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Anna Selepina
anna.selepina@uky.edu

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Impact of Physical Activity Vital Sign Screening on Physical Activity Counseling and Referrals in Primary Care

Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Nursing Practice at the University of Kentucky

By

Anna Selepina

Lexington, KY

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Abstract

Background/Purpose. Physical Activity Guidelines for Americans recommend 150-300 minutes of moderate-intensity physical activity each week for adults; however, half of the adults do not meet this goal, which leads to increased chronic health conditions and poor health outcomes. The physical activity vital sign (PAVS) screening tool is an evidence-based assessment tool associated with increased physical activity counseling, which can lead to increased physical activity and improved patient outcomes.

Objective: The purpose of this study was to examine the impact of PAVS screening on physical activity counseling and referrals in primary care.

Methods. This prospective study took place in a small primary care clinic providing care to women. Physical Activity Vital Sign screening was implemented to examine the effect of PAVS screening on the rate of physical activity counseling and referral to exercise promotion programs. The intervention consisted of provider education and implementation of PAVS screening during annual wellness exams. Six primary care providers working in the clinic were given pre- and post-intervention surveys. Baseline and post intervention data of providers' physical activity counseling and referrals was obtained via chart review.

Results. The sample consisted of six Caucasian female primary care providers. Five out of six providers chose to participate in the baseline survey and four in the post intervention survey. In the pre survey (N=5) agreed that a visual aid listing current physical activity guidelines would be helpful and they liked the PAVS screening tool. Barriers to physical activity screening and counseling were time to have the conversation (100%) and patients' disinterest (50%). Prior to the intervention, 49% of patients had documented exercise counseling vs. 64.3% after the

intervention (p = 0.15). Similarly, referrals to exercise/weight loss clinic increased from 2% to 7.1% (p = .208). Patients who received exercise counseling had a significantly higher BMI compared to those who did not (M = 32.7, SD = 8.6 vs. M = 28.5, SD = 6.8, p = .003), suggesting high BMI was a trigger for exercise counseling and referral rather than activity levels.

Conclusions. Our findings support established evidence that the PAVS screening is a valuable screening tool and is appropriate for use in a primary care setting. Universal physical activity screening is recommended, and providers should be cautious about relying on BMI as the cue to action for physical activity counseling and referral. The limitations of this study are discussed and suggestions for future research are presented.

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Background and Significance

Problem Statement

Physical inactivity is one of the top contributing factors leading to multiple diseases and premature mortality in the United States. The estimated annual cost of inadequate physical activity is 117 billion dollars, which is about 8.4 percent of US health care expenses (CDC, 2022). Being physically inactive has multiple consequences; it can negatively impact one's health and the quality of life. Physical inactivity is linked to an increased risk of 25 chronic diseases, including heart disease, stroke, diabetes, obesity, osteoporosis, and cancers (Sallis et al., 2016). Only half of American adults get the required physical activity to help prevent chronic diseases (CDC, 2022). The American Heart Association states that an inactive lifestyle is responsible for approximately 334,000 deaths yearly in the United States and over 5 million worldwide (Kraus et al., 2015). Recent research shows that even a slight increase in physical activity by 10 minutes per day is projected to prevent over 100,000 deaths yearly (Saint-Maurice et al., 2022).

Centers for Disease Control and Prevention conducted a telephone survey in every state in which the survey respondents were asked if they did any physical activity outside of their regular job in the past month. People were considered inactive if they said they do not do any physical activity outside of their regular job. Kentucky had one of the highest levels of self-reported physical inactivity levels in the nation, ranking 48th out of 50 states when it comes to physical activity; only Puerto Rico and Mississippi score worse (CDC, 2022). Primary care providers across the United States are seeing more patients suffering from chronic preventative conditions and obesity associated with physical inactivity. Therefore, providers need to incorporate physical activity assessment into annual visits and promote primary and secondary prevention, highlighting the beneficial effects of regular exercise. American Heart Association

promotes brief healthcare provider counseling during an office visit as it can play a critical role in patients adopting lifestyle modifications (Kraus et al., 2015).

Context, Scope, and Consequences of the Problem

Physical activity falls under an individual's behavior and is a determinant of health. While genetics, environment, and access to medical health influence health outcomes, a person's behavior and lifestyle choices are major factors contributing to health outcomes (Thompson et al., 2020). One of the Healthy People 2030 goals is to provide behavioral counseling on a healthy diet and physical activity to all adults. Physical activity has multiple benefits, including improved mental health, cognitive function, sleep quality, quality of life, and physical function (CDC, 2022). Physical activity can help prevent one in eight cases of breast cancer and colorectal cancer, one in twelve cases of diabetes, and one in fifteen cases of heart disease, which is still the number one cause of mortality in the United States (CDC, 2022). Physically active people have fewer sick days at work resulting in a more productive workforce. In addition, physical activity and strength training improve joints, prevent falls, and prevent fall-related injuries. Only half of the American adults meet the physical activity guideline target of 150 to 300 minutes of moderate-intensity physical activity each week, and only 23.4% meet the recommendations for strength training on two or more days of the week (AuYong et al., 2016; CDC, 2022). This is significant because sedentary lifestyle attributes to approximately 8% of all deaths in the US, doubling the risk for cardiovascular diseases, diabetes, and obesity and significantly increasing the risk for depression, anxiety, cancers, osteoporosis, lipid disorders, and high blood pressure (Calson et al., 2018).

Current Evidence-Based Interventions

There are decades of scientific research reporting evidence that regular physical activity protects against multiple chronic diseases (O'Connor, 2020). Furthermore, there is consensus in the scientific community regarding providers counseling patients as it leads to increased physical activity, improving body weight, and reducing obesity (O'Connor, 2020). Even though there is evidence for the cost-effectiveness of physical activity counseling in primary care, only one-third of patients report that they have received physical activity counseling from their primary care provider (Jones et al., 2019). Healthcare providers are willing to conduct physical activity screening and interventions, but they admit that they often do it poorly (Clark et al., 2021). The United States Preventive Services Task Force (USPSTF) recommends counseling interventions to promote a healthy diet and physical activity because adequate evidence supports that counseling interventions reduce cardiovascular disease (CVD) and improve healthy lifestyle habits (O'Connor, 2020). Studies have shown that screening, counseling, and prescribing exercise can motivate patients (Brickwood et al., 2021; Byrd et al., 2019; James et al., 2017). The USPSTF recommends individualized behavioral counseling by clinicians to promote physical activity for all patients not meeting the physical activity guidelines, as it can result in health benefits for all people, regardless of their cardiovascular risk status (Grossman et al., 2017). Current evidence supports the recommendation that providers assess patients' physical activity levels to promote physical activity in a clinical setting, starting with an evaluation of the amount and intensity of the patient's physical activity per week (Kuntz et al., 2021; Sallis et al., 2016; Yvonne et al., 2017).

Implementing evidence-based strategies to improve physical activity for patients can reduce deaths in the US and improve patients' quality of life. Physical activity assessment tools

help health professionals to identify patients who could benefit from increasing their physical activity and deliver individualized support. Assessment of physical activity and brief physical activity counseling by providers can improve the physical activity level of patients. Research shows that Physical Activity Vital Sing Screening (PAVS) is a valid, quick two-question physical activity assessment tool to screen patients and identify those that do not meet physical activity guidelines (Ball et al., 2016). Using an assessment to identify patients not meeting physical activity guidelines facilitates physical activity counseling and increased physical activity (Ball et al., 2016).

The first step in helping patients to decrease their sedentary lifestyle is assessing their physical activity level with a validated screening tool. Ball et al. (2016) compared Modifiable Activity Questionnaire (MAQ) to PAVS and found MAQ to be lengthier to administer, three-to-five-minutes vs PAVS taking less than 30 seconds to administer. The advantage of PAVS is that it can identify almost 90% of patients who do not meet physical activity guideline recommendations and is more likely to be used, as it is much shorter and maybe more feasible in clinical practice (Ball et al., 2016). Although PAVS has high test-retest reliability, its specificity is only 56% and 78% sensitivity; however, according to the research reviewed, there are no other more reliable convenient screening tools for physical activity (Quiles et al. 2019). Fitzgerald et al. (2015) mentioned that PAVS might only identify half of the patients who need to be counseled for physical activity; however, their study compared accelerometry, an objective measure of physical activity, to a patient self-report tool, which may assess different constructs. Accelerometry captures purposeful and not purposeful physical activity, whereas PAVS asks for self-reported minutes per week of purposeful moderate to strenuous exercise. Even though accelerometry is considered a gold standard for measuring physical activity, it may not be the

best comparison for self-reported physical activity instruments. Multiple studies reported PAVS being a valuable tool in primary care in identifying patients who do not meet physical activity guidelines (Ball et al., 2016; Lin et al., 2022; Quiles et al., 2019). Even if self-reported tools underestimate the patients who need to be counseled, they are more practical in primary care. Using accelerometry outside of research may not be comfortable, nor cost efficient, nor convenient for patients. Therefore, using a self-reported physical activity assessment tool is currently the best option, since PAVS enables providers to better understand the physical activity status of their patients and prompts physical activity counseling and referrals.

