

University of South Carolina Protocol v2

Study Title: Energize! Internet-Delivered Physical Activity Program for Adults with Knee Replacement

Principal Investigator Name: Christine A. Pellegrini, PhD

Funding: This work was supported by an ASPIRE grant from the Office of the Vice President for Research at the University of South Carolina.

Clinical Trials Identifier: NCT06096727

Date: 9/4/2023

A. SPECIFIC AIMS

Aim 1: Examine the effects of an internet-based physical activity program on moderate to vigorous intensity physical activity (MVPA), pain, self-reported physical function, sleep disturbance, cognitive function, and psychosocial constructs in adults with TKR at 3 months (post-intervention) and 6 months (maintenance).

Hypothesis: *Participants randomized to Energize! will engage in more MVPA, have less pain and sleep disturbance, better physical and cognitive function at 3 months as compared to those in Delayed Energize!.*

Aim 2: Examine the acceptability of the Energize! Exercise Program by assessing adherence to the intervention (number of video lessons viewed, planning and reporting of exercise minutes, completion of homework assignments) and participant satisfaction ratings.

Aim 3: Explore the maintenance effects of an internet-based physical activity program on moderate to vigorous intensity physical activity (MVPA), pain, self-reported physical function, sleep disturbance, and cognitive function in adults with TKR at 6 months (maintenance) among those randomized to the immediate Energize! condition.

B. BACKGROUND AND SIGNIFICANCE

More than 4 million adults ≥ 50 years are living with a total knee replacement (TKR).¹ TKR utilization in the US continues to increase dramatically across all ages, with over 615,000 TKR completed annually.² The number of *new* TKR's is expected to approach 3.48 million by 2030.³ TKR substantially increases lifetime medical costs and accounts for 61% of osteoarthritis-related direct medical costs.⁴ Hospital-based costs of TKR exceed \$16 billion.⁵ With the dramatic expected rise of TKR utilization over the next 20 years³ and substantial burden on the economy, it is imperative to identify approaches to maximize the benefits of this costly treatment.

While TKR can improve health-related quality of life,⁶ pain,⁷ and physical function⁸, less than 5% of adults with TKR reach recommended physical activity guidelines after surgery, and physical activity levels at 1 year post-surgery remain similar to pre-operative levels.^{9,10} The continued low levels of physical activity are concerning because inactivity is associated with increased risk of mortality¹¹ and chronic disease,^{12,13} as well as lower quality of life¹⁴ and poorer physical function.^{15,16} Further, while undergoing TKR initially reduces overall mortality, within the decade following surgery, adults with TKR are at higher risk for death from dementia¹⁷ and cardiovascular disease¹⁸ as compared to adults without TKR. In particular, ~70% of deaths that occurred ≥ 10 years after TKR are due to cardiovascular diseases, Alzheimer's disease, and dementia.¹⁹ Although exact reasons for the excess mortality in this population are unknown,¹⁹ increased physical activity after TKR may help prevent or delay the development of cardiovascular disease,^{20,21} dementia,^{20,21} and Alzheimer's disease.²⁰

As a result, there has been an increase in the number of interventions targeting increased physical activity after TKR, but increases in physical activity have been small to modest (e.g., increase of 1,164 to 1,808 steps or 39-73 minutes of moderate intensity activity).²²⁻²⁴ It has been hypothesized that many of these programs have had limited success because they were implemented too soon after surgery (this includes our ASPIRE-I trial),²⁵ as evidence suggests that physical impairments, activity limitations, and social participation restrictions continue to

University of South Carolina Protocol v2

occur throughout the first 12 months post-TKR.²⁶ Further, it is estimated that at least 20% of adults after TKR still experience significant pain beyond this period.²⁷ Prior research also suggests that interventions which have had the greatest impact on physical activity have been too costly or burdensome to implement within clinical care.^{22,23} *Therefore, low-cost physical activity programs that could be implemented when adults with TKR are completely recovered from surgery are critical for addressing the low levels of physical activity observed in this population and reducing their increased risk for cardiovascular disease and dementia.*

The Energize! Exercise Program is 3-month fully-automated internet-based physical activity program, which is guided by the Multi-Process Action Control (M-PAC) framework,²⁸ and represents a low-cost and highly disseminable approach for targeting physical activity in TKR patients, particularly given that over 91% of adults have access to the internet.²⁹ Preliminary results suggest high feasibility, acceptability, and initial efficacy of this program for increasing activity among inactive adults; however, it has not been tested in adults with TKR. Due to potential physical limitations and comorbidities, those with TKR are often excluded from physical activity programs, despite being a growing and high-risk population.

