Anna Kahkoska, MD, PhD

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EDUCATION

2021 **MD**
University of North Carolina at Chapel Hill

2019 **PhD, Nutrition**
Epidemiology Minor
University of North Carolina at Chapel Hill

2013 **BS, Biochemistry**
Anthropology Minor
Syracuse University
summa cum laude

PROFESSIONAL EXPERIENCE

2023 - present Editorial Board Member, *Diabetes Care*

2023 – present Assistant Director, Precision Health and AI Research Lab, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, Chapel Hill, NC

2022 – present Adjunct Assistant Professor, Division of Endocrinology & Metabolism, School of Medicine, University of North Carolina at Chapel Hill, Chapel Hill, NC

2022 – present Affiliate, University of North Carolina Center for Aging and Health

2021 – present Research Assistant Professor, Department of Nutrition, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, Chapel Hill, NC

2021 – present North Carolina Translational and Clinical Sciences Institute Gene Orringer Junior Faculty Career Development (TraCS KL2) Program Scholar

2020 – 2021 Innovating from Discovery to Delivery (iD2D) Program Trainee, One Brave Idea™

2021 – 2021 Mentored Clinical Scholar, University of North Carolina at Chapel Hill School of Medicine Program for Precision Medicine in Healthcare, University of North Carolina at Chapel Hill, Chapel Hill, NC

2013 – 2021 MD/PhD Candidate, University of North Carolina at Chapel Hill, University of North Carolina at Chapel Hill, Chapel Hill, NC

2017 Teaching Assistant, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, Chapel Hill, NC

2015 – 2019 Graduate Research Assistant, University of North Carolina at Chapel Hill, Chapel Hill, NC

2009 – 2013 Undergraduate Research Assistant, Syracuse University, Syracuse, NY

2012 Summer Undergraduate Research Program, Fred Hutchinson Cancer Research Center,

Seattle, WA

2011 Undergraduate Research Assistant, Trinity College, Dublin, Ireland

HONORS

2023 Gillings School Teaching Innovation Award

2022 American Diabetes Association Pathway to Stop Diabetes® Accelerator Award

2022 National Academy of Medicine Healthy Longevity Global Competition Catalyst Award

2022 Translational Science 2022 "Top 50" Poster

2021 PDM2021 Early Career Moderated Poster Presentation Finalist, American Diabetes Association and European Association for the Study of Diabetes Precision Diabetes Medicine Initiative

2021 Isaac Hall Manning Award, University of North Carolina at Chapel Hill School of Medicine

2021 Poster Award, National Institutes of Health Precision Nutrition: Research Gaps and Opportunities Workshop

2020 James Moses and Stella Frosst Alexander Scholarship, University of North Carolina at Chapel Hill School of Medicine

2020 Young Investigator Excellence in Precision Health, Precision Medicine Leaders' Summit

2020 Alpha Omega Alpha Honor Medical Society

2019 George A. Bray Doctoral Dissertation Award, The Obesity Society

2019 Carolyn E. Conway Endowed Philanthropic Educational Organization (P.E.O.) Scholar Award

2019 Philanthropic Educational Organization (P.E.O.) Scholar Award

2019 Dean's Distinguished Dissertation Award in Biological & Life Sciences, University of North Carolina at Chapel Hill

2019 Impact Award, University of North Carolina at Chapel Hill Graduate Education Advancement Board

2018 Clinical Emerging Leader Award, First Place, American Society for Nutrition

2018 The A. Hughes Bryan Doctoral Award, Department of Nutrition, University of North Carolina at Chapel Hill

2018 Albert Schweitzer Fellowship Sustainability Award

2017 Albert Schweitzer Fellowship

2016 Neil Scott Schwirck MD/PhD Fellowship, University of North Carolina at Chapel Hill

2013 Dean's List, Syracuse University

2013 Best Capstone Honors Thesis for Science and Engineering, Syracuse University

2013 Class Marshall, Syracuse University College of Arts and Sciences

2013 Syracuse University Scholar

2013 Award for Exceptional Performance in Biochemistry, Syracuse University

2012 Remembrance Scholar, Syracuse University

2012 Goldwater Scholarship Honorable Mention, Barry Goldwater Scholarship and Excellence in Education Foundation

2012 Wise-Marcus Scholar, Syracuse University Renée Crown University Honors Program

2011 George Wiley Award for Exceptional Performance in Organic Chemistry, Syracuse University

2010 iLEARN Scholar, Syracuse University

2010 Exceptional Performance in Honors Chemistry, Syracuse University

2010 Syracuse University Louise Wetherbee Phelps Writing Award

2009 Syracuse University Coronat Scholar

2009 Renée Crown University Honors Program, Syracuse University

BIBLIOGRAPHY

Books and Chapters

1. **Kahkoska A,** Dubal A, Weinstein J, Weinstock R. Special Issues in Old Age - Use of Technology (2024), In: Sinclair AJ, Abdelhafiz A, Manual of Diabetes Care for Older People, Wiley-Blackwell, Oxford, United Kingdom.
2. **Kahkoska AR**, Dabelea D. Diabetes in Youth: A Global Perspective. Endocrinol Metab Clin North Am. 2021 Sep;50(3):491-512. doi: 10.1016/j.ecl.2021.05.007. Epub 2021 Jul 13. Review. PubMed PMID: 34399958; PubMed Central PMCID: PMC8374087.
3. Riddell MC, Davis EA, Mayer-Davis EJ, **Kahkoska A**, Zaharieva DP. Advances in Exercise and Nutrition as Therapy in Diabetes. Diabetes Technol Ther. 2021 Jun;23(S2):S131-S142. doi: 10.1089/dia.2021.2509. PubMed PMID: 34061626; PubMed Central PMCID: PMC8336238.

Peer-Reviewed Publications (includes in press)

1. Cristello Sarteau A, Ercolino G, Muthukkumar R, Fruik A, Mayer-Davis EJ, **Kahkoska AR**. Nutrition and Dietary Interventions To Support Healthy Longevity in Type 1 Diabetes: A Call for More Evidence Towards Clinical Guidelines. Accepted March 14, 2024. Diabetes Care.
2. Weinstein JM, Busby-Whitehead J, Jonsson Funk M, Pratley RE, Weinstock RS, Young LA, **Kahkoska AR.** Receipt of Diabetes Management Services Among Older Adults with Type 1 and Type 2 Diabetes in the United States Based on Medicare Fee-for-Service Data, 2015 – 2019. Accepted April 28, 2024. Diabetes Care.
3. Sy S, Sinclair A, Munshi M, **Kahkoska AR**, Weinstock R, Cukierman-Yaffe T. Use of Technologies at the Advanced Age. Diabetes Technol Ther. 2024 Mar;26(S1):S172-S186. doi: 10.1089/dia.2024.2511. PMID: 38441458.
4. Klein KR, Abrahamsen TJ, **Kahkoska AR**, Alexander GC, Chute C, Haesndel M, Mehta H, Miller J, Moffit R, Stürmer T, Kvist K, Buse JB. Association of Premorbid GLP-1RA and SGLT-2i Prescription Alone and in Combination with COVID 19 Severity in the Continuously Expanding National COVID Cohort Collaborative (N3C). *Under Review.* Diabetes Therapy. Accepted March 4th, 2024.
5. Freeman NLB, Muthukkumar R, Weinstock RS, Wickerhauser MV, **Kahkoska AR**. Use of machine learning to identify characteristics associated with severe hypoglycemia in older adults with type

1 diabetes: a post-hoc analysis of a case-control study. BMJ Open Diabetes Res Care. 2024 Feb 27;12(1):e003748. doi: 10.1136/bmjdrc-2023-003748. PMID: 38413176.

6. Cho H, She J, De Marchi D, El-Zaatari H, Barnes EL, **Kahkoska AR,** Kosorok MR, Virkud AV. Machine Learning and Health Science Research: Tutorial. J Med Internet Res. 2024 Jan 30;26:e50890. doi: 10.2196/50890. PMID: 38289657; PMCID: PMC10865203.
7. Smith C, Cristello Sarteau A, Qu X, Noe V, Young LA, Hassmiller Lich K, **Kahkoska AR**. A conceptual model of the continuous glucose monitoring integration process for older adults with diabetes developed using participatory systems science methods. Diabetes Res Clin Pract. 2023 Dec 12:111053. doi: 10.1016/j.diabres.2023.111053. Epub ahead of print. PMID: 38097112.
8. Zhang J, Wei X, Liu W, Wang Y, **Kahkoska AR**, Zhou X, Zheng H, Zhang W, Sheng T, Zhang Y, Liu Y, Ji K, Xu Y, Zhang P, Xu J, Buse JB, Wang J, Gu Z. Week-long norm glycaemia in diabetic mice and minipigs via a subcutaneous dose of a glucose-responsive insulin complex. Nat Biomed Eng. 2023 Dec 6. doi: 10.1038/s41551-023-01138-7. Epub ahead of print. PMID: 38057427.
9. Tobias DK, Merino J, Ahmad A, Aiken C, Benham JL, Bodhini D, Clark AL, Colclough K, Corcoy R, Cromer SJ, Duan D, Felton JL, Francis EC, Gillard P, Gingras V, Gaillard R, Haider E, Hughes A, Ikle JM, Jacobsen LM, **Kahkoska AR**, Kettunen JLT, Kreienkamp RJ, Lim LL, Männistö JME, Massey R, Mclennan NM, Miller RG, Morieri ML, Most J, Naylor RN, Ozkan B, Patel KA, Pilla SJ, Prystupa K, Raghavan S, Rooney MR, Schön M, Semnani-Azad Z, Sevilla-Gonzalez M, Svalastoga P, Takele WW, Tam CH, Thuesen ACB, Tosur M, Wallace AS, Wang CC, Wong JJ, Yamamoto JM, Young K, Amouyal C, Andersen MK, Bonham MP, Chen M, Cheng F, Chikowore T, Chivers SC, Clemmensen C, Dabelea D, Dawed AY, Deutsch AJ, Dickens LT, DiMeglio LA, Dudenhöffer-Pfeifer M, Evans-Molina C, Fernández-Balsells MM, Fitipaldi H, Fitzpatrick SL, Gitelman SE, Goodarzi MO, Grieger JA, Guasch-Ferré M, Habibi N, Hansen T, Huang C, Harris-Kawano A, Ismail HM, Hoag B, Johnson RK, Jones AG, Koivula RW, Leong A, Leung GKW, Libman IM, Liu K, Long SA, Lowe WL Jr, Morton RW, Motala AA, Onengut-Gumuscu S, Pankow JS, Pathirana M, Pazmino S, Perez D, Petrie JR, Powe CE, Quinteros A, Jain R, Ray D, Ried-Larsen M, Saeed Z, Santhakumar V, Kanbour S, Sarkar S, Monaco GSF, Scholtens DM, Selvin E, Sheu WH, Speake C, Stanislawski MA, Steenackers N, Steck AK, Stefan N, Støy J, Taylor R, Tye SC, Ukke GG, Urazbayeva M, Van der Schueren B, Vatier C, Wentworth JM, Hannah W, White SL, Yu G, Zhang Y, Zhou SJ, Beltrand J, Polak M, Aukrust I, de Franco E, Flanagan SE, Maloney KA, McGovern A, Molnes J, Nakabuye M, Njølstad PR, Pomares-Millan H, Provenzano M, Saint-Martin C, Zhang C, Zhu Y, Auh S, de Souza R, Fawcett AJ, Gruber C, Mekonnen EG, Mixter E, Sherifali D, Eckel RH, Nolan JJ, Philipson LH, Brown RJ, Billings LK, Boyle K, Costacou T, Dennis JM, Florez JC, Gloyn AL, Gomez MF, Gottlieb PA, Greeley SAW, Griffin K, Hattersley AT, Hirsch IB, Hivert MF, Hood KK, Josefson JL, Kwak SH, Laffel LM, Lim SS, Loos RJF, Ma RCW, Mathieu C, Mathioudakis N, Meigs JB, Misra S, Mohan V, Murphy R, Oram R, Owen KR, Ozanne SE, Pearson ER, Perng W, Pollin TI, Pop-Busui R, Pratley RE, Redman LM, Redondo MJ, Reynolds RM, Semple RK, Sherr JL, Sims EK, Sweeting A, Tuomi T, Udler MS, Vesco KK, Vilsbøll T, Wagner R, Rich SS, Franks PW. Second international consensus report on gaps and opportunities for the clinical translation of precision diabetes medicine. Nat Med. 2023 Oct 5. doi: 10.1038/s41591-023-02502-5. Epub ahead of print. PMID: 37794253.
10. Young KG, McInnes EH, Massey RJ, **Kahkoska AR**, Pilla SJ, Raghavan S, Stanislawski MA, Tobias DK, McGovern AP, Dawed AY, Jones AG, Pearson ER, Dennis JM; ADA/EASD PDMI. Treatment effect heterogeneity following type 2 diabetes treatment with GLP1-receptor agonists and SGLT2-inhibitors: a systematic review. Commun Med (Lond). 2023 Oct 5;3(1):131. doi: 10.1038/s43856-023-00359-w. PMID: 37794166; PMCID: PMC10551026.