The American College of Sports Medicine has a program called Exercise is Medicine (EIM); the goal is to make physical activity assessment and promotion a standard in clinical care to connect people of all abilities with evidence-based physical activity resources for people of all abilities everywhere (American College of Sports Medicine, 2021). The EIM program was established in 2007 by the American College of Sports Medicine; this program recommends screening patients to identify patients not meeting physical activity guidelines and then providing brief intervention and referral to treatment. Brief intervention includes physical activity counseling and prescribing physical activity (American College of Sports Medicine, 2021). Exercise is Medicine program focuses on translating physical activity research into practice and increasing exercise minutes per week, which leads to disease prevention and can have a very positive impact on health, leading to improved health and helping patients achieve their fitness and weight goals (Dement et al., 2015). Providers are encouraged to ask every patient about physical activity at every visit using the PAVS screening tool and advise how physical activity will help improve their health. In addition, providers are encouraged to assess any barriers to patient success and assist them by providing counseling and personalizing recommendations.

Referral to treatment can be referral to a program, a professional, or a place (Exercise is Medicine, 2021).

Two large health care systems, Keiser Permanent in Southern California and Greenville Health System in South Carolina have adopted the EIM initiative, including the implementation of consistent physical activity assessment using PAVS (Trilk & Phillips 2014; Young et al. 2014). Physical Activity Vital Sign is an objective measure to assess compliance with the Physical Activity Guidelines for Americans (Kuntz et al., 2021). Using the PAVS questionnaire facilitates capturing the essential points of physical activity, which enables further discussion of the topic, alerting providers of inactivity, which could be further assessed, and patients could be counseled and referred appropriately. To promote a healthy lifestyle, providers need to establish physical activity as a key health indicator tracked by health systems and electronic health records (CDC, 2022).

At the Women's Health Clinic, physical activity assessment is incorporated into annual wellness visits. The process at the start of this study consisted of providers asking, “Do you exercise?” using the annual visit flowsheet; the options were “no” or “yes,” and if yes was selected, then the options were “less than 30 min three times per week” or “30 min three times per week.” Providers would only be prompted by the flowsheet to offer counseling about the importance of regular physical activity to patients whose BMI is higher than 25. As this clinic is partnered with an EIM program at the University of Kentucky, patients who are obese and interested in improving their physical activity have the option to be referred to the EIM free of charge to all University of Kentucky employees, spouses of employees, and retirees. Despite the efforts of the EIM program to partner with providers at the Women's Health Clinic, only a small percentage of eligible patients are referred to the EIM program. A baseline needs assessment

conducted by the PI revealed no standardized physical activity assessment tool; patients are only counseled on physical activity promotion and other lifestyle modifications if their BMI is above 25, and referrals to the EIM program are very rare.

Purpose/Objectives

The purpose of this study was to examine the impact of PAVS screening on physical activity counseling and referrals in primary care.

Specific Aims

1. Educate providers and staff on the PAVS tool and implement the PAVS assessment tool.
2. Evaluate the physical activity assessment rates, counseling, and referrals to EIM pre- and post-intervention.
3. Evaluate the provider's perspective and recommendations about physical activity promotion and the PAVS tool pre- and post-intervention.

Synthesis of the Evidence in the Literature

PICOT question and search methods

Physical inactivity is common; it leads to obesity and a vast array of harmful effects on health. Therefore, primary care providers are obligated to address physical inactivity with their patients. Thus, adopting the PICO format, the question guiding this project review was: Within primary care settings, what interventions have been used to support providers in counseling patients to achieve the desired physical activity goals? A search was done using Wiley Online Library, CINAHL, and PubMed, utilizing the terms "physical activity counseling," "physical activity screening," and "primary care." The time was limited from 2013 to 2023. Additional filters included peer-reviewed articles in English and adults (18 years or older). The search

yielded 128 results. Articles were chosen based on relevancy. Original research studies meeting the inclusion criteria and literature reviews on physical activity promotion and screening in primary care were chosen. A total of 11 articles were chosen for this review. Two recent scoping literature reviews pertaining to the topic were also reviewed.

Evidence Review

A total of 11 studies were reviewed from across the world, including studies from Australia (Eaking et al., 2014), Canada (Agarwal et al., 2020; Clark et el., 2020), USA (Ball et al., 2016; Dutton et al., 2014; Grant et al., 2014; Lin et al., 2022; O'Connor et al., 2020; Quiles et al., 2019), and United Kingdon (Fitzgerald et al., 2015). These studies are summarized in Table 1. Most studies were conducted in primary care or primary care offices at university medical institutions. The study size ranged from 38 to 696,267 participants. Successful interventions targeting supporting providers resulting in increased physical activity counseling included: using convenient and reliable screening tools and having counseling prompts and resources (Ball et al., 2016; Clark et al., 2020; Grant et al., 2014; Lin et al., 2022; Quiles et al., 2019), telephone counseling (Brickwood et al., 2021; Eaking et al., 2014), behavioral counseling (O'Connor et al., 2020), and wearable activity trackers (Brickwood et al., 2021). A longitudinal study with 521 participants compared PAVS against accelerometry, which is considered the gold standard physical activity assessment tool; it concluded that PAVS is a valuable physical activity assessment tool and correctly identifies most patients who do not meet physical activity guidelines (Kuntz et al., 2021). Overall, studies supported the use of PAVS to screen patients in primary care.

Published literature reviews about prescribing exercise as medicine in general practice were reviewed. O'Regan and colleagues (2021) identified barriers and facilitators to exercise

prescribing and adherence to it by general practitioners. Barriers included: provider characteristics, patient's physical and psychosocial factors, systems and cultural failures, and uncertainty around exercise prescribing. The approach to prescribing exercise was summarized as the ABC approach; it included A: assessment of physical activity, B: brief intervention, and C: continued support. Multiple supports were identified, including user-friendly resources, workshops for providers, electronic devices, health system support, and collaboration with other healthcare and exercise professionals (O'Regan et al., 2021). Thornton and colleagues (2022) scoping review of fifteen studies identified similar results; the characteristics of physical activity prescriptions that improved clinical outcomes for patients included: personalized advice, brief intervention, behavioral support (such as handouts and referrals), and provider follow-up. Adverse effects of increased physical activity were rare. Regular physical activity screenings during annual physical/follow-up visits and counseling/referrals to programs such as EIM is an evidence-based approach providing meaningful and valuable support for patients wishing to increase their exercise; it allows providers to support patients in implementing physical activity as part of their disease prevention and treatment strategies (Coombes et al., 2015; Thompson et al., 2020; Thornton et al., 2022).

A cohort study also supports using PAVS screening because it led to an increase in exercise counseling and referrals (Grant et al., 2014). An observational study indicated PAVS enabled providers to better understand the physical activity status of their patients and was useful in identifying patients who do not meet their physical activity guideline recommendations (Lin et al., 2022). Several case studies support PAVS being a valid and reliable tool (Ball et al., 2016; Quiles et al., 2019). A qualitative study exploring providers' and patients' perceptions concluded that a screening tool must be convenient for the clinician and enable physical activity discussions

within the existing workflow, serving as a prompt (Clark et al., 2020). In addition, multiple randomized controlled trials support referring to an exercise specialist for counseling as it significantly improves physical activity levels (Brickwood et al., 2021; Byrd et al., 2019; James et al., 2017).

Synthesis of the Evidence

The United States Preventive Services Task Force recommends counseling interventions to promote a healthy diet and physical activity because there is adequate evidence supporting that counseling interventions reduce overall CVD events and improve healthy lifestyle habits (O'Connor et al., 2020). A recent systematic review supports that physical activity interventions and/or counseling improves body weight, thus reducing obesity (O'Connor et al., 2020).