C. RESEARCH DESIGN AND METHODS AND DATA ANALYSIS

Study Design: The proposed project is a pilot randomized controlled trial examining the acceptability and preliminary effects of an internet-based physical activity program on MVPA following TKR. A total of 50 adults will be recruited and randomized to either start the Energize! internet-based physical activity program immediately or at 3 months.

Procedures:

Screening: Participants will be screened by an online REDCap survey to ensure they meet study criteria. Interested and eligible participants will be scheduled for a telephone call with a study staff member to review study details and answer any questions participants may have about participation in this study.

Informed Consent: Following telephone discussion with a study staff member, participants will be emailed a link to complete the online informed consent. To ensure the consent form is understandable to the study population, the consent form will be written using short sentences and non-technical terms, with a reading level at or below an eighth-grade level. Interested participants will type their name in the online approved informed consent document.

Randomization: After completing the baseline assessment, participants will be randomized in a 1:1 ratio to either: (1) Energize! or (2) Delayed Energize!. Participants will be notified of their randomization and the start date of when they will start Energize!.

Randomized Conditions:

- 1.) **Energize!.** Prior to the start of the program, participants will attend a 30-minute webinar where they will be taught how to navigate the study website and given the opportunity to ask questions. Each week, participants will be prescribed a MVPA goal, starting at 75 min/wk and gradually progressing to 200 min/wk by month 3. Participants will learn how to monitor exercise intensity and encouraged to engage in TKR appropriate moderate-intensity aerobic activity (e.g., brisk walking, cycling). To

University of South Carolina Protocol v2

promote a regular habit of exercise, participants will be encouraged to engage in activity 5 days/week.

Participants will watch a 10-15 minute video lesson weekly during the 3-month program. Topics of the lessons include exercise planning, problem solving around exercise barriers, exercise motivation, and thinking like an exerciser. In addition, participants will be encouraged to make a plan of when they will exercise and the type and duration of their intended activity. Action planning is predictive of health behavior change in many domains³⁰ and helps to bridge the intention-behavior gap often seen with exercise.³¹ Participants will report their actual activity performed daily on the study website (e.g., minutes/day, time of day, and type of activity) and will receive computer-generated personalized feedback based upon the data that was input from the previous week. Feedback algorithms take into account the amount of exercise performed, whether or not the homework assignment was completed, and whether it was an atypical week in terms of injury, illness or vacation. Feedback messages are designed to be encouraging and motivational, praising individuals for meeting goals. When goals are not met, support and encouragement are provided along with specific recommendations for behavioral strategies to implement. If participants do not report their exercise on the study website in a given week, an automated email reminder will be sent. To help participants apply the intervention content, they will be asked to complete homework assignments corresponding to each video lesson (~10 minutes to complete). Example assignments include creating routines around activity to promote habit formation, journaling about the value of activity in their own lives, journaling about positive feelings associated with activity, evaluating their progress, problem solving around activity barriers, and answering prompts to help them identify with being an 'exerciser'.

- 2.) **Delayed Energize!**. Participants randomized to Delayed Energize! will receive the Energize! Program following the completion of the 3-month assessment.

Measures:

Assessments will be completed at baseline, 3, and 6 months. Participants will be emailed a link to complete surveys administered via REDCap. Additionally, participants will be mailed an activity monitor, activity log, and prepaid padded envelope to return the monitor following completion of the 7-day wear period. Participants will receive a \$25 electronic gift card for completing each assessment.

1. **Physical Activity.** MVPA assessed using Actigraph GT9X Link accelerometers will be the primary outcome. Participants will be asked to wear the monitor on their waist for 7 days. Non-wear time will be defined as ≥ 90 minutes with zero activity counts, allowing for up to 2 minutes of < 100 counts/min.³² Participants must have ≥ 4 days of valid wear time (≥ 10 hours/day) to be included in analyses. Participants will also be asked to complete a log indicating times the monitor was worn and taken off. Physical activity will be categorized as sedentary (< 100 counts/min), light (100-2019 counts/min), and MVPA (≥ 2020 counts/min).³³ Total MVPA/week will be calculated. The average number of steps/day will also be obtained and calculated.
2. **PROMIS.** Pain intensity, pain interference, physical function/mobility, sleep disturbance, and cognitive function will be assessed using PROMIS computer-adaptive tests on