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12. Allen CG, Olstad DL, **Kahkoska AR**, Guan Y, Ramos PS, Steinberg J, Staras SAS, Lumpkins CY, Milko LV, Turbitt E, Rahm AK, Saylor KW, Best S, Hatch A, Santangelo I, Roberts MC. Extending an Antiracism Lens to the Implementation of Precision Public Health Interventions. Am J Public Health. 2023 Aug 31:e1-e9. doi: 10.2105/AJPH.2023.307386. Epub ahead of print. PMID: 37651661.
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14. Weinstein JM, Urick B, Pathak S, Fuller KA, Albright J, Stürmer T, Buse JB, **Kahkoska AR**. Impact of Continuous Glucose Monitoring Initiation on Emergency Health Services Utilization. Diabetes Care. 2023 Jun 19:dc230341. doi: 10.2337/dc23-0341. Epub ahead of print. PMID: 37335978.
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18. Shirazi D, Haudenschild C, Lynch DH, Fanous M, **Kahkoska AR**, Jimenez D, Spangler H, Driesse T, Batsis JA. Obesity, multiple chronic conditions, and the relationship with physical function: Data from the national health and aging trends survey. Arch Gerontol Geriatr. 2022 Dec 19;107:104913. doi: 10.1016/j.archger.2022.104913. Epub ahead of print. PMID: 36565604.
19. **Kahkoska AR**, Freeman NLB, Jones EP, Shirazi D, Browder S, Page A, Sperger J, Zikry TM, Yu F, Busby-Whitehead J, Kosorok MR, Batsis JA. Individualized interventions and precision health: Lessons learned from a systematic review and implications for analytics-driven geriatric research. J Am Geriatr Soc. 2022 Dec 16. doi: 10.1111/jgs.18141. Epub ahead of print. PMID: 36524627.
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22. Pathak S, Kearin K, **Kahkoska** AR, Fuller KA, Staats B, Albright J, Stürmer T, Buse JB, Urick BY. Impact of Expanding Access to Continuous Glucose Monitoring Systems Among Insulin Users with Type 1 or Type 2 Diabetes. Diabetes Technol Ther. 2022 Dec 8. doi: 10.1089/dia.2022.0418. Epub ahead of print. PMID: 36480256.
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27. Weinstein JM, **Kahkoska AR.** Association of Continuous Glucose Monitoring Use and Hemoglobin A1c Levels Across the Lifespan Among Individuals With Type 1 Diabetes in the US. JAMA Netw Open. 2022 Jul 1;5(7):e2223942. doi: 10.1001/jamanetworkopen.2022.23942. PMID: 35895064.
28. Weinstein JM, **Kahkoska AR**, Berkowitz SA. Food Insecurity, Missed Workdays, And Hospitalizations Among Working-Age US Adults With Diabetes. Health Aff (Millwood). 2022 Jul;41(7):1045-1052. doi: 10.1377/hlthaff.2021.01744. PMID: 35787082.
29. Sarteau AC, **Kahkoska AR**, Crandell J, Igudesman D, Corbin KD, Kichler JC, Maahs DM, Muntis F, Pratley R, Seid M, Zaharieva D, Mayer-Davis E. More hypoglycemia not associated with increasing estimated adiposity in youth with type 1 diabetes. Pediatr Res. 2022 Jun 22. doi: 10.1038/s41390-022-02129-1. Epub ahead of print. PMID: 35729217.
30. Irwin A, Igudesman D, Crandell J, Kichler JC, **Kahkoska AR**, Burger K, Zaharieva DP, Addala A, Mayer-Davis EJ. Mindfulness, disordered eating, and impulsivity in relation to glycemia among adolescents with type 1 diabetes and suboptimal glycemia from the Flexible Lifestyles Empowering Change (FLEX) Intervention Trial. Pediatr Diabetes. 2022 Mar 16. doi: 10.1111/pedi.13334. Epub ahead of print. PMID: 35297136.
31. **Kahkoska AR**, Sarteau AC, Igudesman D, Reboussin BA, Dabelea D, Dolan LM, Jensen E, Wadwa

RP, Pihoker C, Mayer-Davis EJ. Association of Insulin Regimen and Estimated Body Fat Over Time among Youths and Young Adults with Type 1 Diabetes: The SEARCH for Diabetes in Youth Study. J Diabetes Res. 2022 Jan 28;2022:1054042. doi: 10.1155/2022/1054042. PMID: 35127949; PMCID: PMC8816579.

32. Lynch DH, Petersen CL, Fanous MM, Spangler HB, **Kahkoska AR**, Jimenez D, Batsis JA. The relationship between multimorbidity, obesity and functional impairment in older adults. J Am Geriatr Soc. 2022 Feb 3. doi: 10.1111/jgs.17683. Epub ahead of print. PMID: 35113453.
33. Freeman NLB, Sperger J, El-Zaatari H, **Kahkoska AR**, Lu M, Valancius M, Virkud AV, Zikry TM, Kosorok MR. Beyond Two Cultures: Cultural Infrastructure for Data-driven Decision Support. Obs Stud. 2021 Jul;7(1):77-94. doi: 10.1353/obs.2021.0024. PMID: 35106520; PMCID: PMC8802367.
34. Nolan JJ, **Kahkoska AR**, Semnani-Azad Z, Hivert MF, Ji L, Mohan V, Eckel RH, Philipson LH, Rich SS, Gruber C, Franks PW. ADA/EASD Precision Medicine in Diabetes Initiative: An International Perspective and Future Vision for Precision Medicine in Diabetes. Diabetes Care. 2022 Feb 1;45(2):261-266. doi: 10.2337/dc21-2216. PMID: 35050364.
35. **Kahkoska AR**, Pokaprakarn T, Alexander R, Crume TL, Dabelea D, Divers J, Dolan LM, Lawrence J, Marcovina S, Pihoker C, Reboussin BA, Saydah SH, Kosorok MR, Mayer-Davis EJ. The impact of racial and ethnic health disparities in diabetes management on clinical outcomes: a reinforcement learning analysis of health inequity among youth and young adults in the SEARCH for Diabetes in Youth Study. Diabetes Care. dc210496; DOI: 10.2337/dc21-0496. Epub 2021 Nov 2.
36. Alexopoulos AS, **Kahkoska AR**, Pate V, Bradley MC, Niznik J, Thorpe C, Stürmer T, Buse J. Deintensification of Treatment With Sulfonylurea and Insulin After Severe Hypoglycemia Among Older Adults With Diabetes. JAMA Netw Open. 2021 Nov 1;4(11):e2132215. doi: 10.1001/jamanetworkopen.2021.32215. PMID: 34726745.
37. Liese AD, Reboussin BA, **Kahkoska AR**, Frongillo EA, Malik FS, Imperatore G, Saydah S, Bellatorre A, Lawrence JM, Dabelea D, Mendoza JA. Inequalities in Glycemic Control in Youth with Type 1 Diabetes Over Time: Intersectionality Between Socioeconomic Position and Race and Ethnicity. Ann Behav Med. 2021 Sep 27;. doi: 10.1093/abm/kaab086. [Epub ahead of print] PubMed PMID: 34570884; NIHMSID:NIHMS1745744.
38. **Kahkoska AR**, Abrahamsen TJ, Alexander GC, Bennett TD, Chute CG, Haendel MA, Klein KR, Mehta H, Miller JD, Moffitt RA, Stürmer T, Kvist K, Buse JB. Association Between Glucagon-Like Peptide 1 Receptor Agonist and Sodium-Glucose Cotransporter 2 Inhibitor Use and COVID-19 Outcomes. Diabetes Care. 2021 Jul;44(7):1564-1572. doi: 10.2337/dc21-0065. Epub 2021 Jun 16. PubMed PMID: 34135013; PubMed Central PMCID: PMC8323175.
39. Wang J, Wang Z, Chen G, Wang Y, Ci T, Li H, Liu X, Zhou D, **Kahkoska AR**, Zhou Z, Meng H, Buse JB, Gu Z. Injectable Biodegradable Polymeric Complex for Glucose-Responsive Insulin Delivery. ACS Nano. 2021 Mar 23;15(3):4294-4304. doi: 10.1021/acsnano.0c07291. Epub 2021 Mar 8. PubMed PMID: 33685124; PubMed Central PMCID: PMC8210813.
40. Travia KR, **Kahkoska AR**, Igudesman D, Souris KJ, Beasley C, Mayer-Davis EJ. Impact of Hurricane Matthew on Diabetes Self-Management and Outcomes. N C Med J. 2021 Mar-Apr;82(2):100-107. doi: 10.18043/ncm.82.2.100. PubMed PMID: 33649123; PubMed Central PMCID: PMC8230667.
41. Wang Z, Wang J, **Kahkoska AR**, Buse JB, Gu Z. Developing Insulin Delivery Devices with Glucose

Responsiveness. Trends Pharmacol Sci. 2021 Jan;42(1):31-44. doi: 10.1016/j.tips.2020.11.002. Epub 2020 Nov 26. Review. PubMed PMID: 33250274; PubMed Central PMCID: PMC7758938.

42. Sutherland MW, Ma X, Reboussin BA, Mendoza JA, Bell BA, **Kahkoska AR**, Sauder KA, Lawrence JM, Pihoker C, Liese AD. Socioeconomic position is associated with glycemic control in youth and young adults with type 1 diabetes. Pediatr Diabetes. 2020 Dec;21(8):1412-1420. doi: 10.1111/pedi.13112. Epub 2020 Sep 21. PubMed PMID: 32902080; PubMed Central PMCID: PMC8054269.