Out of the eleven studies reviewed, evidence was moderate to low on the hierarchy of evidence creating a moderately high risk of bias and low generalizability. There were no randomized controlled trials supporting PAVS specifically. Two retrospective cohort studies supported PAVS correctly identifying the majority of patients not meeting exercise guidelines (Grant et al., 2014; Kuntz et al., 2021). Two case studies and one descriptive study demonstrated that PAVS is a valid and reliable tool (Ball et al., 2016; Lin et al., 2022; Quiles et al., 2019). One case study determined that PAVS underestimated patients who need to be counseled for increasing their physical activity (Fitzgerald et al., 2015). Despite noted limitations in the current published evidence, PAVS has sufficient support to justify its use in the clinical setting, with major benefits being its ease of implementation and low burden of use for the patient and health care provider in addition to its acceptable validity and reliability for measuring physical activity.

Practice Gap

Current evidence showed that physical activity screening and counseling in primary care for patients with insufficient physical activity was inconsistent across the United States (Clark et al., 2021; Jones et al., 2019). This study took place at a women's health primary care clinic, which is part of the large academic healthcare system in Lexington, KY. A needs assessment at the WH clinic revealed a similar problem. Discussions with the Medical Director at the Women's Health Clinic and the Exercise is Medicine Director highlighted a gap in physical activity screening and referrals. Approximately 60% of the patients seen at the clinic are overweight or obese. According to the data received from the medical director, an estimated 720 patients annually are eligible for EIM referral, but only 12% of those patients get referred.

The PAVs screening is a part of the EIM program, but it was omitted when the EIM was introduced to the clinic because it was during the time of an EMR transition from one system to another. The patient's physical activity level is already assessed in the clinic during the annual wellness visits; however, currently, there is no standardized screening method or assessment tool. The current practice at the clinic is to screen patients by asking if they exercise more than three times per week, at least thirty minutes at a time, which is inconsistent with the current physical activity guideline recommendations. In addition, the exercise intensity and quantity are not recorded and monitored, and physical activity counseling is only provided to patients with BMIs over 25. Exercise counseling should be provided to patients not meeting physical activity guidelines regardless of their BMI. Otherwise, the opportunity for primary prevention of obesity and multiple health problems associated with a sedentary lifestyle is missed. The PAVS tool could help providers at this clinic to identify patients not meeting the physical activity guidelines

and to offer primary prevention before patients' BMIs are above the goal. It will also help providers monitor patients' progress with a numerical value.

Theoretical/Conceptual Framework or Model

A successful change in practice most often requires a planned approach to implement that change or a change theory. Kurt Lewin's Theory of Planned Change is a popular theory that can be applied to physical activity promotion and mobilizing people's stage of change (Lewin & Lewin, 1997). This theory suggests that organizational change can be achieved by increasing factors that support change. The theory consists of three stages: unfreezing, change, and refreezing. The first stage is called 'unfreezing,' or getting ready for change. The needs assessment at the clinic showed the practice gap, illustrating the discrepancy between the physical activity guidelines, recommendations, and current practice. Since the study is taking place in Kentucky, one of the top three physically inactive states in the nation with the highest rates of cardiovascular disease and diabetes, this creates a sense of urgency. The evidence-based intervention was selected based on the review of the literature. Consent from the clinic's medical director was obtained, and the PI spoke to the providers and EIM facilitators to strengthen the driving forces. In the unfreezing stage, the PI gathered support from the EIM and clinic providers to create a sense of awareness and help everyone recognize the need for change. The second step is once "unfrozen" to implement the change. This stage started after the PI educated the providers on the PAVS screening tool and how it can improve their physical activity counseling, leading to increased physical activity, showing them how to fill it out in EPIC, and assisting them in educating their medical assistants on how to complete this screening. The change in practice was difficult to achieve because this new screening tool was voluntary, and the PI was not always at the clinic to assist and engage the providers to use it. Refreezing would involve the

PI sharing the data from the study with the clinic medical director and having her embed the PAVS screening into their standard practice. Screening patients with the PAVS screening would be a new norm.

Another theory that applied to the project was the Health Belief Model, which offers an explanation for why patients choose not to participate in physical activity even when it is promoted by the providers (Butts & Rich, 2018). The Health Belief Model is a health-specific social cognitive model that helps to predict and explain why patients change or maintain certain health behaviors (Saghafi-Asl et al., 2020). Components of the model include perceived susceptibility to the severity of the given condition, perceived benefits of and barriers to action to decrease the risk of the disease, along with cues to action to inspire taking action or thinking of the change, and in later years, self-efficacy or confidence in one's ability to take action was added to the model (Butts & Rich, 2018). Applying the Health Belief Model, the provider needs to examine the patient's beliefs about the problem, including their perceived risk of the disease associated with the lack of physical activity, because a patient may not think that leading a sedentary lifestyle puts them at risk of being overweight or obese and that the consequences of obesity are severe once the disease is contracted. Perceived benefits the exercise could bring need to be addressed. A person may not believe that the benefits of physical activity will outweigh the cost involved; this is called perceived barriers. Cues to action are reminders of the person's environment about the problem and acting. Lastly, self-efficacy would be the belief in oneself succeeding in exercise. Understanding why patients do not utilize great resources readily available to them will inform the liaisons and facilitators on how to improve. Thus, it is important to use the Health Belief Model as a guide when interviewing patients and targeting counseling and interventions based on their feedback.

Methods

Design

The study's design was a prospective, one-group, pre-post design to examine the effect of PAVS screening on the rate of physical activity counseling and referral to the Exercise is Medicine (EIM) program for exercise promotion. An intervention included implementing an evidenced-based assessment tool into practice and monitoring documented physical activity counseling rates and EIM referrals.

Setting

Agency Description

This study took place at the WH clinic, which provides primary care services to women. The WH clinic consists of six primary care providers. It espouses the DIReCT (Diversity, Innovation, Respect, Compassion, and Teamwork) values in providing primary care to adult female patients of all ages. In addition, it provides a convenient way to have all annual exams and tests completed in one appointment for women between 40 and 64 years of age. Annually, the clinic serves about 3000 patients, of which approximately 60% are overweight or obese; therefore, providers are required to counsel those patients on a diet and increasing physical activity. In addition, approximately 40% of the patients at the clinic have HMO insurance, making them eligible for free Health and Wellness resources, including Exercise is Medicine.

Congruence of the Project to the Selected Agency's Mission

The Women's Health Clinic is a part of the Center for the Advancement of Women's Health; it provides comprehensive primary care services for women during all stages of life,

including mammography and other annual exams, specializing in treatment, research, and education related to women's health. Improving physical activity counseling and patient participation in the EIM program, which provides one on one exercise promotion and life modifications therapies, can aid providers in facilitating health promotion and disease prevention for their patients.

Sample

The proposed study population consisted of Women's Health Clinic providers. No exclusion was made on sex/gender or racial/ethnic groups. Enrollment began upon IRB approval, an announcement about the study was made at the monthly staff meeting, and all clinic providers were invited to participate. At the beginning of the study, six providers were working in the clinic; all providers were Caucasian females. The inclusion criteria were a provider practicing in the Women's Health Clinic where the study is taking place, excluding residents or students. All providers working at the clinic in October 2022 were invited to participate in the study.

Procedure

IRB Approval

IRB approval was obtained on October 12, 2022. The PI attended a monthly staff meeting via zoom to present the project to providers.

Description of Evidence-Based Intervention

The principal investigator introduced the project to staff during the November 2022 staff meeting, invited them to participate in the surveys, and educated providers on the planned intervention. The intervention involved educating providers on PAVS screening; this was done

via a short PowerPoint presentation created by PI, which was approved by the IRB board. The educational PowerPoint (see appendix E) informed providers that PAVS screening is an evidence-based screening tool intended to identify patients not meeting physical activity guideline recommendations. Patients were managed according to institutional patient management protocols.

The principal investigator presented the educational PowerPoint intervention during the monthly staff meeting. The principal investigator individually educated each provider about the Physical Activity Vital Sign screening tool and how to access it in EPIC (see appendix A and F). Providers were asked to use the screening tool for their annual wellness visits or follow-up appointments. The principal investigator compared screening and subsequent physical activity counseling before and after the intervention and analyzed providers' perceptions.

Measures and Instruments

The pre- and post-surveys were informed by the literature review and developed by the PI to collect providers' feedback (see appendix C and D). The surveys focused on assessing the providers' perceptions of physical activity promotion and barriers and facilitators to physical activity screening and counseling. A manual chart review was completed by the PI to measure baseline and post-intervention physical activity screening, counseling, and referrals; patients' BMIs were also collected for comparison.