University of South Carolina Protocol v2

REDCap.³⁴ These measures are commonly used, have demonstrated test-retest reliability, and are sensitive to change in adults with TKR.^{35,36}

3. **EXERCISE BENEFITS/BARRIERS SCALE.** Perceived exercise benefits and barriers will be assessed using a 43-item survey. Participants will respond to each question with strongly agree, agree, disagree, strongly disagree.
4. **Self-Determination Theory Constructs.** Exercise Self-Identity will be assessed using the 9-item Self-Reported Exercise Identity Scale.³⁷ Participants will rate on a scale from 1 (strongly disagree) to 5 (strongly agree) their feelings relating to exercise identity. Examples include, “I would feel a real loss if I were forced to give up exercising” and “I need exercise to feel good about myself.” Intrinsic Motivation Inventory³⁸ assesses participants’ interest/enjoyment, perceived competence, effort, value/usefulness, felt pressure and tension, and perceived choice while performing a given activity.³⁹ This will only be assessed at either 3 or 6 months, depending on randomization to Immediate or Delayed. Perceived Competence⁴⁰ will be assessed using a 4-item survey assessing confidence in your ability to exercise regularly.
5. **Process Measures & Program Satisfaction.** Adherence to Energize! will be examined over the 3-month program, including the number of video lessons viewed, planning and reporting exercise minutes, and completion of the homework assignments. Participants will complete a program evaluation to rate usefulness and satisfaction of program features, and their overall satisfaction with the program. Participants will also have an opportunity to provide an open-ended response to features they liked, disliked, or would want to change. These results will be used to inform additional future adaptations to the program.

Data Analysis: Descriptive statistics will be used to describe baseline characteristics, process measures, and program satisfaction. Mixed ANOVA or ANCOVAs, if appropriate adjustments are required based on baseline characteristics, will examine the changes in physical activity levels (MVPA/week, steps/day) and patient-reported outcomes (PROMIS pain intensity, pain interference, mobility, and cognitive function) across time between Energize! and Delayed Energize! conditions. Although the proposed study may not be powered to detect significant differences, the results will allow us to collect preliminary efficacy and acceptability data, refine the intervention, if necessary, and determine effect sizes for future grant submissions.

Data Management: All surveys will be administered online via REDCap (secure, web application for building and managing online surveys and database – managed by Health Sciences South Carolina). Any paper documents will be stored in a locked filing cabinet at the TechHealth Center at University of South Carolina. All computer files will be password protected. Only the study team will have access to the data.

D. PROTECTION OF HUMAN SUBJECTS

1. TARGET POPULATION:

A total of 50 adults will be recruited to participate. Participate eligibility criteria includes:

Inclusion Criteria: The target population will include having a partial or complete TKR surgery ≥12 months ago, regular access to the internet, completion of baseline assessment measures (surveys, ≥4 days valid of activity monitoring), willingness to wear the accelerometer for 7 days at baseline, 3-, and 6-months, and engage in less than 60 minutes/week of self-reported moderate intensity exercise.

University of South Carolina Protocol v2

Exclusion Criteria: Participants will be excluded if they are non-english speaking, planning to have another surgery that limits mobility in the next 6 months, or if they have any other medical conditions which limits their activity.

2. RECRUITMENT PLANS:

Participants will be recruited through numerous methods including flyers and postcards at physical therapy clinics and orthopedic surgeon offices in the Columbia, SC area, Research Match, SCresearch.org, and online and social media outlets (e.g., Facebook) that have been successful for recruiting older adults with arthritis.

3. EXISTING DATA/SAMPLES:

N/A

4. CONSENT/ASSENT:

Following telephone discussion with a study staff member, participants will be emailed a link to complete the online informed consent. To ensure the consent form is understandable to the study population, the consent form will be written using short sentences and non-technical terms, with a reading level at or below an eighth-grade level. Interested participants will type their name in the online approved informed consent document and a copy of the consent can be emailed to participants for their records.

5. POTENTIAL RISKS:

The risks of participating in this study are minimal; however, potential risks that participants may experience include:

- Muscle soreness or pain from increasing physical activity after knee replacement.
- An injury as a result of their physical activity. Participants are encouraged to stop exercising immediately if at any time they are injured or are encouraged to stop engaging in physical activity from their physical therapist/physician/medical professional.
- A loss of balance and fall during exercise.

