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A Prescription for Exercise in Adolescents: A Pilot Project

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by

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Author Note

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Abstract

Purpose: The purpose of this evidence based practice project was to increase physical activity (PA) times in pediatric patients who were not meeting the recommended guidelines of 60 minutes per day of activity. The goal was to educate adolescents on the benefits of exercise in order to increase their overall PA, even if it did not meet the recommended 60 minutes per day. The implemented education was also intended to motivate patients to establish healthy habits and minimize risks of poor health outcomes.

Background: Adolescence is characterized by development of neuronal plasticity and establishment of behavioral patterns. PA has been associated with improved academic performance, cognitive function, and general health. Approximately 80% of the adolescent population is not meeting the recommended levels of PA, which is contributing to increased rates of obesity, diabetes, and depression. Therefore, it is vital to promote exercise in a young age to ensure optimal health is achieved for the entirety of the child's life.

Methods: The San Diego 8 A's Evidence Based Practice Model was adapted and implemented in this pilot project. The Physical Activity Vital Sign (PAVS) questionnaire was utilized at a well child visit to evaluate exercise times and during reassessment after implementing the intervention. For this project, one participant filled out the PAVS questionnaire, received physical education counseling, and was contacted in one month to complete a follow up PAVS questionnaire.

Results: After individualized education specific to PA was implemented into a well child visit, patient activity time increased from an average of five days per week of 60 minutes per day to an average of six days per week of 60 minutes per day over a one month period.

Evaluation: Providing adolescents with information on PA and its importance on overall health revealed a positive effect on increasing exercise times. Additional data is required to apply the intervention to a larger group of adolescents. Due to unforeseen circumstances at the designated clinic site, only one patient was available for evaluation.

Keywords: PAVS Questionnaire, Adolescent, Physical Activity, Exercise

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Background and Significance

Physical activity (PA) is a term frequently used in the medical field when discussing healthy behaviors. It is defined as "any bodily movement produced by contraction of skeletal muscles that require energy expenditure" (PA, n.d., Physical Activity section). It is a key primary and tertiary treatment option that is recommended to prevent disease or reduce the severity. According to the Centers for Disease Control and Prevention (CDC), the recommended criteria for 6–17-year-olds is 60 minutes, or more, of moderate to vigorous PA (MVPA) 7 days per week (CDC, 2022c). PA recommendations are further broken down to 60 minutes per day of moderate to vigorous intensity aerobic exercise at least 3 days per week, 60 minutes of muscle strengthening at least 3 days per week, and 60 minutes of bone strengthening exercises at least 3 days per week (CDC, 2022c). Currently in the United States, less than 24% of this age group is meeting that guideline. On a worldwide scale, more than 80% of the adolescent population is insufficiently active and does not meet recommended guidelines (World Health Organization, n.d.).

These statistics provide insight into the potential severe and sometimes permanent outcomes of not including a balanced exercise regimen into daily life at a young age. The CDC (2022b) found not meeting these guidelines can result in increased risk of cardiovascular disease, Type 2 diabetes, development of certain cancers, low bone density, and energy imbalances leading to obesity.

In pediatric patients, incorporating PA into an everyday routine not only decreases negative consequences to health but increases positive benefits. Belcher et al. (2020) found when exercise is implemented into a developing mind, there are cellular and cognitive factors that

result in resilience which may combat varying mental health problems. Christianson and Shagena (2018) found early exercise intervention in a younger age group results in enhanced sleep, cognition, academic performance, and decreased rates of depression and anxiety.

Healthcare professionals are in an advantageous role to educate on evidenced based information relating to exercise health. Specifically nurse practitioners, who consistently interact with children and their families during well child visits (Jakubowki et al., 2015). These regular appointments are opportunities to promote preventative care and discuss the importance of daily PA and its effect on well-being (Joy & Lobelo, 2017).

Ultimately, a vast majority of this population is not active enough. There are many benefits of participating in the advised exercise routine, as well as ramifications if PA standards are not met. Healthcare professionals are in an important position to continuously communicate this information and incentivize adolescents to partake in activities that incorporate the different modalities of exercise.

Purpose/Aims

The purpose of this evidenced-based practice (EBP) pilot project was to evaluate patient activity levels and implement patient and family education on the recommended PA guidelines. Overall, the goal was to increase PA times in patients who were not meeting the recommended 60 minutes per day of daily activity.