Data Collection

The Women’s Health Clinic providers were contacted via institutional email to invite them to participate in the pre-survey to gather providers' perceptions of physical activity promotion and barriers and facilitators to physical activity screening and counseling. The list of

the providers working in the clinic was obtained online on the clinic website. The PI was able to email providers via university email using their first and last names. The post-test survey was sent via email to all providers after the intervention. A cover letter explaining the purpose, methodology, risk/benefits, survey process, and investigator contact information was included in the email with the pre-intervention survey link (see appendix B). Providers were informed the study is voluntary and anonymous with no effect on their performance evaluation or job duties.

The pre-survey was created with RedCAP and was available for two weeks to complete. The pre-survey consisted of nine questions; the first seven were Likert scale-type questions, and the last two questions were multiple choice, having an open response option. The survey took about 5 minutes or less to complete. The post-survey had the same questions as the pre-survey, plus two additional Likert scale questions to get providers' perceptions on the PAVS screening tool and one open response question for additional comments on physical activity promotion.

Baseline data from 100 visits that meet the criteria was collected by the PI via a chart review to evaluate the baseline physical activity screening rate, physical activity counseling rate, and referrals to EIM. The inclusion criteria for baseline data were: 100 patients seen at the clinic in October 2022 for their annual wellness visit or follow-up visit. The patients were 18 years of age and older, with a mix of established and new patients. Telehealth and acute visits were excluded from the review. Post-intervention data was collected on the patients who had had their annual visit in December or January and had PAVS screening completed during their visit. The deidentified data was entered into an excel spreadsheet for analysis.

Data Analysis

The chi-Square test of association was used to determine if there was an increase in exercise counseling from the pre-to post-intervention. The two-sample t-test was used to test for differences in BMI between those who received exercise counseling and did not receive the exercise counseling. Provider perceptions were summarized using frequency distributions. All data analysis was conducted using SPSS, version 27, with an alpha of .05 throughout.

Results

Demographics and Findings

The six providers working at the Women's Health Clinic at the time of this study were all Caucasian females. Demographic data on the patients was not collected for this study. A convenience sample meeting the inclusion criteria was obtained for the baseline and post-intervention data. Pre- and post-intervention data was obtained via chart review from 100 charts for the baseline data and 28 charts for the post-intervention data, since the PAVS screening was only completed for 28 patient visits by the end of the data collection period.

Prior to the intervention, 49% (n = 100) of patients had documented exercise counseling in the provider's notes. After the intervention, the documented physical activity counseling rate increased to 64.3% (n=28); see Table 2. The p value was high; therefore, the increase is statistically non-significant (p = 0.15). Combining the pre- and post-intervention data, those who received exercise counseling had a significantly higher BMI compared to those who did not (M = 32.7, SD = 8.6 vs. M = 28.5, SD = 6.8, p = .003); see Table 4.

All the providers who responded (n =4) agreed on both pre- and post-surveys that physical activity is important for the health of the patients and that a visual aid listing current

physical activity guidelines would be helpful to both providers and patients (100%). On both the pre- and post-provider surveys, the most commonly noted barriers to physical activity screening/counseling were time to have the conversation (100%) and patients not interested in physical activity (40% and 50% respectively). Barriers to referrals for physical activity promotion were similar on both the pre- and post-provider surveys. The most noted barriers to physical activity promotion referrals were patient not interested (75%), time to have the conversation (25%), and patient preferring weight loss medication (75%); see Table 3.

Discussion

The current study showed that only 49 % (n = 100) of the patients were getting exercise counseling prior to the intervention at the primary care clinic where the study took place, which is higher than what Jones and colleagues (2019) found, where only one-third of the patients reported getting physical activity counseling from their providers. The exercise counseling rate did increase with the use of PAVS by 15.3% ($p = 0.15$) in our study; although statistically non - significant, this slight increase in the documented exercise counseling is clinically significant and is consistent with the results from a more extensive study (n = 696,267) by Grant et al. (2014), where they noted a statistically significant increase of exercise-related documentation with the use of PAVS. The current study showed that those who received exercise counseling pre- plus post-intervention had a significantly higher BMI compared to those who did not ($M = 32.7$, $SD = 8.6$ vs. $M = 28.5$, $SD = 6.8$, $p = .003$). The patient's BMI is currently the driver for physical activity counseling (see Table 4), which is consistent with findings from previous research, such as Dutton and colleagues (2014) cross-sectional study that found a positive association between BMI and counseling, where higher BMI was associated with more frequent counseling ($p < 0.001$). This highlights that interventions for physical inactivity start late when the patients' BMI

is already high, and patients have multiple health complications from obesity; using a physical activity screen would assist in identifying patients at high risk for obesity and start interventions earlier.

The exercise and weight loss referrals were very low for eligible patients both before and after the intervention; only 2% of patients (n=100) were referred in the baseline sample, and 8.7% of patients (n=28) were referred in the post-intervention sample. According to the providers' survey at this clinic, the top barriers to referrals were patients not interested (75%, n=4), patients preferring weight loss medications (75%, n =4), and time to have the conversation (25%, n=4). Clark and colleagues' (2021) study looked at the provider's perceptions of implementing new exercise guidelines; it concluded that using a screen to quantify physical activity may not be supportive of the providers. Some suggestions for facilitating exercise screening in primary care were EMR-integrated resources, including integrating evidenced-based handouts to help providers with counseling or motivational interviewing-informed prompts and referral to local resources or exercise professionals embedded into EMR, point of care reminders, or decision tools.

The sustainability of using PAVS screening at this clinic will depend on the providers and the clinical director; the PI will share the findings from this study with the clinic staff and encourage them to continue assessing the physical activity of their patients' using PAVS. For the refreezing stage to be successful, employees need to not return to their old physical activity screening process. Without an interventional plan for sustainment, effective changes are unlikely to continue and more likely to return to the old ways. For this setting, a sustainability plan that could work would be editing the current flow sheet to replace the old physical activity screening with PAVS, including a prompt for counseling if the patient screens below guideline

recommendations. Currently, providers are not mandated to screen all patients for physical activity. Therefore, there is little incentive to do so unless they are highly motivated and believe it will significantly benefit their patients. Grant and colleagues (2014) reported that a healthcare system intervention improved the recognition of insufficient physical activity. To be compliant with the current physical activity guidelines, providers should screen patients' physical activity levels and counsel patients not meeting the exercise recommendations instead of waiting until BMIs are high to counsel and refer patients. Currently primary care providers' physical activity counseling is inconsistent, and many counseling opportunities are missed.

Implications for Practice

Primary prevention of obesity and chronic disease associated with it could be addressed by screening all patients for PA and counseling leading to improved patient outcomes such as decreased heart attacks and improved diabetes management. Since the screening is already in the EMR, it does not add any cost to utilize it other than provider time. As described in the literature review, financial implication of physical inactivity is estimated at 117 billion dollars annually in the United States. By not screening for PA, counseling opportunities are missed, and this may decrease the patients' quality of life. The providers need to remember that PA is a billable service and providing it increases the quality of care they are providing.

Not all patients will be appropriate for moderate to vigorous intensity exercise counseling; for example, some might have disabling chronic conditions due to multiple physical and psychological reasons. In the current study, we have not differentiated those patients, although USPSTF (2021) recommends physical activity counseling even for patients with CVD as it improves patient outcomes with no evidence that it causes harm to the patients (O'Connor, 2020).

Providers were reluctant to counsel and prescribe due to multiple barriers; the most prominent were the time to have the conversation and the patient's disinterest. Providers have limited time during their encounters with patients and may not believe that spending precious time on physical activity assessment and counseling is a wise use of their time. This is consistent with findings from other studies; AuYong and colleagues (2016) report that some of the provider barriers are insufficient time and insufficient training for physical activity interventions. Additionally, O'Regan and colleagues' literature review (2021) indicates that most providers (94%) report they do not have adequate knowledge of guidelines and training to provide counseling. Although providers' surveys in the women's health clinic did not bring up insufficient knowledge as one of the barriers, all of them agreed that having a visual aid listing current Physical Activity Guidelines would be helpful when counseling patients; therefore, our recommendation is to use the PAVS handout from the American College of Sports Medicine for support (see Appendix A). Fowles and colleagues (2018) reported increased physical activity counseling, prescription, and referral practices after the Exercise is Medicine workshop training among providers in Canada. The training increased the provider's confidence in providing physical activity and exercise information, giving advice, and providing exercise referrals for patients. Although the providers at the Women's Health Clinic already received education from EIM, perhaps more training and education would be beneficial to increase the eligible patient referral rate.

The counseling and referral increase was not statistically significant in this study. One of the reasons could be the location of the PAVS screening in the electronic medical records. The results of the PAVS screening require several clicks to be accessed. Understanding why providers do not utilize or refer patients to the resources readily available to their patients would

need more research, as it could help to inform the exercise liaisons and facilitators on how to improve. Since knowledge is not enough to make a change, providing support for staff and providers through EMR, as described in the Clark and colleagues (2021) study, is an excellent opportunity for future research. On the organizational level, insufficient reimbursement for physical activity counseling plays a role in organizations not being incentivized to promote physical activity (AuYoung et al. 2016).

