

## PHYT 824 Assignment 4

### **Background**

Approximately 1 in 10 Americans have diabetes, and 90-95% of these individuals have Type 2 diabetes (T2DM).<sup>1</sup> T2DM is caused by insulin resistance where the pancreas overproduces insulin resulting in increased blood sugar.<sup>1</sup> Risk factors for developing T2DM include prediabetes, age over 45 (although an increasing amount of younger individuals are diagnosed), overweight/obese, family history of diabetes, hypertension, and decreased physical activity.<sup>1,2</sup> Additionally, individuals who are African American, Hispanic/Latino, Asian American, Alaska Native, American Indian, Native Hawaiian, or Pacific Islander have an increased risk of T2DM.<sup>1-3</sup> Individuals with T2DM are at risk for developing serious health complications such as heart disease, stroke, diabetic neuropathy, kidney disease, retinopathy, and lower extremity amputation.<sup>1,2</sup> Fortunately, exercise and lifestyle interventions have been demonstrated to effectively mitigate the complications, decrease morbidity, and decrease the risk of developing T2DM.<sup>1,2,4-6</sup> A community-based exercise intervention program, such as Iyengar yoga, targeted at individuals with or at risk for T2DM can be an effective measure to improve diabetes-related biological health markers, HbA1c and anthropomorphic measurements, in this population.<sup>6-8</sup> The program will also utilize social support via the program instructor and members as an intervention to increase adherence to the program as the overall benefits will need to be maintained over time.

The practice of yoga has been present in different cultures for thousands of years; it is based on the principle of mindfulness and unity of the mind and body.<sup>9</sup> The positions in yoga challenge the body's strength and flexibility and have been

demonstrated to be an effective and safe form of exercise for weight management.<sup>10</sup> Iyengar yoga in particular utilizes positioning aids such as block, blankets, and chairs which make it an ideal practice for novices.<sup>7,8</sup> Yoga as a whole has been demonstrated as an effective intervention in reducing HbA1c levels<sup>7,11</sup>, anthropomorphic measures,<sup>6,11</sup> and improving mental health<sup>6</sup> in individuals with T2DM. The specific outcome measures from the yoga intervention to focus on would be HbA1c levels, BMI, and waist circumference. These three measurements are directly linked to reducing the risk of T2DM as blood glucose levels and obesity lead to poorer outcomes in this population.<sup>1,2,6-8,10,11</sup> Iyengar yoga can be easily created into a free, community-based intervention program to target individuals with and at risk for T2DM such as African Americans.

As mentioned earlier, minority groups such as African Americans are at greater risk for developing T2DM.<sup>1-3</sup> The yoga program will focus on this population and create a welcoming environment for families and members of the community to receive the health benefits from yoga. Yoga will be the primary intervention in this program with support from the program leader and other members serving as a secondary intervention. African Americans surveyed in one study reported more likely to trust black professionals and are more loyal to black-owned businesses.<sup>12</sup> Having the program led by an African American yoga instructor would be beneficial to the members of the program and possibly encourage attendance and adherence. The program leader would also serve as the primary social supporter among the members.

Previous studies using Iyengar yoga as an intervention for T2DM described decreased health outcomes when adherence to the program dropped.<sup>8</sup> Adherence to the

program will be measured by sessions attended per week in addition to time spent at home performing the yoga techniques learned from class. The goal would be to perform at least 150 minutes of yoga per week per recommendation of the 2018 Physical Activity Guidelines for Americans.<sup>13</sup> There are several mediators for change within a social support system that can focus at the individual and interpersonal levels in this program in order to increase adherence. Improving self-efficacy among the members related individual barriers the person may face has been shown to be effective in improving physical activity.<sup>5</sup> Support and positive modeling from family members is also powerful to encourage physical activity, especially when the exercises are performed with family members.<sup>5</sup> Additionally, external motivation may be more effective when used with older individuals with T2DM as a supplementary strategy.<sup>5</sup> This may be an area to focus on as T2DM tends to affect individuals over 45 years of age.<sup>1,2</sup> Using the strategies of increasing self-efficacy, family support, and external motivation will help increase adherence to the program to maximize the positive outcomes.