Evidence-Based Practice Model

The evidence-based practice model used for this project was the San Diego 8 A's framework. This model is based off of an 8-step process that includes assessment, asking, acquiring, appraising, applying, analyzing, advancing, and adopting (Brown & Ecoff, 2011). This framework was chosen because the stepwise process seamlessly guides the user through an

EBP project while translating evidence-based research into clinical significance. The San Diego 8 A's model is a user-friendly guide that fostered the generation of this pilot project into a potential practice change through transformation of evidence synthesis into clinical implementation (Brown & Ecoff, 2011).

The decision to initiate this project derived from recognition of a recurrent problem in the pediatric population; patients are not as physically active as they should be. The identification of concern served as the catalyst and entry point to move through each step (Brown & Ecoff, 2011). There were multiple changes throughout the project including the EBP questionnaire and project outcomes prior to forming the final topic. The fluid nature of this model shaped the original broad concept into a more focused idea, which was valuable when searching for high quality levels of evidence. In addition, this model uses a pre and post change to evidence evaluation where baseline data are compared to outcome data. This comparison is congruent with the pre and post questionnaire used in this EBP project.

Evidence for the Problem

Importance of Physical Activity

Meeting PA guidelines has significant positive impacts on physical and mental health outcomes. Lobelo et al. (2020) stated cardiorespiratory fitness, lipid profiles, insulin sensitivity, and serum glucose concentrations all respond favorably to physical activity. In addition, MVPA improves bone density, muscular fitness, weight status, and cardiometabolic risk factors in children and adolescents (Lobelo et al., 2020).

One in 5 children and adolescents are affected by obesity which can lead to several debilitating diagnoses such as high cholesterol, Type 2 diabetes, and asthma (CDC, 2022a). Seo et al. (2019) stated children and adolescents who are obese have a higher probability of

remaining obese into adulthood leading to development of metabolic syndrome, cardiovascular disease, atherosclerosis, and dyslipidemia. Seo et al. found implementing a training program of 3 days per week, 60 minutes per session, in 6–16-year-olds with a body mass index greater than or equal to the 95th percentile resulted in improved body fat percentage, diastolic blood pressure, lean body mass, and decreased serum c-reactive protein. An exercise program, coupled with nutrition and psychological counseling in clinical practice is an attainable treatment plan to challenge obesity in the pediatric population to prevent adverse sequelae.

Along with physical benefits, there are neurocognitive implications to exercising on a regular basis. Belcher et al. (2020) found PA may act as a resilience factor in adolescents by inducing neuroplasticity to create cerebral circuits that improve emotional and behavioral regulation. This is accomplished through neurologic changes that strengthen self-regulation, interpretation, and processing of information. Exercise is a tool that can be implemented to prevent depression, anxiety, attention deficit hyperactivity disorder, and substance use and has also been proposed as a treatment modality for these conditions. (Belcher et al., 2020).

Contreras-Osorio et al. (2021) found executive function, which dictates response to environmental demands, is a factor of cognitive growth and is enhanced with PA and sports in children and adolescents. In a systematic review and meta-analysis, children and adolescents who participated in sports programs had improved working memory, cognitive flexibility, and inhibitory control. These outcomes translate to improved academic performance, cognitive, social, and psychological success (Contreas-Osorio et al., 2021). Students with higher grades were more likely to engage in physical activity at the recommended criteria and less likely to watch television or play video games for more than 3 hours a day (CDC, 2021).

Addressing Barriers to Physical Activity

There are multiple barriers to meeting pediatric activity guidelines including unavailability of systematic screening methods, provider knowledge, and socioeconomic status. The lack of standardized tools to assess PA has served as a barrier to addressing youth patients on a consistent basis (Joy & Lobelo, 2017). Efficient workflows related to PA evaluation are required to address activity, provide counseling, and make referrals at each clinic visit (Lobelo et al., 2020). There are well documented data on standardized PA assessment in adults, but differing developmental levels in children present more of a challenge when evaluating PA in the pediatric population (Joy & Lobelo, 2017). To overcome this barrier, identifying and utilizing a standardized pediatric activity assessment tool is necessary.

The first line of education should stem from medical professions, however, not all providers are knowledgeable in this sector of healthcare. According to Lobelo et al. (2020), only 23% of family physicians and 33% of pediatricians were able to correctly identify PA guidelines in children 6–18 years old. Similarly, Jakubowski et al. (2015) found providers exhibit varying levels of PA assessment, with some chart reviews only demonstrating a 15% rate of documented PA times in the pediatric population. Pediatricians may not have experience or training to appropriately guide patients to meet PA recommendations (Lobelo et al., 2020). This is problematic when the pediatric population is at risk for poorer health outcomes due to inadequate activity. It is imperative that providers first become proficient in evidence-based physical activity guidelines to educate patients and families.

