

## WORK IN PROGRESS AND LESSONS LEARNED

### Implementing Fitness and Nutrition Education in Urban, Underserved, Community-Based Montessori Schools: Challenges and Lessons Learned

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## **ABSTRACT**

**Background** – Few studies have discussed school-based health programs in Montessori education. Lumin has a network of Montessori elementary schools serving mainly lower income families in Dallas, Texas. Since 2015, our medical school has partnered with Lumin to design and implement fitness and nutrition curricula adherent to Montessori principles.

**Objectives** – To describe a novel Montessori school-based health program and determine avenues for improvement based on lessons learned.

**Methods** – Led by medical students with guidance from faculty mentors, the program was developed collaboratively with Lumin leaders based on a critical need in their community and shaped with results from a cross-sectional health needs assessment among Lumin families. Data were collected to measure the impact of the program and a program evaluation was conducted after five years of operation to explore curriculum refinement.

**Results/Lessons Learned** –The greatest challenges were recruitment of student volunteers, scheduling and coordination, and garnering community interest for secondary activities (e.g. health fairs).

**Conclusions** – Despite challenges, this partnership has resulted in a successful program that relies on faculty and student volunteers, incorporates CBPR and service-learning concepts, and follows Montessori principles.

**KEYWORDS:** Needs Assessment, Physical Fitness, Health disparities, Health promotion, Community-Based Participatory Research, Community health partnerships, Child Development

## Background

Innovative approaches are needed to combat the rise of childhood obesity. Almost 1 in 6 children are obese,<sup>1</sup> with Hispanic and African American children disproportionately impacted.<sup>2</sup> Texas ranks 19<sup>th</sup> in childhood obesity, and 32% of Texas children are considered overweight (Body Mass Index {BMI} 85<sup>th</sup> to 95<sup>th</sup> percentile) or obese (BMI>95<sup>th</sup> percentile).<sup>1,3</sup> Children who are overweight or obese often continue to be as adults,<sup>4</sup> and childhood obesity is associated with several medical and psychosocial comorbidities.<sup>5</sup> It is recommended that children have at least 1 hour of moderate-to-vigorous physical activity (MVPA) a day,<sup>6</sup> along with consuming a healthy diet limited in sugars, sodium, and fats.<sup>7</sup> Most children do not meet these physical fitness and nutrition recommendations,<sup>8</sup> and children of low socioeconomic status are more likely to have poorer diets and less physical activity.<sup>9</sup> With this growing epidemic of childhood obesity, it is imperative to explore opportunities that schools can provide to shape children's health, prevent excessive weight gain, and build a foundation of healthy living.<sup>10, 11</sup> Several health interventions have been effective in introducing physical fitness activities during afterschool care or through supplemental activities outside of the classroom.<sup>12,13</sup> Targeted classroom interventions have also been developed such as Coordinated Approach to Child Health (CATCH),<sup>14-16</sup> Fit2Play,<sup>17</sup> and Planet Health.<sup>18</sup> However, their success differs by school setting, available resources, and ability to integrate fitness and nutrition curricula into classroom settings.<sup>14,18</sup>

However, schools struggle to find ways to incorporate fitness and nutrition curricula addressing childhood obesity in the classroom setting.<sup>14</sup> The most significant challenge encountered by various school-based nutrition and physical education programs has been a lack of funding. Other challenges include limited time during school for these classes, no

reinforcement of key concepts in the home, and difficulties navigating the bureaucracies within school systems.<sup>9,16</sup>