This community-based yoga program will benefit members of an African American community and their family who have or are at risk for T2DM. The program will utilize Iyengar yoga as the primary intervention in order to improve outcomes in HbA1c levels, BMI, and waist circumference. The program will also incorporate social support intervention via self-efficacy, family support, and external motivation in order to increase adherence as a secondary outcome measure. These strategies will be important to create a successful program that will benefit the community members and help reduce the risk and complications of T2DM.

## **Program Goals**

The following SMART goals will be used in order for a community-based Iyengar yoga program targeted at African Americans with T2DM to be successful:

- Members will reduce their bodyweight by 15-20 pounds by the end of 16 weeks in order to demonstrate healthy improvements in BMI.<sup>14</sup>
- Members will reduce their HbA1c levels by at least 0.5% in 16 weeks to demonstrate a clinically meaningful improvement.<sup>15</sup>
- Members will complete at least 150 minutes of yoga (supervised or unsupervised) per week at the end of 16 weeks to measure adherence to the exercise intervention.<sup>13</sup> Sessions attendance will be recorded and members will document time spent practicing yoga at home.
- Members will attend one check-in meeting every 2 weeks with the program leader via in person, phone, or video call in order to discuss progress, barriers, motivation, or other aspects of the program.

## **Methods**

The community-based Iyengar yoga program will take place in a local community center on Monday and Thursday evenings. Each session will take place from 7 to 8pm and will be led by the program instructor. Members of the program will be adults in the community with T2DM, and the class will be marketed to African Americans. Members will be recruited from flyers, social media postings, and word of mouth within the community. Recruitment materials will focus on images of African Americans performing yoga in order to connect and reach the target audience. Family members of individuals with T2DM will be invited to join to practice yoga together, although they will not be

included in the program outcomes. The goals of the program listed above are specifically for the members with T2DM.

The instructor will be recruited from postings in the Iyengar Yoga National Association of the United States (IYNAUS). According to the IYNAUS website, volunteerism is a core belief of the practice and a part of their mission.<sup>16</sup> This value is important as the instructor will not be financially compensated due to the lack of funding of this program as it is a free resource for a lower income community. The main qualifications of the instructor are to be a member of the African American community, at least Level 1 Iyengar yoga certification, and possess strong interpersonal skills. The success of the program is dependent on the program instructor to promote a strong bond between the group and encourage the members. Two instructors may be recruited, if necessary, in order to share the workload appropriately.

The sessions will last 60 minutes in duration and take place over 16 weeks. Previous studies implementing Iyengar yoga in individuals with T2DM reported a 12-week intervention program was too brief and recommended 16 weeks for more positive outcomes.<sup>7</sup> Participants in this study also noted a learning curve of 3 to 4 weeks to feel comfortable performing the yoga interventions at home.<sup>7</sup> Equipment for the program will be minimal due to the nature of yoga. Members will be encouraged to bring a mat if able, but limited mats donated from yoga studios will be available. Iyengar yoga utilizes props such as chairs and towels/blankets which will also be available to members from the community centers resources.

The yoga program will include guided meditation, relaxation, breath focus, and a combination of active and passive poses. The general sequence of the session will be

as followed: seated guided breathing, standing warm up, standing poses, supine poses, prone poses, seated poses, and supine guided breathing/meditation/relaxation. This general sequence is adapted based on Iyengar yoga studies performed with individuals with T2DM.<sup>6-8</sup> The instructor will demonstrate the poses and give modifications/feedback to participants when required. Members will be strongly encouraged to attend both sessions per week if able. Descriptive paper handouts of the poses and progressions will be provided to each member to practice at home. Members will record the number of minutes of yoga performed at home; a minimum of 150 minutes of physical activities such as yoga per week is recommended per the 2018 Physical Activity Guidelines for Americans.<sup>13</sup>

In order to document results of the 16-week program, HbA1C levels will be taken prior to the first session at week 1 and after of the last session at week 16. HbA1C levels will be taken by a health care professional at a volunteer clinic (such as UNC SHAC) in order to reduce financial burden on the members. Weight will be taken on a standard scale to determine weight in pounds to be recorded at weeks 4, 8, 12, and after completing the program at week 16. These are two established, important health markers in individuals with T2DM and can be used to objectively track progress.