6. POTENTIAL BENEFITS:

By taking part in this study, you may or may not experience any benefits. You may experience positive changes to health and mood. Additionally, this research may be valuable for learning better ways to aid individuals in making healthy behavior changes after knee replacement.

7. CONFIDENTIALITY

To ensure participants information is confidential, all participants will be assigned a study ID, which will be used on all paper or electronic forms. All study files will be stored in locked cabinets or on password-protected computer data files or secure-websites that only authorized study personnel can access. All results will be presented in aggregate form and participants will not be identified personally in any scientific report or presentation.

8. COMPENSATION:

Participants will receive \$25 in the form of an electronic gift card for completing each assessment, which will be conducted at baseline, 3-month, and 6-month.

9. WITHDRAWAL:

University of South Carolina Protocol v2

Participants will be informed they can leave the research at any time without penalty. If a participant decides to withdraw, no more information will be collected. The participants will be made aware of this during the consent process.

Any data collected during their participation may be used by the investigators for the purposes described above. Choosing not to be in the study will not result in any penalty or loss of benefit to which participants are entitled. Specifically, the choice not to be in this study will not negatively affect a participant's right to any present or future medical treatment or his/her present or future employment.

E. REFERENCES/LITERATURE CITATIONS

1. Weinstein AM, Rome BN, Reichmann WM, et al. Estimating the burden of total knee replacement in the United States. *J Bone Jt Surg Am*. 2013;95(5):385-392. doi:10.2106/JBJS.L.00206
2. Losina E, Thornhill TS, Rome BN, Wright J, Katz JN. The Dramatic Increase in Total Knee Replacement Utilization Rates in the United States Cannot Be Fully Explained by Growth in Population Size and the Obesity Epidemic. *J Bone Jt Surg Am*. 2012;94(3):201-207. doi:10.2106/jbjs.j.01958
3. Kurtz S, Ong K, Lau E, Mowat F, Halpern M. Projections of Primary and Revision Hip and Knee Arthroplasty in the United States from 2005 to 2030. *J Bone Jt Surg Am*. 2007;89(4):780-785. doi:10.2106/jbjs.f.00222
4. Losina E, Paltiel AD, Weinstein AM, et al. Lifetime Medical Costs of Knee Osteoarthritis Management in the United States: Impact of Extending Indications for Total Knee Arthroplasty. *Arthritis Care Res Hoboken*. 2015;67(2):203-215. doi:10.1002/acr.22412
5. Russo A, Elixhauser A, Steiner C, Wier L. Hospital-Based Ambulatory Surgery, 2007: Statistical Brief #86. In: *Healthcare Cost and Utilization Project (HCUP) Statistical Briefs*. Agency for Healthcare Research and Quality (US); 2006. Accessed July 8, 2020. <http://www.ncbi.nlm.nih.gov/books/NBK53600/>
6. Ethgen O, Bruyere O, Richy F, Dardennes C, Reginster JY. Health-related quality of life in total hip and total knee arthroplasty. A qualitative and systematic review of the literature. *J Bone Jt Surg Am*. 2004;86-A(5):963-974.
7. Vina ER, Hannon MJ, Kwok CK. Improvement following total knee replacement surgery: Exploring preoperative symptoms and change in preoperative symptoms. *Semin Arthritis Rheum*. 2016;45(5):547-555. doi:10.1016/j.semarthrit.2015.10.002
8. Mizner RL, Petterson SC, Clements KE, Zeni JA, Irrgang J, Snyder-Mackler L. Measuring Functional Improvement after Total Knee Arthroplasty Requires both Performance-Based and Patient-Report Assessments: A Longitudinal Analysis of Outcomes. *J Arthroplasty*. 2011;26(5):728-737. doi:10.1016/j.arth.2010.06.004
9. Arnold JB, Walters JL, Ferrar KE. Does Physical Activity Increase After Total Hip or Knee Arthroplasty for Osteoarthritis? A Systematic Review. *J Orthop Sports Phys Ther*. 2016;46(6):431-442. doi:10.2519/jospt.2016.6449
10. Harding P, Holland AE, Delany C, Hinman RS. Do activity levels increase after total hip and knee arthroplasty? *Clin Orthop*. 2014;472. doi:10.1007/s11999-013-3427-3
11. Nocon M, Hiemann T, Müller-Riemenschneider F, Thalau F, Roll S, Willich SN. Association of physical activity with all-cause and cardiovascular mortality: a systematic review and meta-analysis. *Eur J Cardiovasc Prev Rehabil Off J Eur Soc Cardiol Work Groups Epidemiol Prev Card Rehabil Exerc Physiol*. 2008;15(3):239-246. doi:10.1097/HJR.0b013e3282f55e09
12. Sullivan PW, Morrato EH, Ghushchyan V, Wyatt HR, Hill JO. Obesity, inactivity, and the prevalence of diabetes and diabetes-related cardiovascular comorbidities in the U.S., 2000-2002. *Diabetes Care*. 2005;28(7):1599-1603. doi:10.2337/diacare.28.7.1599
13. Lee IM, Shiroma EJ, Lobelo F, Puska P, Blair SN, Katzmarzyk PT. Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *The Lancet*. 2012;380(9838):219-229. doi:[http://dx.doi.org/10.1016/S0140-6736\(12\)61031-9](http://dx.doi.org/10.1016/S0140-6736(12)61031-9)