Exercise opportunity may be hindered in children of minority status and children from low socioeconomic status (Lobelo et al., 2020). Lack of access to a safe outdoor parks or playgrounds may result in delayed motor skills and confidence in sports participation

(Jakubowski et al., 2015). Christinanson and Shagena (2019) stated to overcome these barriers, utilization of free applications, such as the Nike Fitness Club, along with community programs, and family based interventions are an integral part of combatting these challenges.

Methods

Literature Review

A thorough literature review was performed to find evidence to support the PICOT question and locate an appropriate screening tool for the intended audience. A review of the literature was completed using the following search engines: PubMed and Cochrane Database of Systematic Reviews. Search terms included “physical activity,” “adolescent exercise”, “pediatric exercise recommendations,” “screening for pediatric exercise,” “pediatric physical activity and mental health,” and “adolescent physical activity.”

Participants and Setting

The evidence-based intervention took place at a pediatric primary care site in Southern California and targeted 12–18 year-old patients who did not meet the recommended PA guidelines. If the recommended exercise guidelines of 60 minutes per day, 7 days per week was met, the patient was not eligible for inclusion. There was one patient who met the criteria for participation and was evaluated in this project.

PAVS Questionnaire

The PAVS screening questionnaire is a validated tool that has been primarily used in the adult population. It has shown positive results in initiating an exercise conversation in adults and, because of its success, has recently been adapted into the pediatric population. Intermountain Healthcare developed the pediatric version for patients 6–18 years old (Joy & Lobelo, 2017). Since modifying this screening tool to cater to the pediatric population, it has gained traction as a

starting point to a PA conversation (Lobelo et al., 2020). Compared to the original PAVS questionnaire, the pediatric specific PAVS assesses days per week of MVPA as well as specific types of activities, active transportation to and from school, physical education, after school activities, and screen time (Joy & Lobelo, 2017). Additionally, it evaluates if physical activity is an area of concern for the patient or parent.

Physical activity should be treated as another vital sign considering the low percentage of children who exercise at recommended levels (Christinanson & Shagena 2019). The PAVS questionnaire is a tool that can identify those not meeting PA guidelines and further streamline visits. Lobelo et al. (2020) agreed the PAVS is an efficient tool to incorporate PA assessment, education, and necessary referrals into clinical visits.

Data Collection

PA times were determined using the pediatric specific PAVS questionnaire (see Figure 1A) which assessed the average days per week of achieving 60 minutes per day of PA. This screening tool was administered during the patient's check-in during a well child visit.

The provider was allotted 5 extra minutes at the end of the visit to review results of the questionnaire and implement structured education on the benefits of exercise if the daily 60 minutes per day threshold was not met. It was also an opportunity to gauge the understanding of the patient and parent on activity guidelines and classifications.

One month after the initial visit, the PAVS questionnaire was readministered over a telephone call. The goal was only to increase patient activity times compared to the month prior, even if it did not meet the daily 60 minutes per day recommendation.

Ethical Considerations

Prior to commencing the project, Institutional Review Board approval was received from the designated clinic site and the University of San Diego.

Confidentiality was reviewed prior to initiating the project. An identification number was used in place of the patient's name and all associated patient data were stored in a locked cabinet. The follow up telephone call was completed at the designated clinic site using a company phone on a private line. Upon completion of results analysis, paperwork with patient information was shredded.

Results

One patient was available and consented to partake in this project. The results revealed a positive association between PA education and activity times. One month after the initial education was administered, the patient increased exercise times from an average of 5 days per week of 60 minutes per day to an average of 6 days per week of 60 minutes per day. The patient demonstrated a 20% improvement in overall activity time as seen in Figure 2A.

Discussion

Summary

Incorporating extra time for education at the end of the well child visit may have assisted in increasing physical activity times. The patient responded positively one month later to an open discussion regarding physical activity and exercise techniques. At the end of the PAVS questionnaire when asked "is PA an area you want to work on with your family to improve", the parent and patient answered "no" even though the patient was not meeting the recommendations. This answer provided insight into the family's knowledge on exercise standards and presented an entry point for the provider to divulge accurate information on PA times. Although the patient's

PA times did not meet the CDC recommendation of a daily 60-minute PA practice, overall activity time increased which was the intended objective.

An important factor in the outcome of this project was the sample size. This EBP was intended to have a greater number of participants; however, due to heightened numbers of acutely ill children during the winter months and lack of nursing staff to accommodate all providers, nurse practitioners were placed on telehealth for sick visits only. The PAVS questionnaire was planned to be delivered at well child visits. This was a nonnegotiable factor because well child visits are directed at discussions on health promotion and prevention, which includes physical activity. Ultimately, the project was blunted due to an abrupt change within the unit and the premeditated sample size of 10 patients was unable to be achieved.