Limitations

The study limitations include the time frame to complete the study, the small sample, and the ambivalence of the staff. The PAVS intervention included using a new screening in the existing electronic health record, which changed the clinical workflow and added a step to staff responsibilities. The sample size was small, which limited the ability to assess statistical significance (Type 2 error) accurately; a larger sample may have resulted in a statistically significant difference between pre- and post-intervention physical activity counseling and referrals, suggesting the impact of using PAVS. Phase two of the project was not completed due to time limitations and ambivalence from the clinic staff in completing the PAVS screening; if there was more time, barriers such as staff resistance could be addressed. The staff has competing demands, and PAVS screening may not have been their priority. The findings of this study were consistent with the results from several more extensive studies; thus, it is likely that statistically non-significant findings from this were due to the small sample size and possibly the time limitation of the study. Future research with a larger sample may yield different results.

Conclusion

The purpose of this project was to examine the impact of PAVS screening on physical activity counseling and referrals in primary care. Providers at the primary care Women's Health clinic were surveyed on their physical activity screening and counseling beliefs and practices. Barriers to screening, counseling, and referrals need to be addressed in future research. Our findings support established evidence that PAVS screening is a valuable screening tool and is appropriate for use in a primary care setting. Universal physical activity screening is recommended, and providers should be cautious about relying on BMI as the cue to action for physical activity counseling and referral. Although not statistically significant, the increased counseling and referral rates after the intervention are clinically significant. Strong support from leadership and stakeholders is essential to successful implementation of PAVS in the clinical setting. The Women's Health clinic where this study was conducted is open to change and improvement. Recommendations for the next steps include additional PDSA cycles with PAVS screenings on a larger sample. If the use of PAVS screening at the Women's Health clinic continues to show positive results, implementation of this tool throughout the organization should be considered.

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Table 1. Evidence Table

Author, year Link	Location/ design/ sample	Independent and dependent variables	Objective	Measures and methods used	Data analysis techniques	Findings	Strengths/ weaknesses
Agarwal et al. (2020)	Canada Cluster randomized trial N= 296 intervention N= 234 control	Independent variables: Electronic health tool to support PA counseling. Dependent variables: patient reported PA at 4 months, measured metabolic equivalent of task min/wk. Self-efficacy and intension to change.	To assess the feasibility of implementing an electronic health tool to support PA counseling by PCPs	Sample consisted of volunteer adult patients at a single primary care clinic. Exclusions: dementia or cognitive impairment, major illness, pregnancy, non-English speaking patients. Intervention group completed e-survey unlocking PA guidelines, community resources, focusing on perceived barriers/motivators. Control group received usual care.	Descriptive analysis via means and standard deviations and frequencies and proportions respectively.	Only half of the participants in the intervention group received PA prescription and only less than half of those patients received the full intervention including tailored resources from their PCP. Due to suboptimal intervention no statistically, significant differences were observed between the control and intervention group. Authors concluded that greater work needs to be done to address PCP barriers to resource distribution.	Strengths: pilot study to identify potential issues Weakness: MET minutes were highly variable suggesting a need for a better PA measures in future trials
Ball et al. (2016)	USA Quasi experimental N = 305	Independent variables: demographic characteristics Dependent variables:	Assess congruent validity of the PAVS questionnaire with the Modifiable Activity	Participants were volunteer adults. Exclusions: non-English speaking, and patients	Validity assed by Person correlation and agreement assessed using	PAVS results agreed with those of MAQ 89.6% of the time and demonstrated good agreement identifying patients who do not meet PA guideline	Strengths: PAVs does not overestimated PA as much as MAQ Weaknesses: findings limited by

		PAVS questionnaire validity or ability to assess if patient meets levels of physical activity recommended by US Dept. of Health and Human services	questionnaire (MAQ)	with dementia. MAQ and PAVS questionnaires were compared	Bland-Altman agreement plots	recommendations (k= 0.55. p = 0.57; P < 0.01).	MAQ's reliance on self-report.
Brickwood et al. (2021)	Australia RCT N = 117	Independent variables: telephone counseling, wearable activity trackers Dependent variable: physical activity levels, health outcomes	To investigate whether newer technologies such as wearable activity trackers assist in providing support to maintain physical activity levels	Randomized sample had three groups: activity trackers, telephone counseling, and usual care. Study lasted 12 months, participants wore accelerometer	Data was analyzed using STATA and graphically represented using GraphPad Prism. P values for comparison between groups were adjusted with Holm test for multiple comparisons.	Activity trackers and telephone counseling were both effective in supporting participants to maintain the exercise goals. Activity trackers were as effective as telephone counseling.	Strength: long term intervention period Weakness: small sample size
Clark et al. (2020)	Canada Qualitative study N = 38	Independent variables: Primary care health care providers (physicians, nurses, nurse practitioners, occupational therapists, kinesiologist, and physical therapists),	To develop a physical activity screen for electronic medical record integration	Participatory action research, purposeful sampling from primary care setting, two interviews, focus groups, and telephone	Inductive thematic analysis by two interviewers, peer debriefing to improve credibility and minimize biases, content analysis	The screening tool must be convenient for the clinician and instrument must enable physical activity discussions within existing workflow. Healthcare providers need physical activity counseling prompts and resources. Paper handouts with age specific physical	Strengths: diversity of the participants, Depth of the problem Weakness: small sample size, limited generalizability, Self-reported comments and suggestions

		patients and stakeholders Dependent variables: Preferences for physical activity counseling and physical activity screen for EMR				activity guidelines, list of local resources and website with videos of home exercise was suggested.	
Dutton et al. (2014)	USA Cross-sectional survey N = 143	Independent variables: Patient characteristics; characteristics of physician and physician patient relationship. Dependent variables: frequency of weight loss counseling; recommending interventions to lose weight; and referral.	To examine patient characteristics, Provider characteristics and provider patient relationship associated with physical activity counselling	Patients completed anonymous self-reported surveys	Descriptive analyses was used for demographics and logistic regression was used to examine the associated between	Higher BMI was associated with more frequent weight loss counseling, $p < 0.001$. A greater number of medical conditions was associated with more frequent weight loss counseling, $p < 0.05$. Female gender of the provider was associated with higher rates of obesity counseling and referrals	Weaknesses: self-reported results, all patients were participating in managed care weight loss program
Eaking et al. (2014)	Australia RCT N = 151 control N = 151 intervention	Independent variables: telephone counseling Dependent variables: weight, accelerometer derived MVPA, HbA1c. Dietary intake, waist	To evaluate the effectiveness of a telephone-delivered behavioral weight loss and physical activity intervention in patients	Two arm randomized controlled trial, participants were recruited from nine general primary care practices. Eligibility criteria: inactive,	SPSS version 21. Statistical significance set $P < 0.05$ (two-tailed). Interventions effects were examines via linear mixed models	Telephone counseling resulted in modest but significant weight loss increased in moderate/vigorous intensity PA, diet quality, and waist circumference; but not HbA1c level. Intervention effects for physical activity remained statistically	Strengths: Original research, RCT, Recruitment of a largely representative sample of Australian primary care patients Weaknesses: collection of fairly crude data on diabetes

		circumference, fasting blood lipids, blood pressure.	with type 2 diabetes	overweight, or obese. Exclusions: weight loss meds, bariatric surgery	correlating for baseline values and potential confounders	significant at 24 months.	medications usage and thus inability to control for effects of meds on primary outcomes.
Fitzgerald et al. (2015)	United Kingdom and USA Quasi-experimental N=76	Independent variables: Dependent variables:	To evaluate Exercise Vital Sign (EVS) and General Practice Physical Activity (GPPAQ) questionnaires compared to accelerometry	38 subjects from USA and 38 from UK completed EVS and GPPAQ. Both questionnaires were compared to accelerometry.	Sensitivity (ability of the EVS or GPPAQ to identify subjects not meeting the PA guidelines) and specificity (ability of the EVS or GPPAQ to identify subjects meeting the PA guidelines) were calculated as a measurement of validity. ANOVA and SPSS.	EVS and GPPAQ may not identify about half of the patients who need to be advised to increase their physical activity. EVS had slightly better sensitivity (59% vs 46% and specificity (77% vs 50%) than GPPAQ. EVS overestimated MVPA compared to accelerometry for all subjects except UK women.	Strength: participants from multiple countries Weakness: small sample size, may not be generalizable
Grant et al. (2014)	USA Quasi-experimental longitudinal observational study N = 696,267	Independent variables: Exercise vital signs/PAVS Dependent variables: exercise documentation in progress notes, lifestyle referrals,	To examine PAVS which was designed to determine patient reported exercise levels at the beginning of each	Visit outcomes such as exercise documentation in progress notes, referrals, and patient survey results were compared to	Logistic regression models (Poisson regression). Control was pre practice year. clustering data for repeated	Visits utilizing PAVS had an increase in exercise counseling documented in the progress notes (26.2% vs 23.7 %) and referrals (2.1 % vs 1.7%) compared to visits without PAVs. Patients reported increased exercise counseling (88% vs 76%) overweight	Strengths: large sample size Weakness: study was conducted within one health care system in one state. Improvement in the main measures was small (but