In 2011, a coalition of key stakeholders in Dallas County, Texas developed a strategic plan to prevent childhood obesity by requiring schools in the Dallas Independent School District (DISD) to integrate a fitness and nutrition curriculum in the classroom.<sup>19</sup> Due to high costs of the evidence-based curriculum, some Dallas community schools, including Lumin Education, were unable to participate. Lumin Education (Lumin) is a network of Montessori public community schools that teaches students 3-9 years of age. Montessori principles are centered on given freedom in an environment prepared for students' self-directed activity, based on a child's stage of development and progression of growth.<sup>20</sup> Lumin has four campuses (East Dallas, Lindsley Park, Bachman Lake, and Wesley-Rankin) that serve approximately 603 children up to 3rd grade.<sup>21</sup> The student population is primarily Hispanic, from low- to middle-income families. Lumin has independent leadership; however, schools still fall under the DISD jurisdiction. Therefore, they must follow DISD fitness and nutrition requirements, including annual administration of the FitnessGram, an assessment used across all Texas public schools to gauge students' physical fitness. This assessment includes a cardiovascular component, as well as muscle strength and endurance testing.<sup>22</sup> Meeting these requirements has been challenging, as the self-directed nature of Montessori education does not typically blend well with traditional health and physical education classes.

An innovative approach to support community-based programs in underserved settings is through partnerships with academic medical institutions that provide service-learning experiences and community-based participatory research (CBPR) opportunities for future health

professionals. Service-learning is a structured experience that combines community service with specific learning objectives, preparation, and reflection through community academic partnerships.<sup>23</sup> Medical student participation in service-learning projects has been shown to improve their comfort, interest, interpersonal communication skills, understanding of diversity, awareness of health-related needs of underserved populations, and self-efficacy in working with underserved populations. These experiences may prove to be pivotal in encouraging more medical students to work with these populations in their careers.<sup>24,25</sup> CBPR focuses on the engagement and inclusion of community members in the research process. Interventions conducted under the principles of CBPR establish trust between communities and research institutions, incorporate broader resources from both community and academic organizations, and garner knowledge that can be more readily applied to other programs.<sup>26-29</sup> With service-learning and CBPR approaches, interventions can be conducted within populations to whom the benefits are directly targeted.

The Department of Family and Community Medicine at the University of Texas Southwestern Medical School (UTSW) has developed a pipeline of innovative service-learning and CBPR-focused medical research and training programs over the past two decades.<sup>30-33</sup> In collaboration with over 55 community partners, several community health initiatives have been led by medical students and residents in settings such as free clinics, community centers, faith-based organizations, and schools.<sup>34</sup>

## **Objectives**

In this article, we provide an overview of the partnership between UTSW and Lumin to address the challenges faced by Lumin in meeting fitness and nutrition school requirements. We

describe the rationale behind the program, program development and implementation, program evaluation conducted after five years of operation, and lessons learned throughout the collaborative process.

## **Methods**

### Program Development

UTSW and Lumin's partnership began in 2015 with a series of meetings in which Lumin stakeholders expressed a need for health education and organized Fitnessgram testing at their schools. Additionally, in order to gain an understanding of the concerns of the Lumin community, a cross-sectional needs assessment was conducted with families of Lumin students. The goal was to assess their health-related needs, rank their most important needs, and partner with parents and the community to develop intervention plans. Results are presented in Table 1. The needs assessment revealed that Lumin families had access to food and health resources but could benefit from education on health and healthy habits. Results were shared with Lumin, and with CBPR principles in mind<sup>35</sup>, a program was developed to address the original need for health education programming with supplemental components that fit the interests of the Lumin community and was within the scope of available resources. CBPR includes community stakeholders in all phases of research. Academic researchers partner with community organizations to determine how to best meet their needs by building on their strengths and integrating knowledge to meet shared goals. There is a detailed list of CBPR principles, as well as how this program's development, implementation, and evaluation has encompassed these principles, in Figure 1. Lumin felt that this would best address their community's needs, as a tailored program would help them meet DISD requirements while still blending with Montessori

principles. Lumin administration was regarded as the primary voice of the Lumin community; when considering the low response rate of the needs assessment, UTSW chose to focus on the expertise amassed by Lumin administration through years of working directly with Lumin families. To more broadly address the other gaps revealed from the needs assessment, and to fulfill Lumin's mission of involving the families of their students, additional components were developed such as parent workshops, cooking lessons, and health and vaccination fairs.