43. Igudesman D, Crandell J, Zhong VW, Cristello Sarteau A, **Kahkoska AR**, Corbin K, Pratley R, Kosorok MR, Maahs DM, Mayer-Davis EJ. Dietary intake on days with and without hypoglycemia in youth with type 1 diabetes: The Flexible Lifestyle Empowering Change trial. Pediatr Diabetes. 2020 Dec;21(8):1475-1484. doi: 10.1111/pedi.13132. Epub 2020 Oct 5. PubMed PMID: 32981192.

44. Wang Z, Wang J, Li H, Yu J, Chen G, **Kahkoska AR**, Wu V, Zeng Y, Wen D, Miedema JR, Buse JB, Gu Z. Dual self-regulated delivery of insulin and glucagon by a hybrid patch. Proc Natl Acad Sci U S A. 2020 Nov 24;117(47):29512-29517. doi: 10.1073/pnas.2011099117. Epub 2020 Nov 11. PubMed PMID: 33177238; PubMed Central PMCID: PMC7703584.

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ADA/EASD Precision Diabetes in Medicine Writing Group Publications

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2. Francis EC, Powe CE, Lowe WL Jr, White SL, Scholtens DM, Yang J, Zhu Y, Zhang C, Hivert MF, Kwak SH, Sweeting A; ADA/EASD PMDI. Refining the diagnosis of gestational diabetes mellitus: a systematic review and meta-analysis. Commun Med (Lond). 2023 Dec 18;3(1):185. doi: 10.1038/s43856-023-00393-8. PMID: 38110524; PMCID: PMC10728189.
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7. Lim S, Takele WW, Vesco KK, Redman LM, Hannah W, Bonham MP, Chen M, Chivers SC, Fawcett AJ, Grieger JA, Habibi N, Leung GKW, Liu K, Mekonnen EG, Pathirana M, Quinteros A, Taylor R, Ukke GG, Zhou SJ; ADA/EASD PMDI; Josefson J. Participant characteristics in the prevention of gestational diabetes as evidence for precision medicine: a systematic review and meta-analysis. Commun Med (Lond). 2023 Oct 5;3(1):137. doi: 10.1038/s43856-023-00366-x. PMID: 37794119; PMCID: PMC10551015.
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Invited Commentaries, Editorials, and Letters

1. Alexopoulos AS, Crowley MJ, **Kahkoska AR**. Diabetes Medication Changes in Older Adults With Type 2 Diabetes: Insights Into Physician Factors and Questions Ahead. Diabetes Care. 2023 Jun 1;46(6):1137-1139. doi: 10.2337/dci23-0017. PMID: 37220268.
2. **Kahkoska AR**, Cristello Sarteau A, Crowley MJ. Delivering on the promise of technology to augment behavioral interventions in type 2 diabetes. Diabetes Care. 1 May 2023; 46 (5): 918–920. https://doi.org/10.2337/dci23-0009.
3. **Kahkoska AR**, Buse JB. Primum Non Nocere: Refocusing Our Attention on Severe Hypoglycemia Prevention. Diabetes Care. 2018 Aug;41(8):1557-1559. doi: 10.2337/dci18-0020. PubMed PMID: 30030257; PubMed Central PMCID: PMC6054498.

Under Review and Revision

1. Munshi M, **Kahkoska AR**, Neumiller JJ, Alexopoulos AS, Allen NA, Cukierman-Yaffe T, Huang ES, Lee SJ, Lipska KJ, McCarthy LM, Meneilly GS, Pandya N, Pratley RE, Rodriguez-Manas L, Sinclair AJ, Sy SL,Toschi E, Weinstock RS. Realigning Diabetes Regimens in Older Adults: a 4S Pathway to Guide Simplification and Describing Strategies. *Under Review.* NEJM Catalyst.

2. **Kahkoska AR**, Smith C, Young LA, Hassmiller Lich K. Use of Systems Thinking and Group Model Building Methods to Understand Patterns of Continuous Glucose Monitoring Use Among Older Adults with Type 1 Diabetes. *Under Revision.* BMC Research Methodology.
3. Smith C, Cristello Sarteau A, Noe V, Qu X, **Kahkoska AR.** A Qualitative Study of Recruitment Strategies: Perspectives from Older Adults Living With Diabetes. *Under Revision.* Diabetic Medicine.
4. Weinstein JM, Alexopoulos AS, Rickels MR, **Kahkoska AR.** Beliefs about hypoglycemia across the lifespan in type 1 diabetes. *Under Revision.* PLOS One.
5. Ji K, Wei X, **Kahkoska AR,** Zhang J, Xu J, Lu W, Wang Y, Yao Y, Mei S, Liu Y, Wang S, Zhao Z, Lu Z, Buse JB, Wang J, Gu Z. An Oral Glucose-responsive Worm-like Complex for Insulin Delivery. *Under Review.* Nature Nanotechnology.
6. Schoenborn NL, **Kahkoska AR**, McDermott C, Sharma M, Boustani M, Deschodt M, Zullig LL, Hajduk A, Batsis JA. Implementation Science: moving models of care for older patients from research evidence to real world action. *Under Review.* The Gerontologist.
7. Wang Y, Shi J, Xin M, **Kahkoska AR**, Wang J, Gu Z. Cell-Drug Conjugates. *Under Review.* Nature Biomedical Engineering.
8. Brady RP, Jensen ET, Rigdon J, Crimmins NA, Mallon D, Dolan LM, Imperatore G, **Kahkoska AR**, Mottl AK, Honor A, Pettitt DJ, Merjaneh L, Dabelea D, Shah AS, for the SEARCH for Diabetes in Youth Study Group. Prevalence of Celiac Disease, Undiagnosed Celiac Disease and Co-existing Autoimmunity in Youth with Type 1 Diabetes: the SEARCH for Diabetes in Youth Study. *Under Review.* Pediatric Diabetes.
9. Wang Y, Lui W, Wang S, Yang Y, Sheng T, Zhou R, Liao Z, Zhang C, Zhao S, Chen P, Zhao J, Li H, Hu X, **Kahkoska AR**, Jiang H, Cheng H, Wang J. Inflammatory Depot Trapping and Programming Immune Cells to Prevent Type 1 Diabetes. *Under Review.* Nature.
10. Cross L, McKinley M, Laux J, Okah E, Roberson M, Baxter S, Herling J, Raffa B**, Kahkoska AR**, Bevel M, Corbie-Smith G, Sims M, Shimbo D, Dave G. Role of Stress in the Relationship Between Social Determinants of Health and Hypertension in the Jackson Heart Study. *Under Review.* Hypertension.

Refereed Other Products of Scholarship

Refereed Oral Presentations

1. **Kahkoska AR,** Smith C, Batsis JA, Kosorok MR, Mayer-Davis EJ, Pratley R, Weinstock R, Young LA, Hassmiller Lich K. Group Model Building to characterize the experiences of older adults with type 1 diabetes (T1D) with continuous glucose monitoring (CGM) therapy and uncover suboptimal response patterns. Oral Poster Presentation. Translational Science 2022. April 21, 2022. Chicago, IL.
2. **Kahkoska AR.** Clinically relevant phenotypes of type 1 diabetes (T1D): proof of principle for precision health in chronic disease and next steps for translation. RTP—Precision Medicine Leaders' Summit, Young Investigators of Excellence Panel. October 21, 2020. Virtual Format.
3. **Kahkoska AR,** Nguyen C, Jiang X, Dabelea D, Dolan L, Imperatore G, Lawrence JM, Marcovina S, Pihoker C, Reboussin BA, Sauder KA, Kosorok MR, Mayer-Davis EJ. Characterizing the Weight-

Glycemia Phenotype of Type 1 Diabetes in Young Adults. Oral Presentation. American Society of Nutrition: Nutrition 2018. June 9-13, 2018, Boston, MA.

4. **Kahkoska AR**, Shay CM, Crandell JL, Dabelea D, Imperatore G, Lawrence JM, Liese AD, Pihoker C, Reboussin BA, Tooze J, Wagenknecht L, Zhong VW, Mayer-Davis EJ. Race/Ethnicity as a Predictor of Hemoglobin A1c Trajectory in Youth with Type 1 Diabetes. Oral Presentation. American Diabetes Association 77th Scientific Sessions, June 9-13, 2017, San Diego, CA.

Refereed Poster Presentations

1. **Kahkoska AR,** Smith C, Cristello Sarteau A, Qu X, Noe V, Young L, Hassmiller-Lich K. A conceptual model of the continuous glucose monitoring integration process for older adults with diabetes developed using participatory system science methods. E-Poster Presentation. The 17th International Conference On Advanced Technologies & Treatments for Diabetes. March 6-9, 2024. Florence, IT.
2. **Kahkoska AR,** Shah KS, Dubal A, Cristello Sarteau A, Young L, Pratley R. Association Between Attitudes and Fear of Hypoglycemia and Continuous Glucose Monitoring Metrics Among Older Adults with Type 1 Diabetes in the WISDM Study. E-Poster Presentation. The 17th International Conference On Advanced Technologies & Treatments for Diabetes. March 6-9, 2024. Florence, IT.
3. **Kahkoska AR**, Weinstein JM, Muthukkumar R, Young LA. The Prevalence of Diabetes-Related Complications and Comorbidities Among Older Adults with Type 1 Diabetes. American Diabetes Association 83rd Scientific Sessions, June 23-26th, 2023. San Diego, CA.
4. **Kahkoska AR**, Weinstein JM, Muthukkumar R, Young LA. Utilization of Continuous Glucose Monitoring Among Older Adults with Type 1 Diabetes: An Analysis of Real-World Clinical Data. American Diabetes Association 83rd Scientific Sessions, June 23-26th, 2023. San Diego, CA.
5. **Kahkoska AR**, Smith C, Young LA, Hassmiller Lich K. Use of Systems Thinking and Group Model Building Methods to Understand Patterns of Continuous Glucose Monitoring Use Among Older Adults with Type 1 Diabetes. Poster Presentation. 2022 International System Dynamics Conference. July 20, 2022. Virtual/hybrid Format.
6. **Kahkoska AR,** Cristello Sarteau A, Smith C, Thambuluru S, Batsis JA, Pratley R, Weinstock R, Young LA, Hassmiller Lich K. Living with Type 1 diabetes as an older adult: A qualitative study examining experiences and attitudes about diabetes technology use. Poster Presentation. American Diabetes Association 81th Scientific Sessions, June 2-7, 2022, New Orleans, LA.
7. **Kahkoska AR**, Smith C, Thambuluru S, Weinstein J, Batsis JA, Weinstock RS, Young MD, Hassmiller Lich K. Using Systems Thinking and Group Model Building Methods to Model Patterns of Continuous Glucose Monitoring Use Among Older Adults with Type 1 Diabetes. Translational Science 2022. Chicago, IL. April 21, 2022. [Featured as a 'Top 50' Poster].
8. **Kahkoska AR,** Petersen CL, Lynch D, Spangler HB, Fortuna KL, Batsis JA. Social Support and Weight Outcomes Over A Six-Month Weight Loss Intervention for Rural Older Adults. Poster Presentation. The Gerontological Society of America (GSA) 2021 Annual Scientific Meeting. November 10-14, 2021. Phoenix, AZ.
9. **Kahkoska AR**, Pokaprakarn T, Alexander GR, Crume TL, Dabelea D, Divers J, Dolan LM, Jensen ET, Marcovina S, Mottl AK, Pihoker C, Saydah SH, Kosorok MR, Mayer-Davis EJ. The impact of racial

and ethnic health disparities in diabetes management on clinical outcomes: a reinforcement learning analysis of health inequity. Poster Presentation. Transdisciplinary Conference for Future Leaders in Precision Public Health. October 14th, 2021. Virtual Format.