University of South Carolina Protocol v2

14. Brown DW, Balluz LS, Heath GW, et al. Associations between recommended levels of physical activity and health-related quality of life Findings from the 2001 Behavioral Risk Factor Surveillance System (BRFSS) survey. *Prev Med*. 2003;37(5):520-528. doi:10.1016/S0091-7435(03)00179-8
15. Dunlop DD, Song J, Semanik PA, Sharma L, Chang RW. Physical activity levels and functional performance in the osteoarthritis initiative: a graded relationship. *Arthritis Rheum*. 2011;63(1):127-136. doi:10.1002/art.27760
16. Dunlop DD, Semanik P, Song J, et al. Moving to Maintain Function in Knee Osteoarthritis: Evidence from the Osteoarthritis Initiative. *Arch Phys Med Rehabil*. 2010;91(5):714-721. doi:10.1016/j.apmr.2010.01.015
17. Michet CJ, Schleck CD, Larson DR, Maradit Kremers H, Berry DJ, Lewallen DG. Cause-Specific Mortality Trends Following Total Hip and Knee Arthroplasty. *J Arthroplasty*. 2017;32(4):1292-1297. doi:10.1016/j.arth.2016.10.009
18. Robertsson O, Stefánsdóttir A, Lidgren L, Ranstam J. Increased long-term mortality in patients less than 55 years old who have undergone knee replacement for osteoarthritis: results from the Swedish Knee Arthroplasty Register. *J Bone Joint Surg Br*. 2007;89(5):599-603. doi:10.1302/0301-620X.89B5.18355
19. Visuri T, Mäkelä K, Pulkkinen P, Artama M, Pukkala E. Long-term mortality and causes of death among patients with a total knee prosthesis in primary osteoarthritis. *The Knee*. 2016;23(1):162-166. doi:10.1016/j.knee.2015.09.002
20. Rovio S, Kåreholt I, Helkala EL, et al. Leisure-time physical activity at midlife and the risk of dementia and Alzheimer's disease. *Lancet Neurol*. 2005;4(11):705-711. doi:10.1016/S1474-4422(05)70198-8
21. Laurin D, Verreault R, Lindsay J, MacPherson K, Rockwood K. Physical Activity and Risk of Cognitive Impairment and Dementia in Elderly Persons. *Arch Neurol*. 2001;58(3):498-504. doi:10.1001/archneur.58.3.498
22. Losina E, Collins JE, Deshpande BR, et al. Financial Incentives and Health Coaching to Improve Physical Activity Following Total Knee Replacement: A Randomized Controlled Trial. *Arthritis Care Res*. 2018;70(5):732-740. doi:10.1002/acr.23324
23. Christiansen MB, Thoma LM, Master H, et al. Feasibility and Preliminary Outcomes of a Physical Therapist-Administered Physical Activity Intervention After Total Knee Replacement. *Arthritis Care Res*. 2020;72(5):661-668. doi:10.1002/acr.23882
24. Paxton RJ, Forster JE, Miller MJ, Gerron KL, Stevens-Lapsley JE, Christiansen CL. A Feasibility Study for Improved Physical Activity After Total Knee Arthroplasty. *J Aging Phys Act*. 2018;26(1):7-13. doi:10.1123/japa.2016-0268
25. Pellegrini CA, Brown D, DeVivo KE, Lee J, Wilcox S. Promoting Physical Activity Via Physical Therapist Following Knee Replacement: A Pilot Randomized Controlled Trial. *PM&R*. 2023;15(8):965-975. doi:10.1002/pmrj.12895
26. Davis AM, Perruccio AV, Ibrahim S, et al. The trajectory of recovery and the inter-relationships of symptoms, activity and participation in the first year following total hip and knee replacement. *Osteoarthritis Cartilage*. 2011;19(12):1413-1421. doi:10.1016/j.joca.2011.08.007
27. Beswick AD, Wylde V, Gooberman-Hill R, Blom A, Dieppe P. What proportion of patients report long-term pain after total hip or knee replacement for osteoarthritis? A systematic review of prospective studies in unselected patients. *BMJ Open*. 2012;2(1). doi:10.1136/bmjopen-2011-000435
28. Rhodes RE. Multi-Process Action Control in Physical Activity: A Primer. *Front Psychol*. 2021;12. Accessed February 9, 2023. <https://www.frontiersin.org/articles/10.3389/fpsyg.2021.797484>

