawei Bai and Adam Spira, for serving on my thesis committee and their advice during my time at Hopkins.

I thank my friends and colleagues from two working groups I have been a part of: Wearable and Implantable Technology (WIT) group members, including: Andrew Leroux, Erjia Cui, Jiawei Bai, John Muschelli, Junrui Di, Lacey Etzkorn, and ENGAGE group members, including: Amal Wanigatunga, Fangyu Liu, Francesca Marino, Nikki Shen, Perry Kuo. Thank you for contributing to the meetings and letting me learn from you. Both groups meetings have been the highlights of my every week and something I was truly looking forward to.

I am grateful to many fellow students, including: Albert Kuo, Athena Chen, Debangan Dey, Elizabeth Sarker, Haley Grant, Ji Soo Kim, Lauren Lan, Linda Gai, Lucy Qiao, Trang Nguyen, and Yuji Chen. Thank you for your fellowship, and for your help while studying together. I still remember some of the difficult problem sets, or quals preparations, that were tough for me to go through. On the other side, there are such fond memories now as they were walked through together.

I thank the Department of Biostatistics at Johns Hopkins University, including: Debra Moffitt, Fallon Bachman, Karen Bandeen-Roche, Maria Beeson, Mark Miller, Marti Gilbert, Mary Joy Argo, and Patty Hubbard. Thank you for your continuous hard work and for making sure that obstacles are being removed from our ways as much as possible.

I am grateful to all my class teachers and teaching assistants for their hard work and dedication. I have experienced the best-in-class teaching and TA assistantship. Thank you for teaching me work ethics by your example, too.

I thank my summer industry advisors, Ieuan Clay and Jonas Dorn, for giving me their time, sharing their expertise, and literally proving how satisfying an industry career can be. Your advice on my internship project papers was essential. I thank my Master's thesis advisor, Malgorzata Bogdan, for giving an example of how empowering it is to have such an incredibly smart and helpful advisor.

I thank my first research advisor in the USA, Jaroslaw Harezlak, for his research guidance, and first guidance with literally everything related to academia in the USA. His advice, his help, and his jokes have been invaluable.

I thank my friend, Maria Kudela, who I met when I first came to the USA 6 years ago and from whom I learned so very much. Maria is like a sister to me and I truly owe to her being able to ever navigate through PhD applications and so many other things onwards.

While my parents are not in the USA, there is a family of mine here who made this place feel like home: Anna Rykojc, Stanislaw Rykojc, Michelle Rykojc, and Mark Rykojc. Thank you for caring and supporting me above and beyond. You are the very best.

I thank my partner, Osman Veledar, and his family, including Neda Veledar and Sead Veledar, for their support. It means so much to have you and to walk this path with you next to me.

There are people I met in Baltimore who left their footprints in my life. I thank my friends, Haroldo Rodriguez, Lacey Etzkorn, Magdalena Urbanek, Michael Mengyang Gu, Paulina Banas, Paulina Chalan, and Zohaib Akhtar. I thank you for your support, for your time, for working out together, for partying, and long hours of conversations we had. These are never to be forgotten.

I thank my sister Anna Karas, the younger, smarter, and wiser of the two

of us (and those who know both of us know I really mean it). Thank you for being my most trusted source of life advice.

I thank my friends in Poland, including: Agnieszka Rackiewicz, Andzelika Pajchert-Kozlowska, Cezary Dynak, Katarzyna Perska, Malgorzata Swiatkowska, Marta Herman, Marta Koruba, Michal Kielbowicz, Olga Graca-Pazura, and Olga Golacinska. I appreciate your friendship, your time, your advice, and how unique and wholesome are the connections we have. Each of you has contributed to who I am and who I am becoming, and I really thank you for that. Special thanks to Olga Golacinska who has visited me in Baltimore, and who has been my friend since I was 5 years old.

Last but actually first and foremost, I thank my parents, Malgorzata Karas and Dariusz Karas. I was born in Poland when my parents were very young and resources were limited. Since I remember, my parents have been so strongly committed to providing me and my sister the best education they could. They put more effort than I could ever ask for to raise us into happy people. I am eternally grateful for their love, support, patience, and understanding. I consider it the greatest luck and life asset to have them as my parents.

I dedicate my humble effort of working on this thesis to my parents.

I am so very lucky.

Dedication

This dissertation is dedicated to my parents, Malgorzata Karas and Dariusz Karas. I cherish the thought it is fulfilling your dreams and lifelong efforts to provide me with good education.