10. **Kahkoska AR**, Pokaprakarn T, Alexander GR, Crume TL, Dabelea D, Divers J, Dolan LM, Jensen ET, Marcovina S, Mottl AK, Pihoker C, Saydah SH, Kosorok MR, Mayer-Davis EJ. The impact of racial and ethnic health disparities in diabetes management on clinical outcomes: a reinforcement learning analysis of health inequity. Poster Presentation. American Diabetes Association 81st Scientific Sessions, June 25-29, 2021. Virtual Format.
11. **Kahkoska AR,** Nguyen CT, Adair LA, Aiello AE, Burger KS, Buse JB, Dabelea D, Dolan LM, Malik FS, Mottl AK, Pihoker C, Reboussin BA, Sauder KA, Kosorok MR, Mayer-Davis EJ. Longitudinal Phenotypes of Type 1 Diabetes in Youth Based on Weight and Glycemia and Their Association With Complications. Poster Presentation and Moderated Early-Career Poster Presentation. Precision Diabetes Medicine PDM2021 Virtual Conference. April 8-10th, 2021. Virtual Format.
12. **Kahkoska AR,** Nguyen CT, Adair LA, Aiello AE, Burger KS, Buse JB, Dabelea D, Dolan LM, Malik FS, Mottl AK, Pihoker C, Reboussin BA, Sauder KA, Kosorok MR, Mayer-Davis EJ. Longitudinal Phenotypes of Type 1 Diabetes in Youth Based on Weight and Glycemia and Their Association With Complications. Poster Presentation. National Institute of Diabetes and Digestive and Kidney Diseases Precision Nutrition: Research Gaps and Opportunities Workshop. January 11-12 2021. Virtual Format.
13. **Kahkoska AR,** Hachmann-Nielsen, Klein KR, Kongsbak KG, Kvist K, Buse JB. Outcomes of Type 2 Diabetes (T2D) clustering replicated in the DEVOTE trial. Poster Presentation. American Diabetes Association 79th Scientific Sessions, June 7-11, 2019, San Francisco, CA.
14. **Kahkoska AR,** Crandell JL, Driscoll KA, Kosorok MR, Maahs DM, Mayer-Davis EJ. Correlates of hypoglycemia among youth with type 1 diabetes (T1D) and suboptimal glycemic control. Poster Presentation and Moderated Poster Discussion. American Diabetes Association 78th Scientific Sessions, June 22-26, 2018, Orlando, FL.
15. **Kahkoska AR,** Nguyen C, Jiang X, Dabelea D, Dolan L, Imperatore G, Lawrence JM, Marcovina S, Pihoker C, Reboussin BA, Sauder KA, Kosorok MR, Mayer-Davis EJ. Characterizing the Weight-Glycemia Phenotype of Type 1 Diabetes in Young Adults. Poster Presentation. Defining Precision Nutrition Symposia. Nutrition Research Institute of North Carolina. May 1-2, 2018, Kannapolis, NC.
16. **Kahkoska AR**, Shay CM, Reboussin BA, Dabelea D, Pihoker C, Lawrence JM, Liese AD, Crandell JL, The N, Couch SC, Mayer-Davis EJ. Sociodemographic Drivers of Longitudinal Adiposity in Youth with Type 1 Diabetes. Poster Presentation. Spotlight on Student Research, Gillings School of Global Public Health, April 27, 2017, Chapel Hill, NC.
17. **Kahkoska AR**, Brazeau NF, Largay J, Kumar R, Lynch KA, Kirkman MS, Salisbury T, Styner M, Young LA, Buse JB. Implementation and Evaluation of Shared Medical Appointments for Type 2 Diabetes at a Free, Student-Run Clinic in Alamance County, NC. Poster Presentation and Moderated Poster Discussion. American Diabetes Association 77th Scientific Sessions, June 9-13, 2017, San Diego, CA.
18. **Kahkoska AR**, Shay CM, Reboussin BA, Dabelea D, Pihoker C, Lawrence JM, Liese AD, Crandell JL, The N, Couch SC, Mayer-Davis EJ. Sociodemographic Drivers of Longitudinal Adiposity in Youth with Type 1 Diabetes. Poster Presentation. American Diabetes Association 77th Scientific Sessions, June 9-13, 2017, San Diego, CA.

19. **Kahkoska AR,** Gilbert, JR, Burger, KS. Perceived Dietary Restraint and Body Mass in Females: Evidence of a Non-Linear Relationship. Poster Presentation. The Obesity Society ObesityWeek 2016, October 16, 2016, New Orleans, LA.
20. **Kahkoska AR**, Augustus A, Buse, JB. Open Door Clinic. Poster Presentation. UNC School of Medicine Eugene S. Mayer Honor Society Community Service Day, February 20, 2015, Chapel Hill, NC.
21. **Kahkoska AR**, Huckle J, Jay M. Binding Affinity of an Orally Bioavailable Decorporation Agent for Cobalt. Poster Presentation. UNC School of Medicine John B. Graham Student Research Day, January 12, 2015, Chapel Hill, NC; UNC MD/PhD Poster Session, September 8, 2014, Chapel Hill, NC.
22. **Kahkoska AR**, Fazen CF, Doyle RP. Investigation of a Vitamin B12 Conjugate as a PET Imaging Probe. Poster Presentation. UNC Biological and Biomedical Sciences Program (BBSP) First Year Group Poster Session, December 9, 2013, Chapel Hill, NC.
23. **Kahkoska AR**, Nicoud IB, Delaney C. Tissue Culture Materials for Notch-Mediated Ex Vivo Expansion of Umbilical Cord Blood Stem/Progenitor Cells. Poster Presentation. Fred Hutchinson Cancer Research Center Summer Undergraduate Research Program Poster Session, August 10, 2012, Seattle, WA.

Other Refereed Abstracts (Presented denoted with *)

1. *Weinstein JM, Muthukkumar R, Young LA, Kahkoska AR. Challenges for the Diagnostic Classification of Type 1 Diabetes Among Older Adults in Electronic Health Record (EHR) Data. American Diabetes Association 83rd Scientific Sessions, June 23-26th, 2023. San Diego, CA.
2. *Weinstein JM, Muthukkumar R, Young LA, Kahkoska AR. Trends in Enrollment in Medicare Advantage Plans Among Older Adults with Diabetes, 2015 - 2020. American Diabetes Association 83rd Scientific Sessions, June 23-26th, 2023. San Diego, CA.
3. *Muthukkumar R, Haudenschild C, **Kahkoska AR**, Spangler H, MacKenzie T, Lynch D, Batsis J. Obesity and the Risk of Nursing Home Placement in Older Adults. 2023 Annual Scientific Meeting of the American Geriatrics Society. May 4-6, 2023. Long Beach, CA.
4. ***Freeman NLB, **Kahkoska AR**, Kosorok MR, McGinigle KL. Statistical leadership for increasing translational capacity: co-building an evidence base and a team for precision medicine. Women in Statistics and Data Science Conference. October 10-12, 2022. St. Louis, MO.
5. *Lynch DH, Johnson M, Spangler HB, Grant S, **Kahkoska AR**, Haaland P, Marron S, Batsis JA. Association Between Physical Frailty and Quality of Life: National Health and Aging Trend Study (NHATS) 2011-2020). Frailty and Sarcopenia Conference. April 20-22, 2022. Boston, MA.
6. *Kearin K, Pathak S, Albright J, Buse JB, Fuller K, **Kahkoska AR**, Staats B, Stürmer T, Urick B. Expanding the Pharmacy Benefit Improves Utilization of Continuous Glucose Monitoring Systems. Academy of Managed Care Pharmacy AMCP2022. March 29-April 1, 2022. Chicago, IL.
7. *Batsis JA, Hauderschild C, **Kahkoska AR**, Crow RS, Lnch D, Lohman. Association of Obesity, Multimorbidity, and Frailty: Data from the National Health and Aging Trends Survey**.** The Gerontological Society of America (GSA) 2021 Annual Scientific Meeting. November 10-14, 2021. Phoenix, AZ.
8. *Peterson CL, **Kahkoska AR**, Batsis JA. Remotely monitored high levels of physical activity over time associated with decreased weight and increased functional ability in obese older adults.

The Gerontological Society of America (GSA) 2021 Annual Scientific Meeting. November 10-14, 2021. Phoenix, AZ.

9. *Lynch D, **Kahkoska AR,** Petersen CL, Spangler H, Batsis JA. Obesity and Multimorbidity in the USA: National Health and Nutrition Examination Surveys 2005-2014. The Gerontological Society of America (GSA) 2021 Annual Scientific Meeting. November 10-14, 2021. Phoenix, AZ.
10. *Brady RP, Jensen ET, Rigdon J, Crimmins NA, Mallon D, Dolan LM, Imperatore G, **Kahkoska AR**, Mottl AK, Honor A, Pettitt DJ, Merjaneh L, Dabelea D, Shah AS, for the SEARCH for Diabetes in Youth Study Group. Prevalence of Celiac Disease, Undiagnosed Celiac Disease and Co-existing Autoimmunity in Youth with Type 1 Diabetes: the SEARCH for Diabetes in Youth Study. American Diabetes Association 81st Scientific Sessions, June 25-29th, 2021. In press.
11. *Buse JB, **Kahkoska AR,** Harring S, Holst I, Knop FK, Kvist K, Pratley R. Development of an evidence-based tool to facilitate individualised treatment decisions for patients with type 2 diabetes in the clinic. 56th Annual Meeting of the European Association for the Study of Diabetes. Sept 21-25, 2020
12. *Liese AD, Reboussin BA, **Kahkoska AR**, Frongillo EA, Malik FS, Imperatore P, Saydah S, Bellatorre A, Lawrence JM, Dabelea D, Mendoza J. Socioeconomic position (SEP) attributes intersect with race to influence glycemic control patterns in youth with type 1 diabetes (T1D) over time. American Diabetes Association 80th Scientific Sessions, June 12-16, 2018, Chicago, IL.
13. *Cristello AC, **Kahkoska AR**, Igudesman D, Smart C, Mayer-Davis EJ. Acceptability of Structured Eating (SE) and Associations with Glycemic Control Among Youth with Type 1 Diabetes (T1D). American Diabetes Association 80th Scientific Sessions, June 12-16, 2018, Chicago, IL.
14. *Heller S, **Kahkoska AR**, Hachmann-Nielsen E, Klein KR, Kongsbak KG, Kvist KG, Buse JB. Outcomes of type 2 diabetes clustering replicated in the DEVOTE trial. Diabetes UK Professional Conference 2020. March 18-20, Glasgow, Scotland.
15. *Cristello A, **Kahkoska AR**, Cradnell J, Seid M, Kichler J, Maahs DM, Mayer-Davis EJ. Associations between goal setting behavior and changes in HbA1c among youth with type 1 diabetes in the Flexible Lifestyle Empowering Change (FLEX) Intervention. International Society of Pediatric and Adolescent Diabetes 43rd Annual Conference. October 30- November 2, 2019, Boston, MA.
16. **Kahkoska AR,** Hachmann-Nielsen, Klein KR, Kongsbak KG, Kvist K, *Buse JB. Outcomes of Type 2 Diabetes (T2D) clustering replicated in the DEVOTE trial. 55th Annual Meeting of the European Association for the Study of Diabetes, Sept 16-20, 2019, Barcelona, Spain.
17. *Mayer-Davis EJ, Reboussin BA, Pihoker C, **Kahkoska AR**, Dabelea D, Dolan L, Jensen E, Igudesman D, Lawrence JM, Saydah S, Wadwa P. Does Intensification of Insulin Therapy lead to Increased : Does Body Fat Increase Among Youth and Young Adults with Type 1 Diabetes (T1D)? American Diabetes Association 79th Scientific Sessions, June 7-11, 2019, San Francisco, CA.
18. *Travia K, **Kahkoska AR,** Souris KJ, Beasley CM, Mayer-Davis EJ. Impact of Hurricane Matthew on Diabetes Self-Management and Outcomes. American Diabetes Association 79th Scientific Sessions, June 7-11, 2019, San Francisco, CA.
19. *Addala A, Igudesman D, **Kahkoska AR**, Muntis FR, Souris KJ, Whitaker KJ, Pratley RE, Mayer-Davis. The Interplay of Type 1 Diabetes and Weight: A Qualitative Study of Thematic Progression with Age. American Diabetes Association 79th Scientific Sessions, June 7-11, 2019, San Francisco, CA.