In developing the initial curriculum, CATCH was chosen because it included lesson plans that address both diet and physical activity tailored for school settings. Additionally, CATCH has been implemented in other school-based interventions with some similarities to Lumin's population.<sup>36,37</sup> In this partnership, Lumin provided the classrooms and outdoor spaces, many physical education tools, and expertise in Montessori principles to meet the needs and characteristics of their community. UTSW provided expertise in curriculum design, year-to-year recruitment and training of dedicated student coordinators, volunteers, and researchers, as well as experience from other successful CBPR partnerships. UTSW received various grants to support implementation of the program.

### *Incorporating Montessori Principles*

In Montessori education, students engage in largely uninterrupted time to concentrate and focus on assignments, projects, and group work during the mornings. Therefore, the mornings were kept apart from physical education and other 'special' components which were reserved for the afternoon. In order to avoid disrupting the flow of activities in a school day, UTSW worked within the timeframe that Lumin provided (one afternoon per week).

UTSW worked within the Montessori principles of freedom of choice and movement. Fitness and nutrition lessons offered Lumin students some choice of the games they played and activities. Nutrition lessons were revised to encourage more discussion and participation from Lumin students. Students could sit out if desired and were encouraged to participate the following week. The outside environment provided opportunities for students to be physically active under the guidance of UTSW volunteers. Nutrition lessons engaged the students' interests, as the UTSW volunteers were able to relate what the children were learning to their own lives, such as what many of the students received in lunches provided by the school.

#### *Service-Learning and Student Leadership*

Small grants, totaling over \$10,000, have been obtained to support curriculum resources, but most program aspects rely on volunteer time from faculty mentors, student leaders, and volunteers. Four student coordinators are selected each year to lead the program, two for each participating campus. Volunteers are recruited from a multidisciplinary pool of students to teach fitness and nutrition lessons, help administer the FitnessGram, participate in the health fairs, etc. Student researchers are also recruited each cycle to improve components of the program. The original needs assessment was conducted by a student researcher, and subsequent stages of program development, revision, and evaluation have also been performed by UTSW students and residents.

The Lumin fitness and nutrition program provides a valuable opportunity for health professions students to explore working with underserved populations. It also allows students to participate thoroughly in the process of developing, implementing, and revising a health intervention, and practice the principles of CBPR. With this experience, participating UTSW



students can gauge their interest in working with underserved populations in their future careers, and learn to effectively collaborate with a community partner to implement a project of this scope.

### Program Implementation

At the start, the Lumin fitness and nutrition program was conducted at the East Dallas campus, and contained several components including nutrition and fitness lessons from the CATCH curriculum, parent health education workshops, health screening and vaccination fairs, a health component in the Lumin parent newsletter, and an activity day with gardening, cooking, and FitnessGram testing. In 2017, the Lindsley Park campus joined the program, with the addition of a school gardening component for their students. Each year, the curricula were expanded and revised to better suit the Lumin population and to make lessons more straightforward for volunteers and coordinators to lead. The other components fluctuated in their implementation as the years progressed, based on stakeholder input and available resources (Figure 2). For example, subsequent health fairs were modified as prior attendance signaled greater interest in flu shots, and less so in other educational portions. At the beginning of the calendar year, and before the start of the school year, all stakeholders met to discuss program progress, establish a schedule for the year, and revise components as needed based on experiences from the previous semesters. The program is currently undergoing comprehensive revision across the curriculum based on expressed needs, identified gaps, and feedback from all stakeholders (teachers, parents, UTSW researchers, and volunteers).