University of South Carolina Protocol v2

29. PEW Research Center. Internet/Broadband Fact Sheet. Published April 2021. Accessed May 19, 2021. <https://www.pewresearch.org/internet/fact-sheet/internet-broadband/>
30. Gollwitzer PM, Schaal B. Metacognition in Action: The Importance of Implementation Intentions. *Personal Soc Psychol Rev*. 1998;2(2):124-136. doi:10.1207/s15327957pspr0202_5
31. Conner M, Sandberg T, Norman P. Using Action Planning to Promote Exercise Behavior. *Ann Behav Med*. 2010;40(1):65-76. doi:10.1007/s12160-010-9190-8
32. Choi L, Liu Z, Matthews CE, Buchowski MS. Validation of Accelerometer Wear and Nonwear Time Classification Algorithm. *Med Sci Sports Exerc*. 2011;43(2):357-364. doi:10.1249/MSS.0b013e3181ed61a3
33. Troiano RP, Berrigan D, Dodd KW, Masse LC, Tilert T, McDowell M. Physical activity in the United States measured by accelerometer. *Med Sci Sports Exerc*. 2008;40(1):181-188. doi:10.1249/mss.0b013e31815a51b3
34. Cella D, Yount S, Rothrock N, et al. The Patient-Reported Outcomes Measurement Information System (PROMIS): progress of an NIH Roadmap cooperative group during its first two years. *Med Care*. 2007;45(5 Suppl 1):S3-S11. doi:10.1097/01.mlr.0000258615.42478.55
35. Hoffman SA, Ledford G, Cameron KA, Phillips SM, Pellegrini CA. A qualitative exploration of social and environmental factors affecting diet and activity in knee replacement patients. *J Clin Nurs*. 2019;28(7-8):1156-1163. doi:10.1111/jocn.14719
36. Broderick JE, Schneider S, Jungaenel DU, Schwartz JE, Stone AA. Validity and Reliability of Patient-Reported Outcomes Measurement Information System Instruments in Osteoarthritis. *Arthritis Care Res*. 2013;65(10):1625-1633. doi:10.1002/acr.22025
37. Wilson PM, Muon S. Psychometric properties of the exercise identity scale in a university sample. *Int J Sport Exerc Psychol*. 2008;6(2):115-131. doi:10.1080/1612197X.2008.9671857
38. Reeve J, Sickenius B. Development and Validation of a Brief Measure of the Three Psychological Needs Underlying Intrinsic Motivation: The Afs Scales. *Educ Psychol Meas*. 1994;54(2):506-515. doi:10.1177/0013164494054002025
39. Intrinsic Motivation Inventory (IMI) – selfdeterminationtheory.org. Accessed March 16, 2021. <https://selfdeterminationtheory.org/intrinsic-motivation-inventory/>
40. Williams GC, Freedman ZR, Deci EL. Supporting Autonomy to Motivate Patients With Diabetes for Glucose Control. *Diabetes Care*. 1998;21(10):1644-1651. doi:10.2337/diacare.21.10.1644

G. APPENDIX

Attach any additional information pertinent to the application, such as surveys or questionnaires, etc.