20. **Kahkoska AR**, Crandell JL, Hunter C, Seid, *Mayer-Davis EJ, Maahs DM. Effect Modifiers of a Behavioral Intervention in Adolescents with Type 1 Diabetes: The FLEX study. International Society of Pediatric and Adolescent Diabetes 43rd Annual Conference. October 11-14, 2017, Hyderabad, India.
21. *Sutherland MW, Ma Z, Mendoza JA, Bell BA, Reboussin BA, **Kahkoska AR**, Sauder KA, Pihoker C, and Liese AD. Socioeconomic Profiles as Predictors of Glycemic Control in Youth with Type 1 Diabetes. American Diabetes Association 78th Scientific Sessions, June 22-26, 2017, Orlando, FL.
22. **Kahkoska AR,** Watts ME, Driscoll KA, Bishop FK, Mihas P, Thomas J, Law JR, Jain N, *Mayer-Davis EJ. A Qualitative Assessment of Weight Management in Youth with Type 1 Diabetes: Understanding Antagonism and Synergism. International Society of Pediatric and Adolescent Diabetes 43rd Annual Conference. October 18-21, 2017, Innsbruck, Austria.

Other Products of Scholarship

Invited Presentations

1. **Kahkoska AR.** Supporting Diabetes Care and Self-Management in Older Adulthood: Exploring Patient Perspectives Surrounding Evidence-Based Technology and Nutrition. Center for Diabetes Technology Distinguished Speaker Series. Charlottesville, VA. February 13, 2024.
2. **Kahkoska AR.** Therapeutic and Technological Approaches to Prevent Hypoglycemia in Older Adults with Diabetes—Gaps and Opportunities. Real-World Hypoglycemia in Older Adults Symposia. American Diabetes Association 83rd Scientific Sessions. San Diego, CA. June 23, 2023.
3. **Kahkoska AR.** Whole Person Care: Identifying and Treating Diabetes Distress as Part of Routine Type 1 Diabetes Care. Pathway To Stop Diabetes Symposia. American Diabetes Association 83rd Scientific Sessions. San Diego, CA. June 23, 2023.
4. **Kahkoska AR.** CTSA Visiting K Scholar Presentation: Stakeholder-Engaged Precision Health for Longevity and Healthy Aging with Type 1 Diabetes. iThriv CTSA Grand Rounds. June 6th, 2023. Virtual.
5. **Kahkoska AR.** Things I've been up to over in Gillings. UNC Division of Endocrinology Weekly 'Endorama' Conference. April 27th, 2023. Chapel Hill, NC.
6. **Kahkoska AR.** Demographic and Clinical Characteristics of Older Adults with Type 1 Diabetes. International Geriatric Diabetes Society 3rd Annual Workshop. October 31, 2022. Boston, MA. (Presentation was delivered virtually).
7. **Kahkoska AR,** Freeman NF. Introduction to Precision Medicine: From Statistics to Society. Women In Data Science 2022 Workshop Series. October 26th, 2022. Virtual format.
8. **Kahkoska, AR.** Type 1 diabetes management in older adults: opportunities for precision health, early learning, and next steps. Division of Geriatrics Grand Rounds; Research Talk. October 7th, 2022. Chapel Hill, NC.
9. **Kahkoska AR.** Uncovering Data-Driven Phenotypes for 'Precision' Diabetes Care. UNC Core Center for Clinical Research (CCCR) and Program for Precision Medicine in Health Care (PPMH) for Machine Learning Tools for Clinical Researchers: A Pragmatic Approach Series (Part 1: Machine Learning Tools & Precision Medicine in Arthritis & Autoimmunity). May 11, 2022. Virtual format.

10. **Kahkoska AR.** Exploring Stakeholder-Engaged Precision Health for Longevity and Healthy Aging with Type 1 Diabetes. Duke University Center for Applied Genomics and Precision Medicine, Program for Precision Medicine Meeting. May 5, 2022. Virtual format.
11. **Kahkoska AR.** Stakeholder-Engaged Precision Health for Longevity and Healthy Aging with Type 1 Diabetes. 2022 Spring Clinical Translational Science Association Program Meeting for the Lifespan Executive Committee. April 23, 2022. Chicago, IL.
12. **Kahkoska AR.** Stakeholder-Engaged Precision Health for Longevity and Healthy Aging in Diabetes. North Carolina Diabetes Research Center Faculty Workshop. February 10, 2021. Virtual Format.
13. **Kahkoska AR.** Delivering Lifestyle Interventions Through Telemedicine: What are the Opportunities for Older Adults with Diabetes? International Geriatric Diabetes Society 2nd Annual Workshop. November 8th, 2021. Boston, MA. (Presentation was delivered virtually).
14. **Kahkoska AR** and Berg J**.** Precision Medicine Initiatives at UNC. UNC School of Dentistry, Educational Pediatric Dentistry Monday morning seminar series. February 15, 2021. Virtual Format.
15. **Kahkoska AR.** Exploring Data-Driven Phenotypes and Tools for 'Precision' Diabetes Care. UNC Division of Endocrinology Weekly 'Endorama' Conference. July 25th, 2020. Chapel Hill, NC.
16. **Kahkoska AR.** Interdisciplinary Research in Type 1 Diabetes: Co-optimizing Weight and Glycemic Control in Youth and Young Adults. North Carolina Regional Diabetes Research Symposia. March 16, 2018. Greensboro, NC.
17. **Kahkoska AR.** From Bench to Behavior: Chemistry, Nutrition, and Medicine as an MD/PhD Student. Syracuse University 2016 Meredith Symposium in the Chemical and Biological Sciences. October 22, 2016. Syracuse, NY.

Moderating and Chairing Engagements

1. **Kahkoska AR** and Nelson A**.** UNC Core Center for Clinical Research (CCCR) and Program for Precision Medicine in Health Care (PPMH) for Machine Learning Tools for Clinical Researchers: A Pragmatic Approach Series (Part 1: Machine Learning Tools & Precision Medicine in Clinical Research). May 18, 2022. Virtual format.
2. **Kahkoska AR** and Weinstock R. Plenary Session Co-Chairs: Clinical and Scientific Challenges and Opportunities for Precision Diabetes Medicine. Precision Diabetes Medicine (PDM) 2021. April 9th, 2021. Virtual Format.

Research Briefs

1. Kahkoska AR. Type 2 Diabetes Subgroups, Risk for Complications, and Differential Effects Due to an Intensive Lifestyle Intervention. PracticeUpdate website. https://www.practiceupdate.com/content/low-vs-high-carbohydrate-diet-in-type-1-diabetes/82896/12/8/1
2. Kahkoska AR. Low Versus High Carbohydrate Diet in Type 1 Diabetes: A 12-week Randomized Open-Label Crossover Study. PracticeUpdate website. Available at: https://www.practiceupdate.com/content/low-vs-high-carbohydrate-diet-in-type-1-diabetes/82896/65/8/1.

Doctoral Dissertation

1. **Kahkoska AR.** Identifying Clinical Phenotypes of Type 1 Diabetes for the Co-Optimization of Weight and Glycemic Control (Doctoral dissertation, The University of North Carolina at Chapel Hill). https://doi.org/10.17615/pmkd-k264.

TEACHING ACTIVITIES

Courses Taught

NUTR 765: Nutritional Epidemiology for Masters Students
University of North Carolina at Chapel Hill Gillings School of Global Public Health
Co-Instructor, 2023 and 2024

Guest Lectures and Teaching Assistance

NUTR 885: Doctoral Seminar
University of North Carolina at Chapel Hill Gillings School of Global Public Health
Guest Lecture, 2022

HPM 890: Systems Thinking for Collective Impact
University of North Carolina at Chapel Hill Gillings School of Global Public Health
Guest Lecture, 2022

NUTR 818: Advanced Methods in Nutritional Epidemiology
University of North Carolina at Chapel Hill Gillings School of Global Public Health
Guest Lecture, 2021

UNC xTAP (Transition to Application Phase) Clinical Course
University of North Carolina at Chapel Hill School of Medicine
Student Instructor, 2020

NUTR 813: Nutritional Epidemiology
University of North Carolina at Chapel Hill Gillings School of Global Public Health
Teaching Assistant, 2017

Names of Student Supervised

Doctoral Committee Member

David Gaviria. 'Reducing dietetics program director burnout & improving student outcomes via design thinking.' Department of Nutrition. University of North Carolina at Chapel Hill Gillings School of Global Public Health. Anticipated Defense Date: 2025.

Mochuan Liu. 'New Precision Medicine Methods in Consideration of Risk Control'. Department of Biostatistics. University of North Carolina at Chapel Hill Gillings School of Global Public Health. Anticipated Defense Date: 2024.

Josh Weinstein: Exploring the impacts of policy changes on continuous glucose monitoring use in Type 1 diabetes and insulin dependent Type 2 diabetes. Department of Health Policy and Management. University of North Carolina at Chapel Hill Gillings School of Global Public Health. Defense Date: July 2023.

Kushal Shaw: Statistical Machine Learning Methodology for Precision Medicine. Department of Biostatistics. University of North Carolina at Chapel Hill Gillings School of Global Public Health. Defense Date: June 2023

Hadi Beyhaghi: Advanced analytics for predicting survival and facilitating precision medicine in checkpoint immunity. Department of Health Policy and Management. University of North Carolina at Chapel Hill Gillings School of Global Public Health. Defense date: July 2022.

Masters Paper Reader

Nejma Benzaari. Advancing Diabetes Care: The Role of Patient Reported Outcomes in Generating Real-World Evidence. 2022-2023. University of North Carolina at Chapel Hill Gillings School of Global Public Health.

Brittany Perrault. A Review of Evidence-based Dietary Patterns in Adolescents with Type 1 Diabetes and Strategies to Enhance Outcomes. 2020-2021. University of North Carolina at Chapel Hill Gillings School of Global Public Health.

Jennifer Lyu. Program Evaluation of a Pilot Type-1 Diabetes Nutrition Education Intervention at Peking University People's Hospital in Beijing, China. Master's Thesis. 2017-2018. University of North Carolina at Chapel Hill Gillings School of Global Public Health.