Data have been collected to measure the impact of the fitness and nutrition curriculum. Lumin students' nutrition knowledge was assessed with short evaluations that asked students to

simulate choosing and identifying healthy “Go”, somewhat healthy “Slow”, and unhealthy “Whoa” foods. Impact of fitness lessons was evaluated with the FitnessGram, including number of PACER laps, curl-ups, push-ups, inches for trunk lifts, and sit-and-reach tests, as well as changes in BMI percentile. Throughout five years of program implementation, data from about 150 students was collected. Data from 2016 to 2019 demonstrated some improvement in physical abilities and choice of healthier foods. This preliminary data shows that the Lumin fitness and nutrition program has positively impacted the physical fitness and nutrition knowledge of Lumin students.

### Program Evaluation

In 2020, a program evaluation was conducted to assess the program's current state and explore ways to improve and sharpen the focus of the intervention. Evaluations are essential to assessing the continued outcomes of a program and ensuring that the program is effectively addressing the needs of a community.<sup>38</sup> The Centers for Disease Control and Prevention framework for program evaluation contains six key steps – engaging stakeholders, describing the program, focusing the evaluation design, gathering credible evidence, justifying conclusions, and ensuring use of the lessons learned.<sup>39</sup> Ideally, evaluations should be conducted regularly and serve as a standard source of feedback for continued program growth.<sup>39</sup> Due to the service-based nature of this program, resources were not available to conduct formal evaluations periodically, although with each new cohort of student leaders informal feedback was collected and changes to the program were made accordingly. This evaluation was a comprehensive assessment of five years of program implementation. The evaluation reviewed all available program records, and included information gathered from interviews of Lumin administration, UTSW faculty, and

UTSW student coordinators. Details of the evaluation can be found in Figure 3. Completion of the evaluation culminated in lessons learned, as well as recommendations for next steps of the program. Lessons learned are detailed below.

## **Lessons Learned**

### Program Development

*Needs assessment requires adjustment to gather a larger response rate.*

The needs assessment conducted for this project had a 10% response rate. It was disseminated online via email to parents, in both English and Spanish, and took about 15 minutes to complete. It is possible that many busy parents disregarded the survey as it was not required by Lumin, and no compensation was offered. In future endeavors it may be beneficial to consider incentives (monetary, raffles) as well as reminders provided by Lumin to increase the response rate.

*Recruiting a sizeable and consistent student volunteer base has been difficult.*

Due to Lumin's scheduling, nutrition and physical education classes have been held on Friday afternoons. At UTSW, most medical students' exams take place on Friday mornings. Many students may be unwilling to volunteer Friday afternoons, after they have taken an exam. It is also possible that there is not enough student awareness of volunteering opportunities at Lumin. Low volunteer turnout means student coordinators are often left to teach lessons on their own.

### Program Implementation

*More community feedback could benefit the program.*

Only informal input has been given by parents, but direct input has not been solicited since the original needs assessment, and Lumin administration has been the main point of contact for the

overall Lumin community. This makes it easier to communicate more effectively, but the program could benefit from incorporating more regular feedback from other stakeholders, such as parents or Lumin educators.

*Consistent communication between all stakeholders can be difficult.*

As all partners in this collaboration have principal responsibilities to focus on, regular communication between UTSW faculty, UTSW students, and Lumin administration can be a challenge. There are several scheduled meetings that take place each year, but outside of these meetings, regular communication typically does not occur unless an immediate issue needs to be addressed.

*CBPR partnership has allowed a program with no dedicated staff or funding to run successfully for years.* The strong partnership between UTSW and Lumin has allowed this program to continue and grow over the years. Gaps in resources from one partner have been able to be filled by the other. Collaborative efforts and trust have molded this program to greater benefit the Lumin community, while providing a unique research opportunity and valuable service-learning experience for UTSW students. It is difficult to envision a program of this scope, with so few dedicated resources, continuing to this extent without the benefits that a CBPR collaboration brings.