Adherence to the program will be measured by sessions attended per week in addition to time spent at home performing the yoga techniques learned from the class. Previous studies have established the connection between decreased adherence and poorer outcomes in a yoga intervention program for individuals with T2DM.<sup>6</sup> The keys to increasing adherence are improving self-efficacy, positive modeling, and external motivation. In order to make these changes, the program instructor will meet with each

member every two weeks to have a brief discussion on progress, barriers, and motivation. These sessions can be conducted in person or remotely. Having an African American instructor will serve as a positive role model to improve adherence and provide external motivation and encouragement to members at the sessions themselves and the bi-weekly personal check-in meetings. Family members will also be encouraged to join the yoga sessions but will not be considered members of the program. The inclusion of family members will also serve as another method of positive modeling and social support. Self-efficacy is another consideration for adherence and will be measured via the General Self-Efficacy Scale (GSES) before and after the program. The psychometric properties of the GSES are not well established in this population and therefore will not be included in the goals.<sup>17</sup> However, it will still be used in the program to generally measure self-efficacy after completing the 16-week program. Previous studies involving yoga and minority populations have demonstrated self-efficacy can be fostered when performing a new behavior with a group, seeing success in similar individuals to oneself, and positively encouragement in one's physical ability.<sup>18</sup>

### **Program Evaluation**

The community-based Iyengar yoga program will be evaluated by the participants progress on the established goals. As mentioned previously, HbA1c and weight are important biological measures that are positively correlated with T2DM management. In order to reduce cost, HbA1c levels will only be taken twice at the start and conclusion of the program. This is a limitation of the program as this test requires a blood sample taken by a healthcare professional. The goal was set of a reduction of at least 0.5% in HbA1c levels as this is an established clinically significant result to

demonstrate meaningful change.<sup>15</sup> However, in order to objectively track progress throughout the program, weight will be recorded using a standard scale at 4-week intervals. Evidence supports healthy weight loss in adults with T2DM at a rate of 1 to 2 pounds per week.<sup>14</sup> The weight check-ins are spread out in 4 week increments in order to prevent discouragement of the members. Checking weight more frequently may result in smaller losses or fluctuations. This potential lack of progress may affect adherence and motivation if a member is not seeing significant results.

Adherence to the program will be tracked by both sessions attended and minutes of yoga activity per week. The goal is to achieve at least 150 minutes of yoga per week including the 120 minutes included by attending the two weekly sessions. The program instructor will have the opportunity to discuss participation with members during the biweekly meetings. The members will be verbally educated on the importance of achieving at least 150 active minutes per week in order to improve their condition. The program instructor will also make use of the check-in sessions to identify barriers to progress and work through solutions at the interpersonal level. These discussions will also include feedback from members on how to improve the program. For example, perhaps members may prefer a different time/day for the classes or wish to incorporate music. Strong verbal communication between the program instructor and members will help strengthen the social network which has been shown to increase physical activity in similar studies.<sup>19</sup>

## **Conclusion**

This community-based Iyengar yoga program will benefit local members of the African American community with T2DM. It will be a free resource for a group in need

and incorporates evidence-based practice to improve health related outcomes in this population. Goals for the program include clinically meaningful reductions in weight and HbA1c, completing a target number of active minutes per week, and attending biweekly interpersonal sessions with the program leader. The yoga intervention will use Iyengar yoga as it utilizes props for positioning assistance in beginners and the practice can also be completed safely at home. The program leader will make use of interpersonal techniques such as external motivation, positive role modeling, social support, and verbal discussions to overcome personal barriers. T2DM is a chronic disease that can be successfully mediated with completion of a yoga program suggested in this proposal. Additionally, this program will build a larger sense of community and foster healthy lifestyle habits among an at-risk group.