Clinical Research Mentor

Siri Thambuluru, PGY5; Fellow in Endocrinology
Scholarly research project; 2021-2022

Rashmi Muthukkumar, MS4
Individualization Phase Research Elective; Spring 2023

Undergraduate Research Elective Mentor

URES 395. Undergraduate Research. University of North Carolina at Chapel Hill

Aria Dhupkar, Spring 2024

NUTR 295. Undergraduate Research Experience in Nutrition. University of North Carolina at Chapel Hill Gillings School of Global Public Health

Julia Ho; Spring 2024

Aastha Dubal, Fall 2023, Spring 2024

Gabriella Ercolino, Spring 2023

Katherine Moss, Fall 2022

Anne Geib, Fall 2021, Spring 2022 *(co-mentored with Jessica Cassidy, DPT, PhD)*

Damilola Ayinde, Fall 2021

NUTR 629H. Honors Research in Nutrition. University of North Carolina at Chapel Hill Gillings

School of Global Public Health

Gabriella Ercolino, Fall 2023, Spring 2024

Anne Geib, Fall 2022, Spring 2023 *(co-mentored with Jessica Cassidy, DPT, PhD)*

Undergraduate Honors Thesis Research Project Mentor

Anna Geib. Understanding Barriers and Facilitators of Dietary Change Following Stroke: A Qualitative Analysis. 2022-2023. University of North Carolina at Chapel Hill Gillings School of Global Public Health. *Co-mentored with Jessica Cassidy, PT, PhD.*

Kevin Travia: Impact of Hurricane Matthew on Diabetes Self-management and Outcomes. Honors Senior Thesis. 2018-2019. University of North Carolina at Chapel Hill Gillings School of Global Public Health. *Co-mentored with Elizabeth Mayer-Davis, PhD.*

Madison Watts: Barriers to care and provider involvement in weight management for youth with type 1 diabetes. Senior Honors Thesis. 2016-2017. University of North Carolina at Chapel Hill Gillings School of Global Public Health. *Co-mentored with Elizabeth Mayer-Davis, PhD.*

GRANTS

Current:

NCDRC Pilot Award PI: Kahkoska and Kinlaw (Co-PI) 04/01/24 – 03/31/25 $50,000

North Carolina Diabetes Research Center

"Novel Measures for Burden of Recurrent Severe Hypoglycemia in Oder Adults with Diabetes: Improving Clarity and Interpretability of Real-World Evidence"

Older adults with diabetes represent a growing population that has significantly higher risk for recurrent severe hypoglycemia; they are also more likely to experience associated morbidity and mortality. Robust approaches using real-world data (RWD) are needed to identify and address the risk of recurrent severe hypoglycemia among older adults. Our overarching goal is to address these gaps by (1) leveraging a novel pharmaco-epidemiologic method to broadly and flexibly quantify the burden of recurrent severe hypoglycemia among older adults with diabetes; and (2) distilling routinely collected healthcare data surrounding recurrent hypoglycemic events to detect combinations and sequences of insurance claims that may signify increased risk for recurrence(s). Both aims utilize existing Medicare Fee-for-Service claims data from adults ≥65 years with diabetes in 2010-2021.

Role: Co-PI

K01AG084971-01 PI: Kahkoska 2/01/2024 – 01/31/2028 $520,968.00

NIH/NIA

Innovative medical technologies can improve health and increase longevity for older adults with chronic disease and multimorbidity, yet new data are needed to promote their adoption and effective use in real-world settings. For example, nearly a quarter of all adults =65 years old in the US have diabetes. Technology-based approaches to diabetes management, such as continuous glucose monitoring (CGM), can improve clinical outcomes and quality of life in this age group, in addition to preventing dangerous

episodes of hypoglycemia. Despite the potential benefits, CGM remains underutilized among older adults compared to younger adults. The purpose of this project is to generate the scientific evidence needed to expand and improve the delivery of guidelines-aligned care for the expanding population of older adults with diabetes, and particularly with respect to rapidly emerging technology such as CGM. My proposal has exciting, high-impact training opportunities to address three fundamental gaps in the literature, including sparse research characterizing (1) patterns of CGM use among older adults and (2) the clinical effects of long-term use in such real-world settings, as well as a dearth of data on the (3) economic impacts of scaling CGM in this age group.

Role: PI

Ignition Award PI: Kahkoska 10/01/23 – 03/31/24 $15,000

North Carolina Diabetes Research Center

"A national survey study of diet behaviors and beliefs in older adults with type 1 diabetes: A partnership with the T1D Exchange"

It is well-known that nutrition plays a critical role in day-to-day type 1 diabetes management, overall glycemic control, and long-term progression to complications, yet the evidence to guide nutrition and diet for optimal self-management in older adults with type 1 diabetes are entirely lacking. To fill this gap, our team has developed a survey for older adults with T1D to capture usual dietary intake, physical activity habits, diabetes management practices, eating behaviors, and history of nutrition education or dietary counseling. We are actively administering this survey across the UNC Health System. Our project aim to is to use the NCDRC Ignition Fund to partner with the T1D Exchange and broaden the network of respondents by administering the survey across the entire US-based T1D Exchange registry and online community. This partnership with the T1D Exchange will (1) increase number of respondents; (2) broaden representation of older adults with type 1 diabetes to include participants from across the country; and (3) augment our capacity to identify opportunities for new age-specific nutrition education (or re-education) and counseling and other dietary interventions that holistically support nutrition, diabetes management, quality of life, and longevity among older adults with T1D in the future.

Role: PI

K12TR004416 PI: Hernandez, Juliano 07/06/2023 – present 75%

NIH/NCATS

The Gene Orringer Advancing Translational Science Career Development Award at the University of North Carolina at Chapel Hill (TraCS K12)

The Gene Orringer Advancing Translational Science Career Development Award at the University of North Carolina at Chapel Hill (TraCS K12), supports early-career junior faculty for research and career development activities for up to 3 years. The goal is to launch Scholars to their next independent grant. The specific objectives of the K12 are to provide mentored, didactic, and experiential training in translational team science, to integrate Scholars into the resources of the NC TraCS Institute and the CTSA Consortium, to promote Scholar well-being and development of resilience skills and to develop Scholars into effective mentors for mentees from diverse backgrounds . My K12 project is an extension of my KL2 project: "Whether, When, and How: Integrating Systems Science and Precision Health for Individualized Diabetes Care in Older Adults." Project mentors are: Kristen Hassmiller Lich, PhD; Michael

Kosorok, PhD; Elizabeth Mayer-Davis, PhD; John Batsis, MD; Laura Young, MD, PhD.

Role: Scholar

Pilot & Feasibility (P&F) Program award PI: Kahkoska 03/31/23 – 06/30/24 $40,000

Nutrition Obesity Research Center at the University of North Carolina at Chapel Hill

"Characterizing dietary practices and beliefs among older adults with type 1 diabetes and opportunities to provide nutrition-based education and support"

Older adults with type 1 diabetes are understudied, and though nutrition is a critical aspect of diabetes management, very little is known eating beliefs and practices in this patient population. We will employ a mixed methods approach including surveys, focus group discussions, and a small dietary assessment study to generate novel data on older adults' nutrition routines and habits, their beliefs about nutrition and type 1 diabetes management, and their detailed dietary intake. These complementary studies will elucidate opportunities for nutrition-focused education and support in this patient population and inform future interventions targeting the dietary aspects of healthy aging with type 1 diabetes.

Role: PI

Pathway to Stop Diabetes Program Accelerator Award PI: Kahkoska 01/01/23 – 12/31/27 $1,625,000

American Diabetes Association

Fusing rapid-cycle testing and adaptive interventions: A scientific pipeline to translate and individualize evidence-based psychosocial and behavioral interventions in routine type 1 diabetes care

Many efficacious psychosocial and behavioral interventions for type 1 diabetes (T1D) are never translated to routine care settings. Precision medicine statistical methods may address the barriers to translation of evidence-based interventions into clinical practice by more efficiently and effectively matching interventions to the patients, ensuring they remain both clinically and resource-effective. This proposal describes a new translational pipeline that blends the strengths of continuous quality improvement rapid-cycle testing and iteration with cutting-edge precision medicine trial designs and analytics to (1) rapidly implement and optimize interventions for routine clinical settings; and (2) individualize their delivery to patients who are predicted to benefit. The objective of this specific application is to use diabetes distress as a use case to build and test the pipeline.

Role: PI

Prize Agreement Number 2000012740 PI: Kahkoska 11/01/22 – 10/31/23 $50,000

National Academy of Medicine

Systems-Aligned Precision Health for Longevity and Healthy Aging with Type 1 Diabetes

We propose a new approach to tailored diabetes care that uses precision health analytics, informed by systems thinking and stakeholder engagement. Rigorous precision health statistical methods use multisource data for real-time decision support in clinical settings; yet they are markedly underutilized for challenges related to aging. Our approach expands the spirit of precision health—delivery of the right treatment to the right patient at the right time— to match individual patients with the resources, training, and support they need to use technologic therapies, using real-time, patient-level data. This

award is the first phase of the National Academy of Medicine Healthy Longevity Global Competition.

Role: PI

Completed

Project Number 41 PI: Kahkoska 03/01/2022 – 07/31/2023 $50,000

Diabetes Research Connection

Stakeholder Engaged Precision Health for Longevity and Healthy Aging with Type 1 Diabetes

There is a growing population of older adults (≥65 years) with type 1 diabetes. However, there is limited data to guide their care. Continuous glucose monitoring (CGM), a remote-monitoring therapeutic approach that transmits real-time glucose readings from an on-body sensor to a device, has emerged as the standard of care for all adults with Type 1 diabetes. The goal of the project is to generate evidence to tailor support and resources for effective CGM use in older adults with Type 1 diabetes. The project will address how and why older adults with Type 1 diabetes have different experiences initiating and using CGM over time, identify the independent patient characteristics associated with suboptimal response patterns, and generate viable approaches and real-world needs to maximize the benefits of CGM use in older adults.

Role: PI

SE2117 PI: Kahkoska and Young 05/01/22 – 4/30/2023 $2,000

NIH/NCATS

Exploring Needs and Approaches for Optimized Diabetes Education in Older Adults with Type 1 Diabetes: Stakeholder-Engaged Proposal Development

Numerous studies have identified that diabetes education, when done properly, culturally sensitive, and tailored to the target population, can benefit both biological and psychological outcomes in people living with diabetes with lasting effects. Yet, there are currently no age-specific diabetes self-management education materials or curricula for this pivotal transition. As part of the process to develop and NIH proposal for pilot and feasibility studies to address a gap in diabetes education materials for older adults with Type 1 diabetes, we will recruit and collaborate with a stakeholder group. Our stakeholder partner will include older adults living with Type 1 diabetes, their caregivers (including partners and/or children), healthcare providers in the diabetes care space (e.g., physicians, certified diabetes educators), geriatrics subspecialists, nursing staff, and behavioral health experts. Stakeholder contributions will be critical to determine the following: 1) the unmet needs of older adults and their care teams; 2) the best practices for engaging older adults with diabetes in research relevant to their own care; 3) opportunities to enhance educational approaches and their delivery, including digital health options. Involving stakeholders in the development of the research proposal will ensure the entire line of research to be patient-centered, grounded in lived experiences, and relevant to end users. Funded through the NC TraCS Stakeholder Engagement Voucher.