*Working with a new cohort of UTSW students each year poses challenges related to transitioning year to year and keeping track of all program components and materials.*

At the beginning of every calendar year, due to constraints of the medical student schedule, a new cohort of student coordinators takes over the Lumin program. In previous years this transition has led to an adjustment period for new coordinators. It has also been difficult to keep

track of all the varying program components each year, as well as their associated materials. This has led to coordinators taking the initiative to collect supplies on their own, which may lead to duplicate materials and is an unnecessary burden. Additionally, at this time of year both UTSW faculty and Lumin administration are occupied with tasks required for beginning the new semester.

*Regularly changing student leaders and researchers allows the program to be viewed with fresh perspectives and improved in novel ways.*

Student researchers have conducted the needs assessment, updated the curriculum over the years, and conducted the program evaluation. Student coordinators each year provide insight from teaching lessons, running other program components, collecting data, and managing volunteers. Input from students has allowed the program to evolve and run more effectively, and develop extra components such as parent workshops, cooking lessons, and health fairs.

*Program components that initially seemed beneficial attracted few participants.*

Despite initial beliefs that there would be interest among the Lumin community, parent cooking lessons and health fairs had low turnouts. Although attendance was low, this does not necessarily mean parents were not interested. Barriers to attendance, such as not having time or transportation, likely affected turnout rates as well. These activities required significant prep work, and it was decided that they be removed or modified to better fit the community.

*Lumin students were able to remember answers to nutrition pre and post-tests.*

In order to track the impact of the nutrition lessons, students were given pre and post-tests. UTSW volunteers and coordinators reported that students seemed to be remembering the answers after re-taking the same tests year to year.

### Future Steps

With completion of the program evaluation after five years of implementation, recommendations for future steps were based on the above lessons learned. An overview of these future steps, including changes to the Lumin program, service-learning experiences and changes made due to challenges presented by the novel coronavirus (COVID-19) pandemic are provided in Table 2.

### **Conclusions**

Despite our challenges, this partnership has achieved several accomplishments. We have implemented a student-run management structure, tailored fitness and nutrition curricula to fit Montessori principles, developed a cookbook, created parent health education classes, and provided the Lumin community with health screenings and flu vaccinations. Throughout its five-year existence, this program has recruited four cohorts of student coordinators, at least 5 student researchers, and over 50 student volunteers. One Family Medicine resident has also participated as part of the UTSW CARE Program.<sup>40</sup> One student received an Albert Schweitzer Fellowship Award for contributions to this program, and several students have led CBPR projects resulting in three poster presentations at national and international professional meetings. This partnership has demonstrated that applying CBPR principles to address the needs of a community partner allows for development, implementation, and continued growth of a fitness and nutrition program uniquely tailored to reflect Montessori principles and benefit both UTSW and Lumin.

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**Table 1. Lumin Needs Assessment Results, 2015 (n=45)**

|                                                | <b>N (%)</b> |
|------------------------------------------------|--------------|
| <b>Language Spoken at Home</b>                 |              |
| English                                        | 32 (71.11)   |
| Spanish                                        | 5 (11.11)    |
| Both                                           | 8 (17.78)    |
| <b>Language of Survey</b>                      |              |
| English                                        | 37 (82.00)   |
| Spanish                                        | 8 (18.00)    |
| <b>Has a Regular Doctor – Adults</b>           |              |
| Yes                                            | 36 (80.95)   |
| No                                             | 9 (19.05)    |
| <b>Has a Regular Doctor – Children</b>         |              |
| Yes                                            | 43 (95.24)   |
| No                                             | 2 (4.76)     |
| <b>Access to Healthy Food</b>                  |              |
| Yes                                            | 44 (97.00)   |
| No                                             | 1 (3.00)     |
| <b>Top Health Concerns in Last 12 Months</b>   |              |
| Asthma/Respiratory Illnesses                   | 11 (24.00)   |
| Depression and Mental Health                   | 8 (18.00)    |
| Diet                                           | 7 (16.00)    |
| Exercise                                       | 7 (16.00)    |
| Other Concerns                                 | 12 (26.00)   |
| <b>Interest in Incorporating Health Habits</b> |              |
| Yes                                            | 24 (53.00)   |
| No                                             | 21 (47.00)   |