There is a substantial amount of evidence that identifies a large percentage of adolescents are not meeting PA guidelines. Lack of exercise is correlated with chronic health issues such as obesity, diabetes, cardiovascular disease, depression, and anxiety. Healthcare professionals are in a position to deliver PA education and monitoring at annual wellness visits or more frequently, if required. It is vital that providers take ownership of the evidence and implement strategies to narrow the gap between what is recommended and what is achieved.

Study Limitations

There were multiple limitations in this study. The first was the unpredicted clinic changes which rendered a small sample size. Many adolescent patients attend their annual well visits over the summer prior to commencement of the school year, in contrast to the winter months which are notorious for cold and influenza season and increased scheduling of sick visits. Initiating PA education over the summer months might result in a greater sample size.

In addition, due to time constraints, the follow up questionnaire was only implemented once after the intervention was applied. It would be beneficial to assess PA times at several time intervals between annual well visits to assess the duration of effectiveness of the intervention.

Cost-Benefit

To assess a cost versus benefit analysis, there were two minimal costs of this project. The first was cost related to time. This included the time added onto the end of a well child visit to analyze the questionnaire results and provide patient and family education. Also, the provider's time to remain current on PA guidelines and appropriate exercise types given the patient's past medical history. The second cost was related to the price of the printed PAVS questionnaire.

Providing education on PA is a fundamental step to increase pediatric activity levels which translates into overall wellness. There are large future cost savings related to this endeavor. According to Lee et al. (2017), if 50% of the U.S. pediatric population would exercise at the recommended level, it would result in an $8.1 billion savings in direct medical costs and $13.8 billion savings related to loss of productivity over a lifespan. Increasing that number to 75% would result in $16.6 billion savings in direct medical costs and $23.6 billion savings related to loss of productivity. Promoting physical activity in children and adolescents (2022) found that inactivity in the pediatric population would result in 500 million cases of preventable illness worldwide between 2020 and 2030 which will cost each healthcare system about $27 billion per year.

The desired result of this project is to educate children on how to remain healthy for the entirety of their lives leading to cost savings from decreased medical care needs. To mitigate some cost, the printed PAVS questionnaire could be implemented into an electronic health record (EHR).

Future Direction

This evidence-based case study serves as a launching point for future projects on incorporating the PAVS questionnaire into clinical well child visits. Additional research should evaluate how including the PAVS questionnaire into an EHR could improve activity times. Inclusion of a standardized screening tool across pediatric practices will alert providers to stringently evaluate PA as if it were another vital sign. These values can be stored in the patient's chart and tracked over time to continuously assess activity.

Another aspect that could be explored is the relationship between PA and screen time. The sole focus of this EBP project was exercise time evaluation, so screen time was not taken into consideration. Future research may focus on an association between PA and average hours of screen time per day. The goal would be to see an inverse relationship between PA time and screen time.

Conclusions

In conclusion, adolescence is a vulnerable period in a person's life and a critical time of development. It is characterized by the creation of neuronal plasticity and establishment of behavioral patterns. Consistently emphasizing the importance of exercise and its benefits has the potential to translate into tangible results. It is the responsibility of the provider to equip every pediatric patient with knowledge on how PA can enhance their physical and mental well-being as well as provide the tools for success in this venture.

The PAVS questionnaire and subsequent individualized physical education is a cost efficient and simple way to address the discrepancy between evidence-based recommendations and current practices. This education is an opportunity to intervene before detrimental health outcomes emerge. Provider counseling is the first step in addressing the pandemic of pediatric

sedentary behaviors. This project is a step in the right direction to associate individualized PA education with increased activity times, however, future studies are needed with a larger sample size to assume generalizability.

Other Information

Funding

No external funding was provided or used for the completion of this pilot project.

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Appendix

Figure 1A

PAVS Questionnaire

On average, how many days per week does your child get at least 60 minutes of moderate to vigorous physical activity or play (heart beating faster, breathing harder than normal)?	Days per week _____
On most days of the week, does your child: • Walk or bike to school? • Participate in physical education class at school? • Participate in organized physical activity (sports, dance, martial arts, etc.) or spend 30 minutes or more playing outside?	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No
On average, how many hours per day of recreational screen time (video games, TV, internet, phone, etc.) does your child get?	Hours per day _____
Is physical activity an area that you want to work on with your family to improve?	☐ Yes ☐ No

Figure 2A

Pre and Post PAVS Questionnaire Activity Times