Role: Co-PI

KL2TR0002490 PI: Weinberger 07/01/2021 – 06/20/2023 75%

NIH/NCATS

North Carolina Translational and Clinical Science (NC TraCS) Institute Gene Orringer Junior Faculty Career Development Program KL2

The overall goal of the KL2 Program is to train junior faculty to compete successfully as leaders in translational research. The KL2 program has two overarching goals: (1) Train KL2 Scholars to apply their disciplinary expertise to translational science and equip them with the strategic thinking and management skills needed to create and sustain transformative interdisciplinary research programs in a rapidly changing environment and (2) provide KL2 Scholars with the skills to mentor members of their own research teams, their peers, as well as the next generation of translational scientists. My KL2 project title is "Whether, When, and How: Integrating Systems Science and Precision Health for Individualized Diabetes Care in Older Adults." Project mentors are: Kristen Hassmiller Lich, PhD; Michael Kosorok, PhD; Elizabeth Mayer-Davis, PhD; John Batsis, MD; Laura Young, MD, PhD.

Role: Scholar

5F30DK113728 PI Kahkoska 09/01/2017 – 05/31/2021 100%

NIH/NIDDK

Ruth L. Kirschstein National Research Service Award (NRSA) Individual Predoctoral MD/PhD Dual Doctoral Degree F30 Fellowship (September 2017-May 2021)

"Characterizing Impulsivity as a Determinant of Weight Status and Glycemic Control in Youth with Type 1 Diabetes"

Type 1 diabetes is one of the most common chronic diseases in childhood, and the incidence has been increasing for several decades. Weight management in type 1 diabetes has been underemphasized until recently, when it became recognized that the type 1 diabetes population is not spared from the childhood obesity epidemic and is even more susceptible to the complications of obesity. This training grant provided opportunities to develop research skills, scientific expertise, and scientific manuscripts in the field of diabetes and obesity management, focusing on the co-optimization of weight and glycemia among youth with diabetes. Augmented by a rigorous curriculum in nutrition and epidemiology, a longitudinal endocrinology clerkship, and a diabetes clinic service project, this grant also funded a comprehensive training plan for a translational career in nutrition science and medicine under Beth Mayer-Davis, PhD, John Buse, MD, PhD, and Kyle Burger, PhD.

Role: PI

5T32DK007750 PI Falk 07/01/2016 – 09/01/2017 100%

NIH/NIDDK

Renal Epidemiology Training Grant

The goal of the Renal Epidemiology Training Program is to prepare pre- and postdoctoral trainees to design, conduct, and analyze independent study in the expansive kidney-related fields of research. Under the direction of Dr. *Ronald Falk*, this training program has been continually funded since 1999. All training is centered in the UNC Kidney Center in collaboration with the Departments of Epidemiology, Genetics, Health Policy & Management, Microbiology & Immunology, Nutrition, Pathology & Laboratory

Medicine, and Social Medicine. Trainees are immersed in topics addressing the scope and impact of research needed in the field of kidney disease, reviews of the relevant literature, development of research initiatives, data analysis and preparation of abstracts, research presentations, manuscripts and grants. There is also training in numerous topics in the responsible conduct of research, rigor and transparency in research, and sex as a biologic variable. This training grant provided opportunities to study and produce manuscripts at the interface of nutrition, diabetes management, and early microvascular complications of diabetes including diabetic kidney disease.

Role: Predoctoral Trainee

Kathleen Rao Educational Scholarship Award PI: Young, DeSelm 05/01/2019 $5,100.00

UNC School of Medicine Academy of Educators

"Assessing the preparedness and ability of medical students to navigate complex clinical scenarios and diversity-related conflict"

Often, the focus on medical student training is heavy on clinical skills but lacking in training for navigating challenging clinical scenarios involving diversity-related issues. The objective of the study was to survey third year medical students with regards to their comfort level and preparedness to navigate such scenarios as they occur across 3 levels, including with patients, peers, and upper-level supervisors, and over 7 subjects, including sex, race, politics, age, sexual orientation and identity, disability, and religion. This funding supported a pilot project that developed, administered, and analyzed a 24-item survey was administered electronically to third year medical students describing a range of specific interactions with patients, peers (i.e. other medical students), and upper-levels (i.e. residents and attending physicians), spanning subjects including sex, race, politics, age, sexual orientation and identity, disability, and religion.

Role: Co-I

$5-$50K Pilot Grant PI: Mayer-Davis, Kosorok 07/01/2018 – 07/01/2019 $50,000

The North Carolina Translational and Clinical Sciences (NC TraCS) Institute

"Development and Optimization of HEDRA, a novel m-health decision support tool for weight and glycemic control in type 1 diabetes."

Funding from this NC TraCS/NC State Collaborative Pilot Grant facilitated the development of an mHealth decision support tool that incorporates the joint targets of glycemic control and weight management to reduce overall cardiovascular disease among youth and adults with type 1 diabetes. Research activities included the design of a user interface for the mHealth decision support tool, Aim 2 focused on integrating the new user interface with artificial intelligence components, and Aim 3 elicited feedback from individuals living with type 1 diabetes on the resulting mHealth tool prototype. These research efforts expanded a collaboration between investigators in Biostatistics and Precision Medicine at UNC (Michael Kosorok, PhD) and NCSU (Eric Laber, PhD) to include new expertise in obesity and diabetes research (Elizabeth Mayer-Davis, PhD) and endocrine clinical care (Laura Young, MD, PhD).

Role: Co-I

SERVICE

Department, School, and University Service

2023 – present Department of Nutrition Student Social Planning Committee, University of North Carolina at Chapel Hill

2023 North Carolina Diabetes Research Center 2024 Faculty Development Workshop Planning Committee

2021 – present Department of Nutrition Inclusive Excellence Committee, University of North Carolina at Chapel Hill

2022 Hiring committee; NC TraCS Data Science Lab, University of North Carolina at Chapel Hill

2021 Department of Nutrition Alumni Council, University of North Carolina at Chapel Hill

2017 – 2021 MD/PhD Program Admissions Committee, University of North Carolina at Chapel Hill

2018 Department of Nutrition 'Work-in-Progress' Seminar Series Coordinator, University of North Carolina at Chapel Hill

2017 - 2018 MD/PhD Program Vertical Integration Team Captain, University of North Carolina at Chapel Hill

2017 – 2018 Co-Vice President of Research Opportunities, John B. Graham Medical Student Research Society, University of North Carolina at Chapel Hill School of Medicine

2016 – 2017 Treasurer, 2017 – 2018, John B. Graham Medical Student Research Society, University of North Carolina at Chapel Hill School of Medicine

2014 – 2015 Co-Vice President of Student Research Day, John B. Graham Medical Student Research Society, University of North Carolina at Chapel Hill School of Medicine

2010-2013 Dean's Team/College Ambassador, Syracuse University

State, National and International Services

Committees

2023 – American Diabetes Association North Carolina Leadership Advisory Team

2021 – Junior Faculty Representative, Internal Advisory Committee for the North Carolina Diabetes Research Center

2020 American Diabetes Association/European Association for the Study of Diabetes Medicine in Diabetes Initiative PDM2021 Planning Committee Member

Editorial Board Member

Diabetes Care

Ad-hoc Journal Reviewer

JAMA Internal Medicine

Diabetes Care

Diabetes

BMJ Open Diabetes Research & Care

BMJ Open

Conference Abstract Reviewer

Precision Diabetes Medicine PDM2021 Virtual Conference

Grant Reviewer

ADA's Innovative Research to Support the Psychological and Emotional Needs of People with Diabetes (2023)

ADA's Precision Medicine and Diabetes Research Awards (2022)

ADA's Leveraging Nutrition and Lifestyle for Diabetes Prevention Across the Life Span (2022)

Community Service/Volunteer Activities

2014 – 2018 Co-Coordinator, Endocrinology Night at the Open Door Clinic of Alamance County, Burlington, NC

MEMBERSHIPS

Professional Societies

Behavioral Research in Diabetes Group Exchange (Active)
American Diabetes Association (Active)
American Geriatrics Society (Active)
American Society for Nutrition
The Obesity Society
UNC School of Medicine Eugene S. Mayer Honor Society for Community Service
UNC John B. Graham Medical Student Research Society

Research Consortia

International Geriatric Diabetes Society
Nutrition for Precision Health Consortium
American Diabetes Association/European Association for the Study of Diabetes Precision Medicine in Diabetes Initiative
Accelerating Solutions to Optimize Glycemic Control and Weight Management In Young Adults with Type 1 Diabetes (ACT1ON)

RESEARCH STATEMENT

Undergraduate research: I graduated from Syracuse University in 2013 with a biochemistry major and a minor in anthropology. During my time at Syracuse, I conducted research in biological chemistry in the laboratory of Robert Doyle, PhD, studying how to utilize vitamin B12 to deliver proteins orally and to target metalloprobes and chemotherapeutics to tumor cells (Vortherms, Kahkoska et al. 2011, Fazen, Kahkoska et al. 2012, Ikotun, Marquez et al. 2014). For my scholarship at Syracuse, I was named a Coronat Scholar, a Remembrance Scholar, a Syracuse Scholar, an iLEARN Scholar, and a Wise-Marcus Scholar in the Renée Crown University Honors Program.

Graduate Research: I subsequentially enrolled in and completed the MD/PhD program at the University of North Carolina at Chapel Hill (UNC). I received my PhD in Nutrition with a minor in Epidemiology from the UNC Gillings School of Global Public Health in 2019; I graduated with my MD degree from the UNC School of Medicine in 2021. My dual-degree training was funded by a Ruth L. Kirschstein National Research Service Award (NRSA) Individual Predoctoral MD/PhD Dual-Doctoral Degree F30 Fellowship.

My interests in medicine and science have been focused in both type 1 and type 2 diabetes, and I have remained committed to service and research in this area over the past twelve years. I stayed engaged in this realm of patient care as a preclinical medical student and graduate student, where I served as the coordinator of free endocrinology care at the Open Door Clinic of Alamance County. During that time, I was awarded an Albert Schweitzer Fellowship for my project to implement shared medical appointments as the standard of care for diabetes under the supervision of John Buse MD, PhD and Laura Young MD, PhD, exploring the potential of this model for other free clinics (Kahkoska, Brazeau et al. 2018) as well as the ways it could be tailored to address unmet needs in diabetes across the state of North Carolina (Drake, Kirk et al. 2019).

My earliest professional experiences revealed to me the complexities and frustrations that patients and their physicians encounter, and I was intrigued by how we can use data in new ways to better address these gaps. A major challenge in diabetes care is how to address the profound differences between individuals, including their clinical status and their response to therapy. My dissertation work focused on the development and application of machine learning techniques to identify subgroups of patients with diabetes who represent distinct disease subtypes and may be amenable to different therapeutic strategies. My primary thesis advisor was Elizabeth Mayer-Davis, PhD. With co-mentorship from Michael Kosorok, PhD, in the Department of Biostatistics, we used novel statistical methods and a broad range of data from youth with type 1 diabetes to inform future interventions that consider important differences between patients such as body weight, long-term blood glucose control, and short-term fluctuations in blood glucose over the day and night (Kahkoska, Adair et al. 2019, Kahkoska, Nguyen et al. 2019, Kahkoska, Nguyen et al. 2020). This precision medicine approach represented an exciting step towards tailored care with an aim to improve multiple outcomes simultaneously. I have been recognized by the American Society for Nutrition (2018 Clinical Emerging Leader Award), The Obesity Society (2019 George A. Bray Doctoral Dissertation Award), the Philanthropic Educational Organization (2019 Carolyn E. Conway Endowed P.E.O. Scholar Award), the UNC Graduate School (2019 Impact Award and 2019 Dean's Distinguished Dissertation Award), and the North Carolina Precision Health Collaborative (2020 Young Investigator of Excellence in Precision Health) for these studies. By giving voice to the emerging yet vague notion of precision medicine in chronic disease, my goal is to continue to build a program of work that will propel the field to realize the potential of this paradigm for the care of chronic disease.