## References

1. Type 2 Diabetes. Centers for Disease Control and Prevention. <https://www.cdc.gov/diabetes/basics/type2.html>. Published August 10, 2021. Accessed November 10, 2021.
2. Risk Factors for Type 2 Diabetes. National Institute of Diabetes and Digestive and Kidney Diseases. <https://www.niddk.nih.gov/health-information/diabetes/overview/risk-factors-type-2-diabetes>. Published December 2016. Accessed November 10, 2021.
3. Diabetes and African Americans. U.S. Department of Health and Human Services Office of Minority Health. <https://minorityhealth.hhs.gov/omh/browse.aspx?lvl=4&lvlid=18>. Published February 22, 2021. Accessed November 4, 2021.
4. Church TS, Blair SN, Cocreham S, et al. Effects of aerobic and resistance training on hemoglobin A1c levels in patients with type 2 diabetes: a randomized controlled trial. *JAMA*. 2010;304(20):2253-2262. doi:10.1001/jama.2010.1710
5. Van Dyck D, De Greef K, Deforche B, et al. Mediators of physical activity change in a behavioral modification program for type 2 diabetes patients. *Int J Behav Nutr Phys Act*. 2011;8:105. doi:10.1186/1479-5868-8-105
6. McDermott KA, Rao MR, Nagarathna R, et al. A yoga intervention for type 2 diabetes risk reduction: a pilot randomized controlled trial. *BMC Complement Altern Med*. 2014;14:212. doi:10.1186/1472-6882-14-212
7. Bock BC, Thind H, Fava JL, et al. Feasibility of yoga as a complementary therapy for patients with type 2 diabetes: The Healthy Active and in Control (HA1C) study. *Complement Ther Med*. 2019;42:125-131. doi:10.1016/j.ctim.2018.09.019
8. Alexander G, Innes KE, Bourguignon C, Bovbjerg VE, Kulbok P, Taylor AG. Patterns of yoga practice and physical activity following a yoga intervention for adults with or at risk for type 2 diabetes. *J Phys Act Health*. 2012;9(1):53-61. doi:10.1123/jpah.9.1.53
9. Basavaraddi I. Yoga: Its Origin, History and Development. Ministry of External Affairs: Government of India. <https://www.mea.gov.in/in-focus-article.htm?25096/Yoga+Its+Origin+History+and+Development>. Published April 23, 2015. Accessed November 11, 2021.
10. Lauche R, Langhorst J, Lee MS, Dobos G, Cramer H. A systematic review and meta-analysis on the effects of yoga on weight-related outcomes. *Prev Med*. 2016;87:213-232. doi:10.1016/j.ypmed.2016.03.013
11. Gupta U, Gupta Y, Jose D, et al. Effectiveness of Yoga-based Exercise Program Compared to Usual Care, in Improving HbA1c in Individuals with Type 2 Diabetes: A Randomized Control Trial. *Int J Yoga*. 2020;13(3):233-238. doi:10.4103/ijoy.IJOY\_33\_20
12. Kreuter MW, Lukwago SN, Bucholtz DC, Clark EM, Sanders-Thompson V. Achieving Cultural Appropriateness in Health Promotion Programs: Targeted and Tailored Approaches. *Health Education & Behavior*. 2003;30(2):133-146. doi:10.1177/1090198102251021
13. Physical Activity Guidelines for Americans 2nd edition. 2018.

- [https://health.gov/sites/default/files/2019-09/Physical\\_Activity\\_Guidelines\\_2nd\\_edition.pdf#page=56](https://health.gov/sites/default/files/2019-09/Physical_Activity_Guidelines_2nd_edition.pdf#page=56). Accessed November 9, 2021.
14. Your Game Plan to Prevent Type 2 Diabetes. National Institute of Diabetes and Digestive and Kidney Diseases. <https://www.niddk.nih.gov/health-information/diabetes/overview/preventing-type-2-diabetes/game-plan>. Published February 2017. Accessed November 30, 2021.
  15. American Diabetes Association. Standards of medical care in diabetes--2009. *Diabetes Care*. 2009;32 Suppl 1:S13-61. doi:10.2337/dc09-S013
  16. Iyengar Yoga Certification. Iyengar Yoga National Association of the United States. <https://iynaus.org/iyengar-yoga-certification/>. Accessed November 30, 2021.
  17. General Self-Efficacy Scale. Shirley Ryan Abilitylab. <https://www.sralab.org/rehabilitation-measures/general-self-efficacy-scale>. Published August 18, 2020. Accessed December 1, 2021.
  18. Middleton KR, Ward MM, Haaz S, et al. A pilot study of yoga as self-care for arthritis in minority communities. *Health Qual Life Outcomes*. 2013;11:55. doi:10.1186/1477-7525-11-55
  19. Evenson KR, Sarmiento OL, Tawney KW, Macon ML, Ammerman AS. Personal, social, and environmental correlates of physical activity in North Carolina Latina immigrants. *Am J Prev Med*. 2003;25(3 Suppl 1):77-85. doi:10.1016/s0749-3797(03)00168-5