		exercise counseling, weight change, HbA1c changes.	outpatient visit.	between centers before and after PAVS implementation with visits to the medical centers where PAVS was not implemented	patient visits.	patients had greater weight loss, diabetics with HbA1c >7 % (n=30,487) had greater HbA1c.	consistent across multiple clinics)
Kuntz et al. 2021	USA Longitudinal study N = 521	independent variables: demographic data Dependent variables: physical activity data using PAVS and accelerometry	To examine the validity of PAVS by comparing it with accelerometry data	Demographic data, BMI, chronic conditions were collected and aggregated using Charlson Comorbidity Index. PAVS was collected though EMR and accelerometer data was collected using ActiGRaph.	Spearman correlation coefficient was used to examine association between exercise recorded though PAVS and accelerometry	PAVS took is useful physical activity assessment that correctly identifies most of adults who do not meet physical activity guidelines	Strengths: Weaknesses: objective and self-report data may assess different constructs; accelerometer measures activity whether purposeful or not whereas PaVS specifically asks for minutes per week of moderate to strenuous exercise.
O'Connor et al. (2020)	USA Systematic review N=52,174	Independent variables: behavioral counseling Dependent variables: all-cause mortality, cardiovascular events, BP, lipids, adiposity, dietary measures, weight outcomes,	To review the benefits and harms of counseling to increase physical activity in adults with cardiovascular risk factors	Systematic review of RCTs using four key questions related to if provider counseling improves physical activity and improves CVD outcomes as well as harms it may cause.	Summary tables, restricted maximum likelihood model with Knapp-Hartung correction. Evidence was graded looking for bias and at the quality of evidence	Behavioral counseling was associated with improvements in diet and physical activity and was effective in reducing cardiovascular events, BP, LDL, obesity with little to no risk of serious harm.	Strength: large number of studies/participants Weakness: studies over 30 years, effects of medications was not excluded as confounding

		physical activity		Exclusions: diabetes studies			
Quiles et al. (2019)	USA Prospective quasi experimental N= 39	Independent variables: race, ethnicity, accelerometry Dependent variables: PAVS questionnaire validity, sensitivity and specificity	To determine the validity and reliability of the PAVS questionnaire in an ethnically diverse sample	A convenience sample of adult participants ages 18-65; willing to wear an accelerometer on the hip. Exclusion criteria: musculoskeletal disease and unmanaged chronic disease	The reliability of PAVS was calculated using Intraclass correlation coefficient (ICC). Statistical analysis with SPSS v 24. A Bland-Altman plot with 95% limits of agreement between PAVS and accelerometry moderate to vigorous PA (MVPA)	PAVS demonstrated validity and high test-retest reliability (ICC = 0.98) in racially and ethnically diverse populations. Specificity 56%, sensitivity 78%	Strengths: First study to evaluate validity of PAVS questionnaire providing preliminary evidence that PAVS can be used in racially/ethnically diverse populations Weakness: convenience sample, all participants has some college education

Table 2. Impact of PAVS Exercise Screening on Exercise Counseling and Referrals

	Pre (*n* = 100) *n* (%)	Post (*n* = 28) *n* (%)	*p*
Exercise counseling Yes No	 49 (49.0%) 51 (51.0%)	 18 (64.3%) 10 (35.7%)	 .15
Exercise/weight loss referral Yes No	 2 (2%) 98 (98%)	 2 (7.1%) 26 (92.9%)	 .208

Table 3. Provider Perceptions of Physical Activity Screening, Counseling and Promotion

	Pre (n = 5)	Post (n = 4)
Physical activity is important for the health of patients		
Not important/Of little importance	0	0
Neutral	0	0
Important/Very important	5 (100 %)	4 (100 %)
It is important to screen patient's physical activity level during all visits.		
Disagree/strongly disagree	1 (20%)	0
Neutral	2 (40 %)	1 (25%)
Agree/Strongly agree	2 (40%)	2 (50 %)
How often physical activity intensity level and the amount of exercise in minutes is documented.		
Never/rarely	3 (60%)	0
Sometimes	2(40%)	4 (100 %)
Always	0	0
A visual aid listing current Physical Activity Guidelines would be helpful for providers to counsel patients.		
Disagree/Strongly disagree	0	0
Neutral	0	0
Agree/Strongly agree	5 (100%)	4 (100 %)
A visual aid explaining moderate intensity physical activity would be helpful for patients.		
Disagree/Strongly disagree	0	0
Neutral	0	0
Agree/Strongly agree	5 (100 %)	4 (100 %)
Physical Activity Vital Sign is used to screen patient's activity level		
Never/rarely	5 (100 %)	1 (25 %)
Sometimes	0	3 (75 %)
Always	0	0
Patients are referred to exercise programs such as Exercise is Medicine		
Never/rarely	2 (40 %)	1 (25%)
Sometimes	3 (60%)	3 (75 %)
Always	0	0
Barriers to physical activity screening:		
Patient not interested	2 (40%)	2 (50 %)
Time to have the conversation	5 (100%)	4 (100 %)
Forget to screen	1 (20%)	1 (25%)
Barriers to referrals:		

Patient not interested Patient prefers weight loss medication Time to have the conversation	5 (100 %) 2 (40%) 3 (60%)	3 (75 %) 3 (75%) 1 (25 %)
PAVS screening is easy to use: Disagree/Strongly disagree Neutral Agree/Strongly agree	N/A	 0 1 (25 %) 3 (75 %)
PAVs screening tool is helpful: Disagree/Strongly disagree Neutral Agree/Strongly agree	N/A	 0 1 (25 %) 3 (75%)
Additional comments:		I definitely noticed the CMAs documenting this and would discuss physical activity with my patients during their annual exam, but didn't have patients bring it up solely based on the screening. I still think this is a wonderful tool and one that should be utilized regularly!

Table 4. Exercise counseling and BMI

	Exercise Couseling	N	Mean	Std. Deviation	Two sided p
BMI	yes	67	32.7045	8.56277	.003
	no	61	28.4815	6.799558	.003

Appendix A. PAVS

Physical Activity Vital Sign

Exercise is Medicine® | AMERICAN COLLEGE of SPORTS MEDICINE

1. On average, how many days per week do you engage in moderate to vigorous physical activity (like a brisk walk)?	_____	days
2. On average, how many minutes do you engage in physical activity at this level?	_____	minutes
Total minutes per week of physical activity (multiply #1 by #2)	_____	**minutes per week**

Incorporate the Physical Activity Vital Sign (PAVS) into your electronic health record and patient intake forms. Calculations may be programmed and the sedentary patient flagged for referral or counseling.

Using the Physical Activity Vital Sign

National guidelines recommend 150 minutes per week of moderate intensity physical activity. That's just 2 ½ hours out of 168 hours in a week! In place of moderate intensity activity, you can complete 75 minutes of vigorous intensity activity, or an equivalent combination of moderate and vigorous intensity physical activity.

- 1 minute of vigorous activity is equal to 2 minutes of moderate activity.
- You can perform activity in multiple "bouts" of any length throughout the day to add up to the recommended 150 minutes/week.

Although light intensity physical activity (such as a casual walk) is not assessed by the PAVS, it positively impacts health. Wherever they are on their physical activity journey, encourage patients to become and remain active. Promote active living throughout the day to reduce sedentary time (less screen time!).

What's Moderate Intensity?

- You can talk, but not sing, while performing the activity.
- Examples: brisk walking, slow biking, doubles tennis, various forms of dance, active home chores and gardening, etc.

What's Vigorous Intensity?

- Vigorous intensity: You can no longer talk easily during the activity and are somewhat out of breath.
- Examples: jogging, fast bicycling, singles tennis, aerobic exercise class, swimming laps, etc.