My broader body of work has retained the theme of personalized medicine. I have collaborated on the development of other statistical methods to predict youth with diabetes who respond to specific trial interventions (Kahkoska, Lawson et al. 2019, Nguyen, Luckett et al. 2019) and artificial intelligence algorithms for decision support in glucose management (Luckett, Laber et al. 2019) with emerging

industry partnerships to develop an mobile health application. I have contributed in research efforts to develop glucose-responsive insulin delivery systems that may offer an automated and individualized modality of glucose regulation led by Zhen Gu, PhD (Hu, Yu et al. 2017, Wang, Ye et al. 2018, Wang, Yu et al. 2019). To understand individual experiences and how interactions with the larger healthcare system can be integrated into personalized care, I have used mixed methods to study patient-perceived barriers to care (Kahkoska, Watts et al. 2018, Addala, Igudesman et al. 2019) and advanced epidemiological modeling to characterize health disparities in longitudinal diabetes outcomes (Kahkoska, Shay et al. 2018, Kahkoska, Shay et al. 2018, Kahkoska, Crandell et al. 2019).

Current and Future Research: Effective therapy and self-management in diabetes are shaped over time by a complex system of interrelated, multilevel determinants; looking ahead, I believe that the importance of this system cannot be ignored in precision medicine and health research. Understanding the context in which we are providing care will offer direct insights into the best way to appropriately leverage limited resources while most meaningfully addressing different needs that patients may have. In July of 2021, I joined UNC as a Research Assistant Professor in the Dept. of Nutrition, where I am funded by the North Carolina Translational and Clinical Sciences Institute Gene Orringer Junior Faculty Career Development (KL2/K12) Program. As a KL2/K12 Scholar, I undertook a career development plan to acquire training in qualitative systems science approaches, including tools for mapping and modeling the multiple factors that shape health outcomes, and implementation science to augment my background in precision health.

My current research portfolio focuses on the growing number of older adults living with diabetes, with an emphasis on those with type 1 diabetes. Data to inform best practices for care and self-management in this age group are urgently needed. My KL2/K12 research project generated pilot data to tailor resources for effective use of continuous glucose monitoring, a potentially life-saving therapy, in older adults (ages ≥65 years) with type 1 diabetes. These studies have been recognized for their potential impact to leverage a data-driven, precision medicine framework to increase adoption and use of evidence-based technology among older adults with diabetes, with additional funding from the Diabetes Research Connection and a prize from the National Academy of Medicine Healthy Longevity Global Competition. I have successfully completed my KL2/K12 pilot data collection and am currently in the process of securing funding for a pilot precision health trial to develop and test the first adaptive intervention for tailored support for older adults to integrate CGM into their self-care (anticipated start date: summer 2024). I also have a pending K01 award from the National Institute on Aging that will support me to acquire training to evaluate the real-world clinical -and cost-effectiveness of continuous glucose monitoring among older adults with diabetes.

As part of our work to learn about how older adults interact with diabetes technology, my team and I identified that truly very little is known about the dietary practices and beliefs of older adults with type 1 diabetes, even though this population is growing rapidly and will likely require age-specific nutrition guidance to promote health and longevity. In 2022, I won funding from the NORC Pilot & Feasibility Program has allowed me to catalyze a new, exciting line of research that investigates the dietary beliefs and practices of older adults with type 1 diabetes. We are collecting what is, to our knowledge, the first detailed dietary dataset from older adults with type 1 diabetes, critical pilot data to design nutrition-based interventions that are relevant and beneficial to older adults in the future. Looking ahead, I am committed to advancing the field of nutrition science for type 1 diabetes across the entire lifespan through future projects that both expand our epidemiologic data and develop novel, patient-centered educational and behavioral interventions.

Alongside my KL2/K12 studies, I am exploring how to apply systems thinking and precision health to translate evidence-based behavioral and psychological interventions into practice. For example,

psychosocial and behavioral interventions (i.e., interventions with psychological, educational, behavioral change, and peer support components) can address the burdensome nature and emotional toll of diabetes management and offer critical support for individuals to attain their best outcomes; yet it is notoriously challenging to implement and sustain interventions that worked in trial settings in the busy clinical settings where patients receive their routine T1D care. I was awarded one of two of the 2022 Accelerator Awards from the American Diabetes Association Pathway to Stop Diabetes, which is designed to support independent early-career researchers proposing innovative and ambitious diabetes-related research programs with a total of $1,625,000 over five years. My project will build and test a new, translational pipeline to (1) rapidly implement evidence-based psychosocial and behavioral interventions in routine care settings, and then (2) use precision medicine trial designs and analytics to optimally target/tailor their delivery to the patients estimated to benefit most. We will focus on diabetes distress in adults with type 1 diabetes as a use case, with clear extensions into nutrition-based interventions in the future. My long-term objective through this vein of research is to advance the field towards an integrated (i.e., embedded within routine care without burdening individual providers), individualized (i.e., responsive to interindividual differences), and data-driven (i.e., able to use patient data to select optimal interventions) model of delivering psychological and behavioral health as part of routine diabetes care.

TEACHING STATEMENT

As part of my training in graduate school, I had a series of opportunities to mentor multiple bachelor's and master's students in research. As an MD/PhD candidate, I also provided broad career advising for high school, undergraduate, and post-baccalaureate students through the UNC-CH Advocates for Inclusion in Medicine and Science, forming long-term relationships in many cases, and I have mentored three students to successfully applying for and matriculating into MD/PhD programs. These early experiences solidified my desire to continue to find opportunities to mentor others to achieve their specific research goals, as well as in the selection and pursuit of larger career goals that are aligned with their interests, strengths, and the long-term impact they wish to have.

In just over my first year and half as junior faculty in the Department of Nutrition, I have had the privilege of serving as the faculty mentor for more than four Nutrition BSPH students through research electives offered by UNC-CH, as well as an additional group of freshman and post-bac students who have chosen to pursue extracurricular research experiences outside of their coursework. Outside of the Department, I currently serve or have served on two dissertation committees in the UNC Department of Biostatistics two in the Department of Health Policy and Management, and I fund three doctoral students to work on a diverse set of research projects focused on older adults with diabetes, including quantitative and qualitative studies. I also serve as one of two co-Associate Directors for Dr. Michael Kosorok' s research group in the Department of Biostatistics (the Precision Health and AI Research Lab. Finally, I provide training and ongoing mentorships to clinical trainees, including senior medical students in the School of Medicine and clinical fellows in the Division of Endocrinology as part of collaborative projects which fulfill their scholarly work requirements. I received the 2023 Gillings School Teaching Innovation Award, an annual, student-nominated award. In my doctoral training, I served as a Teaching Assistant for NUTR 813: Nutritional Epidemiology. As a Research Assistant Professor, I am currently co-teaching NUTR 765, Nutritional Epidemiology for Masters Students, with Dr. Katie Meyer, with plans for my transition to a primary instructor role in future years.

As a scientific mentor and an educator, I am enthusiastic to support trainees to learn how to interpret evidence or analyze existing data (e.g., cohort, registry, or healthcare data sources) to answer their research questions and advance the practice of nutrition in real-world settings. I believe that strong critical thinking skills transcend domain expertise in any one area of expertise in family of research

methods, and multiple opportunities for discussion and practice are needed for to build these skills such that trainees can go on to thoughtfully consume and contribute to the science (and practice) in their chosen careers. As a research mentor specifically, my goal is to provide a base of structure and support from which students feel inspired, competent, and confident to take a more active scientific role and formulate their own research questions for study. Further, as someone who has spent time in a number of different training environments (i.e., the classroom, the clinic, bench laboratory spaces, statistical research groups, etc.), I realize that different students learn best in different ways and thrive in different environments; equipping trainees with skills for reflection and communication so that they can articulate these factors as part of navigating their own training and when formulating their career trajectories is a priority of my mentoring. Throughout my career, I aim to stay exceedingly generous with my time, and specifically when others need my help or mentoring.

EQUITY AND INCLUSION STATEMENT

I aim to model and contribute to equity and inclusion as a community member, educator, and researcher on the UNC campus. I am committed to doing everything I can to ensure that those around me feel welcomed, respected, and valued, regardless of their race, ethnicity, religion, spirituality, gender identity, sexual orientation, age, ability, or any other aspect of their identity. I have served on the UNC Department of Nutrition's Inclusive Excellence Committee since 2021 when I joined faculty as a Research Assistant Professor.

As a mentor and instructor, I welcome the opportunity to work with students or trainees from all backgrounds and I aim to create an environment for learning and research that is fully inclusive and celebratory of that diversity. I believe that I am highly capable of forming individualized and long-lasting connections with students and bridge across different individual's' interests, goals, and needs to foster an environment where everyone can thrive. I frequently incorporate conversations to highlight the scientific and ethnical aspects for why diversity and representation matters in our research into my mentoring and teaching, as well as the importance of identifying and addressing racism and other forms of discrimination, practicing cultural sensitivity, and selecting inclusive and person-first, strength-based language in all patient-facing materials and scientific communication.

As a scientist, I have benefited deeply from working with teams that include individuals who come from a variety of personal and professional backgrounds, and I aim to surround myself with collaborators who bring identities and perspectives that are different than my own. As I assume more leadership positions in my career, it is my priority to cultivate the true ability to recruit, collaborate with, and learn from everyone around me, modeling a genuine openness to new ideas and viewpoints.

A central aspect of my scholarly work involves the study of health disparities in the context of diabetes management and outcomes. My earlier work called attention to alarming trends of racial-and ethnic inequities that affect youth and young adults with diabetes across a range of important clinical outcomes, and my writing on these. My current portfolio is focused on older adults, a population that remains underrepresented in biomedical research. As this population continues to grow, it is imperative to identify opportunities to leverage nutrition for optimal health across the lifespan. Further, a key aspect of my research involves engaging people living with diabetes and their caregivers to ensure I understand the complexity of their day-to-day experiences and am pursing relevant and impactful research questions that are responsive to their unmet needs. From my KL2 training, I have specialized training in stakeholder engagement and each of my main lines of work includes a prominent stakeholder engagement component.

As a researcher within the broader community, I believe I have other, cross-cutting responsibilities to reinforce a broad culture of equity and inclusion at each step of the research process, including how we

collect data, how we use it, and how we disseminate our results. As I grow my portfolio of work, I will continue using qualitative and community-engaged research methodologies to meaningfully integrate the experiences and perspectives all of the actors who are involved in the care and support of the patient populations that I study, with an eye towards amplifying the voices that are not currently well-represented in biomedical research. As I undertake new data collection projects, I am working with a team to design and operationalize a purposive sampling framework to ensure that our study sample is diverse and representative and optimize our recruitment approach to be as inclusive as possible. When it comes time to disseminate the results, I am committed to discussing thoroughly the role of social factors in trends we observe, stating clearly the limitations in who is often represented in the data that we analyze, and to making explicit the implications for generalizability to real-world, heterogenous populations.