**Table 2. Recommendations and Future Steps, Including Changes Due to COVID-19**

| <b>Changes to Lumin Program</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Changes to Service-Learning</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Changes Due to Covid-19</b>                                                                                                                                                                                                            |
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| <ul style="list-style-type: none"> <li>• Outcome assessment for nutrition lessons will involve interpreting what Lumin students choose for school lunches, instead of re-taking nutrition pre- and post-tests.</li> <li>• New nutrition curriculum with parent handouts will be incorporated into the program.</li> <li>• Parent workshops will be revised with Lumin input and incorporated into the program.</li> <li>• Cooking lessons removed due to low turnout; cookbook with healthy recipes will be finalized and distributed to parents. Cooking lessons will instead be recorded and shared with parents for easy access.</li> <li>• New rainy-day lessons will be developed for</li> </ul> | <ul style="list-style-type: none"> <li>• An additional student coordinator position will be included, to manage materials and communication between both campuses.</li> <li>• Resources for lessons and activities will be collected and organized ahead of time and placed in a centralized location for easy access.</li> <li>• The next year's coordinators will be recruited earlier in the Fall to increase time allotted for the old cohort to appropriately train the new students.</li> <li>• To improve the transition from one cohort to the next, a formal checklist of topics to discuss will be created, to standardize the coordinator transition from year to year.</li> <li>• Volunteer outreach will expand to include a greater variety of UTSW student groups, with recruitment focused on</li> </ul> | <ul style="list-style-type: none"> <li>• Lessons will be held on Zoom or pre-recorded to reach students and families at home.</li> <li>• Cookbook may initially be sent out in an electronic format to reach families at home.</li> </ul> |

|                                                                                                                                                                                                                                                    |                                                                         |  |
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| <p>physical education lessons.</p> <ul style="list-style-type: none"><li>• Health fairs will focus on flu vaccination.</li><li>• Weekly newsletter will include nutrition and physical education tips to emphasize key concepts at home.</li></ul> | <p>larger events such as health fairs and FitnessGram testing days.</p> |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|--|



## Figure 1. CBPR Principles Applied in this Partnership

### Recognize Community as a Unit of Identity

The Lumin Community consists of the administration, teachers, support staff, students, and students' families. This community is focused on providing the best Montessori education possible for students, to foster their learning and growth.

### Build on Strengths and Resources Within the Community

This project was created with the strengths and resources of the Lumin Community in mind. The fitness and nutrition program and secondary components were designed with Lumin administration to utilize the facilities, resources, and expertise that they have available.

### Facilitate Collaborative Partnerships in All Phases of Research

Lumin administration was actively involved in all aspects of program design, implementation, and evaluation. A needs assessment of Lumin families was conducted to understand their interests and priorities.

### Integrate Knowledge and Action for Mutual Benefit

Outcomes and feedback were collected periodically to ensure that the needs of the Lumin community were addressed, and to assess the benefit of conducting fitness and nutrition programming within a Montessori school system.

### Promote a Co-Learning and Empowering Process that Attends to Social Inequalities

This program was developed with Lumin to address their need for health education that was not cost prohibitive. Over the five years of implementation, the Lumin community has learned along with UTSW about how a fitness and nutrition program can work for their unique needs.

### Involves a Cyclical and Iterative Process

Informal feedback has been solicited periodically from all stakeholders to continue to improve the program. A formal program evaluation conducted in 2020 utilized this global feedback to outline lessons learned, and recommendations for future steps.