The Physical Activity Vital Sign – Additional Option

- A comprehensive assessment of physical activity should include muscle strengthening exercises as recommended by the Physical Activity Guidelines for Americans: Adults should do muscle strengthening activities that are moderate or high intensity and involve all major muscle groups on 2 or more days a week.
- If you wish to add a question on muscle strengthening activities, we recommend the following:

How many days a week do you perform muscle strengthening exercises, such as bodyweight exercises or resistance training?	_____	days

Appendix B: Survey Cover Letter

University of Kentucky | College of Nursing

Dear provider at Women's Health Clinic:

Researchers at the University of Kentucky are inviting you to take part in a research study to improve physical activity screening in your patients at the Clinic. The purpose of this research is to gain a better understanding of your attitudes and knowledge of current evidence-based practice recommendations and to assess your familiarity and usage of standardized physical activity screening called Physical Activity Vital Sign. The information obtained from this survey will aid in development of educational intervention that will be offered to all providers during a monthly staff meeting scheduled in September or October 2022. A follow up survey will be sent via email to providers that completed this survey and attended the educational intervention. The follow up survey will assess whether the educational intervention influenced attitudes or improved knowledge. Deidentified patient data will be obtained by the researchers thought CCTS to evaluate if the providers are using PAVS screening and if using it improves physical activity counseling and referrals at the Women's Health Clinic.

Although you may not get personal benefit from taking part in this research study, your responses may help us understand more about the current physical activity screening process at the Women's Health Clinic. In addition, some volunteers experience satisfaction from knowing they have contributed to research that may benefit others in the future.

Participation is voluntary and at no cost to you except for the time taken to complete the survey. You will not be penalized in any way for skipping or discontinuing the survey. The initial survey/questionnaire will take about 5 minutes to complete. The follow up survey is almost identical to this survey therefore will require about 5 minutes to complete. The educational intervention will be presented via PowerPoint during a scheduled staff meeting and will require 5-10 minutes of time.

At the end of the study all participants will be eligible to receive one $10 Starbucks gift card. To be eligible for the price, participants must complete both surveys and be present during the staff meeting where the interventions is presented or verify their attendance by inputting their name in the chat option if the meeting is via zoom. Participants will verbally verify to the PI that they have completed both surveys to receive this small price.

There is minimal risk that there may be a breach of confidentiality. However, your response to the survey is confidential, also no names, IP addresses, email addresses, or any other identifiable information will be collected with the survey responses.

REDCap is a secure web-based application for building and managing online surveys and databases. The application is trademarked by the Vanderbilt CTSA; however, the data is housed on local servers with in house control. REDCap is implemented as a secure web server (HTTPs) located within IPOP behind a firewall on UK's network. Accounts are created using the mc/ad domain account generated by UK and is used for authentication purposes. This login process requires individual password protection for investigators.

When recorded into the database, the investigator can only see a unique number generated for that respondent and date and time completed. IP addresses are captured during survey completion, but they are scrubbed from the data viewed by investigators. REDCap does not share IP addresses with other

consortiums. When investigators are logged onto REDCap to enter data into their case report forms, a vulnerability to hacking the account while open is of concern; however, all data is encrypted when transmitted to the REDCap server. Portable devices are not at risk because nothing is downloaded onto the device, a secure web based connection is used for all data collection.

Data storage on portable devices is not a security concern for REDCap administration, but appropriate measures should be taken when exporting data from REDCap. To assist investigators, REDCap has an email function that offers greater security for large attachments that contain sensitive data. Each recipient receives an email containing a unique downloaded URL, along with a second follow up email with the password for downloading the files. The file is stored securely and removed from the server upon the specified expiration date.

Your information collected for this study will NOT be used or shared for future research studies, even if we remove the identifiable information like your name, clinical record number, or date of birth. If you do not want to be in the study, there are no other choices except not to take part. We hope to receive completed questionnaires from about six providers, so your answers are important to us. Of course, you have a choice about whether to complete the survey/questionnaire, but if you do participate, you are free to skip any questions or discontinue at any time. Please be aware that while we make every effort to safeguard your data once received from the survey, as with anything, we can never guarantee the confidentiality of the data while still en route to us.

If you have questions about the study, please feel free to ask; my contact information is given below. If you have complaints, suggestions, or questions about your rights as a research volunteer, contact the University of Kentucky Office of Research Integrity staff at 859-257-9428 or toll-free at 1-866-400-9428.

Thank you in advance for your assistance with this important project. To ensure your responses/opinions will be included, please submit the survey within two weeks of receiving this link. By clicking the link below, you are agreeing to participate in the research study.

You may open the survey in your web browser by clicking the link below:
PAVS pre survey

If the link above does not work, try copying the link below into your web browser:
https://redcap.uky.edu/redcap/surveys/?s=HK3H94TLPN3DAE49

Sincerely,

Anna Selepina, RN, BSN, CCRN, DNP-Student,

College of Nursing, University of Kentucky

PHONE: 859-533-8490

EMAIL: anna.selepina@uky.edu

Faculty Advisor – Elizabeth Tovar, Ph.D., APRN, Associate Professor

Faculty Phone: 859-323-6611; EMAIL: elizabeth.gressle@uky.edu

Appendix C: Baseline Survey

1. How important is physical activity for the health of the patients?
    a. Not important
    b. Of little importance
    c. Moderately important
    d. Important
    e. Very important

2. It is important to screen patient's physical activity level during all visits?
    a. Strongly agree
    b. Agree
    c. Neither agree or disagree
    d. Disagree
    e. Strongly disagree

3. Do you document physical activity intensity level and the amount of weekly exercise in minutes?
    a. Never
    b. Rarely
    c. Sometimes
    d. Always

4. A visual aid listing current Physical Activity Guidelines for Americans would be helpful to counsel my patients
    a. Strongly agree
    b. Agree
    c. Neither agree or disagree
    d. Disagree
    e. Strongly disagree

5. A visual aid explaining moderate intensity physical activity would be helpful for my patients
    a. Strongly agree
    b. Agree
    c. Neither agree or disagree
    d. Disagree
    e. Strongly disagree

6. I use Physical Activity Vital Sign to screen for patient's activity level
    a. Never
    b. Rarely
    c. Sometimes
    d. Always

7. How often do you write prescription referrals for eligible patients to exercise is medicine?
    a. Never

b. Rarely
c. Sometimes
d. Always

8. The barriers to screen patients for physical activity level are: (List all that apply)
    a. Patient motivation/patient not interested in exercise
    b. Forget to screen
    c. Time to have conversation
    d. Comfort with having the conversation
    e. Lack of evidence for effectiveness of exercise screening
    f. Other _____

9. What are the barriers to refer to EIM for eligible patients? List all that apply
    a. Patient motivation/patient not interested in exercise
    b. Forget to refer
    c. Patients prefer medication management
    d. Time to have conversation
    e. Comfort with having the conversation
    f. Lack of evidence for effectiveness of exercise screening
    g. Other _____

Appendix D: Post Intervention Survey

1. How important is physical activity for the health of the patients?
    a. Not important
    b. Of little importance
    c. Moderately important
    d. Important
    e. Very important

2. It is important to screen patient's physical activity level during all visits?
    a. Strongly agree
    b. Agree
    c. Neither agree or disagree
    d. Disagree
    e. Strongly disagree

3. Do you document physical activity intensity level and the amount of weekly exercise in minutes?
    a. Never
    b. Rarely
    c. Sometimes
    d. Always

4. A visual aid listing current Physical Activity Guidelines for Americans would be helpful to counsel my patients
    a. Strongly agree
    b. Agree
    c. Neither agree or disagree
    d. Disagree
    e. Strongly disagree

5. A visual aid explaining moderate intensity physical activity would be helpful for my patients
    a. Strongly agree
    b. Agree
    c. Neither agree or disagree
    d. Disagree
    e. Strongly disagree

6. I use Physical Activity Vital Sign to screen for patient's activity level
    a. Never

b. Rarely
c. Sometimes
d. Always

7. How often do you write prescription referrals for eligible patients to exercise is medicine?
    a. Never
    b. Rarely
    c. Sometimes
    d. Always

8. The **barriers to screen** patients for physical activity level are: (List all that apply)
    a. Patient motivation/patient not interested in exercise
    b. Forget to screen
    c. Time to have conversation
    d. Comfort with having the conversation
    e. Lack of evidence for effectiveness of exercise screening
    f. Other _____

9. What are the **barriers to refer to EIM** for eligible patients? List all that apply
    a. Patient motivation/patient not interested in exercise
    b. Forget to refer
    c. Patients prefer medication management
    d. Time to have conversation
    e. Comfort with having the conversation
    f. Lack of evidence for effectiveness of exercise screening
    g. Other _____

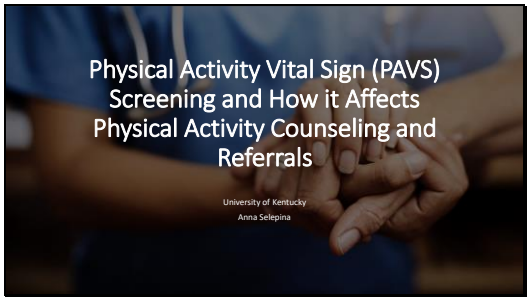
10. The PAVS screening tool is easy to use
    a. Strongly agree
    b. Agree
    c. Neither agree or disagree
    d. Disagree
    e. Strongly disagree

11. The PAVS screening tool is helpful in my practice
    a. Strongly agree
    b. Agree
    c. Neither agree or disagree
    d. Disagree
    e. Strongly disagree

12. Please provide any additional comments or suggestions to help address the issue of physical activity promotion

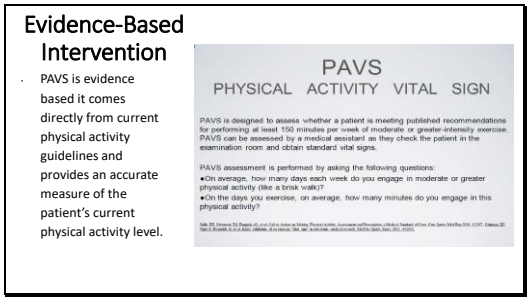
Appendix E: Educational PowerPoint

Slide 1



Slide 2

Slide 3



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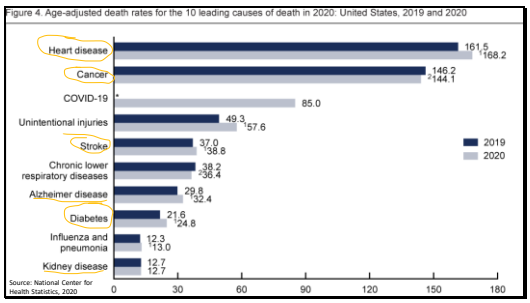

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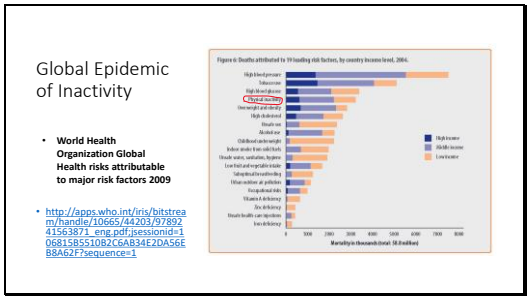

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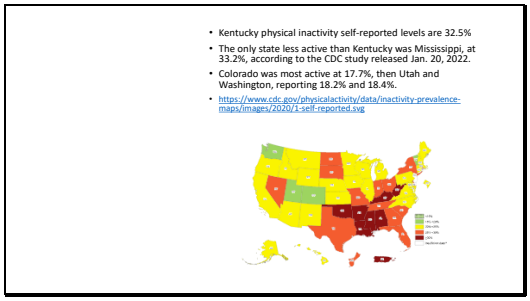


Slide 7

Cost

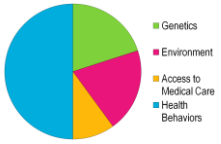
The annual cost of inadequate physical activity in the United States is 117 billion dollars (CDC, 2022).

Slide 8

Determinant of Health

- Physical activity falls under an individual's behavior and is a determinant of health.
- While genetics, environment, and access to medical health influence health outcomes, a person's behavior, and lifestyle choices are major factors contributing to health outcomes (Thompson et al., 2020).
- One of the Healthy People 2020 goals is to provide behavioral counseling to all adults on a healthy diet and physical activity.

Source: Kaiser Family Foundation (CDC, 2015).



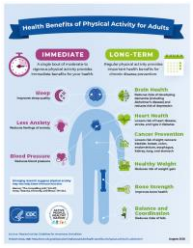
Slide 9

- Physical Activity Guidelines for Americans (2018) recommend that adults ages 18-64 participate in 150 – 300 minutes of moderate-intensity physical activity each week; in addition, the guidelines recommend muscle-strengthening activities at the moderate or greater intensity on two or more intensity more days.
- Getting patients to be more active is an ultimate low-cost therapy for improving health outcomes.

Slide 10

Benefits of Physical Activity

- Physical activity is one of the best things that can be done for health promotion and disease prevention. Not only does it prevent premature death, but it also reduces the burden of chronic diseases.
- An estimated 110,000 deaths per year could be prevented if US adults ages 40 and older increased their moderate-to-vigorous physical activity by a small amount. Even 10 minutes more a day would make a difference (CDC, 2022).



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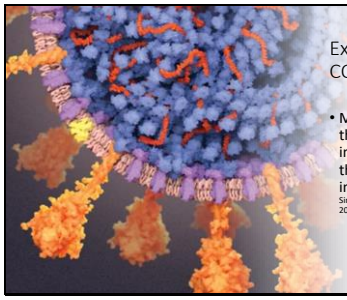


Exercise and COVID-19

- Multiple sources agree that Exercise mobilizes immune cells and therefore strengthens immunity (Duggal et al., 2019; Simpson et al., 2012; Simpson et al., 2020; Woods et al.,2009)

Slide 12

Slide 13

Benefits of the PAVS at Kaiser Permanente

Physicians were more likely to document exercise in progress notes where PAVS was implemented

- 12% increase of documentation of PA habits
- Patients 14% more likely to report having discussed exercise w/ their PCP
- 14% increase in providing exercise referrals to patients

The use of the PAVS was associated with:

- Small, but significant, weight loss in patients that are overweight or obese (Grant et al., 2014).
- Greater reduction in HbA1c levels in patients with diabetes (Grant et al., 2014).
- PAVS is associated with improvements in cardiometabolic risk factors (Nelson et al., 2020).

Slide 14

Current exercise screening and referrals

BMI screening and follow-up plan are one of the Merit-based Incentive Payment System (MIPS) Clinical Quality Measures; they include documenting education, referrals, pharmacologic interventions, dietary supplements, exercise counseling, or nutrition counseling

Currently patient physical activity screening/referrals is at __ % at WH clinic.

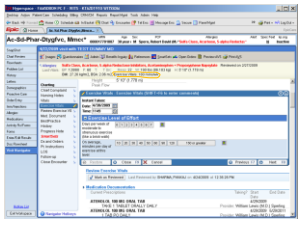
PAVS resulted in 14% increase in providing exercise referrals to patients.

Using PAVs will result in increased documentation of physical activity

Slide 15

Exercise Vitals

- Routine part of health history – can be integrated into electronic medical record
- PAVS takes less than 30 seconds
- Could be done by Medical Assistants while taking other vitals



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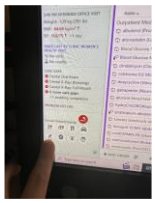
How to access PAVs in our EPIC



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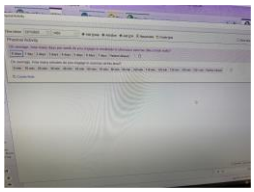
PAVS in EPIC



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Questions?

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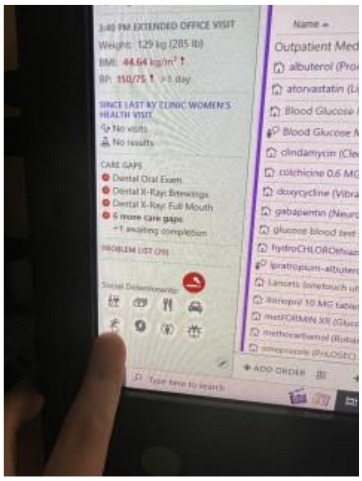
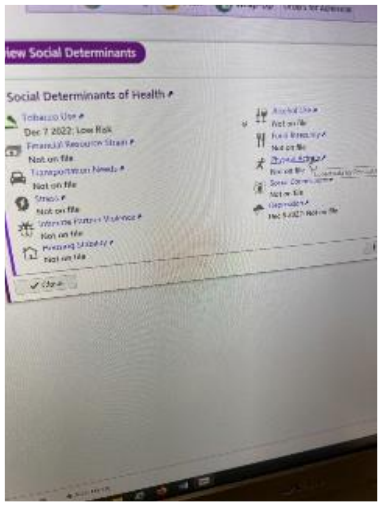
Appendix F. Provider Education

How to access PAVs in our EPIC





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