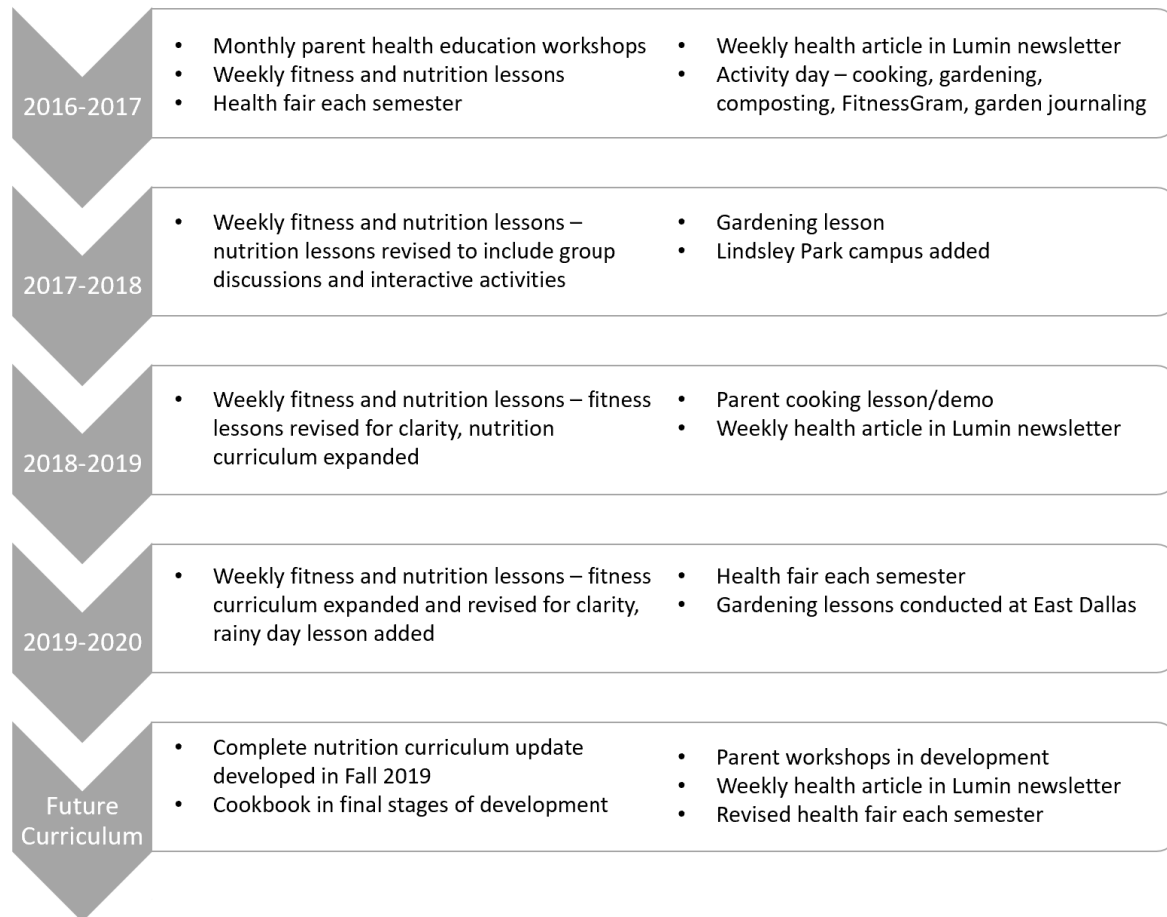
### Address Health from Positive and Ecological Perspectives

This program emphasizes the importance of physical health as a crucial component of overall health. The focus of this program is on the individual level, but feedback from stakeholders and changes made consider the impact of social, cultural, economic, and other factors on health.

### Disseminates Findings and Knowledge Gained to All Partners

Results of the program evaluation were presented and made available to all stakeholders. Periodic meetings and feedback involve all stakeholders and their input as well.

**Figure 2. Progression of Lumin Fitness and Nutrition Program From 2016 to Present**



**Figure 3. Program Evaluation Components**

