Evaluación de la Actividad y Aptitud Física en el Modelo de Educación Deportiva: Revisión Sistemática

Evaluating Physical Activity and Fitness in Sport Education Model: A Systematic Review

Luis Estrada-Oliver[1*], Zachary Wahl-Alexander[2], Anthony Melendez-Nieves[1] & Olvin Rosado[3]
University of Puerto Rico[1]; University of Northern Illinois[2]; Wright State University[3]
*Autor para correspondencia: luis.estrada2@upr.edu

RESUMEN
La Educación Deportiva es el modelo pedagógico más reconocido e investigado en el campo de la Educación Física. Como modelo pedagógico promueve personas entusiastas, competentes, y alfabetizadas por medio del deporte, ha evolucionado con diversos contenidos no deportivos, lecciones prácticas y acondicionamiento físico promoviendo la actividad física y aptitud. El objetivo del estudio fue examinar la relación del modelo de Educación Deportiva con resultados reportados en la actividad física y aptitud. Los artículos analizados fueron encontrados de 5 bases de datos: Web of Science, Scopus, SportDiscuss, Proquest and Google Scholar. Los criterios de inclusión incluyen: a) artículos revisados por pares en revistas indexadas b) intervenciones del modelo de Educación Deportiva o comparaciones con otros c) hallazgos dirigidos a la actividad o aptitud física d) nivel primaria-universitario y relacionados y e) artículos publicados en inglés o español. Se utilizaron palabras asociadas (Educación Deportiva, Modelos de Enseñanza, Modelos Pedagógicos, Actividad Física, y Aptitud Física) en diferentes combinaciones. En total, se identificaron 21 artículos a través del proceso de búsqueda y se analizaron utilizando las guías Preferred Reporting Items for Systematic Reviews and Meta-Analyses. Inicialmente, los artículos se categorizaron de acuerdo a las siguientes dimensiones: ciudad de origen, propósito del estudio, recopilación de datos, duración de la temporada, participantes (grado, género, edad) y resultados. Los resultados demostraron la fuerte relación y adaptabilidad del modelo de Educación Deportiva para promover la actividad física moderada-vigorosa y los componentes de la aptitud física por medio de contenidos no deportivos en escenarios escolares y no escolares.
Palabras clave: Educación Deportiva; Actividad Física; Aptitud relacionada a la Salud

ABSTRACT
The sport education model is the most widely researched and implemented pedagogical model in the physical education field. As a pedagogical model that promotes enthusiastic, competent, and literate people through sports has evolved with non-sports content, practical lessons, and physical conditioning to promote physical activity and fitness. The aim of this study study was to examine the Sport Education Model relationship with physical activity and fitness outcomes. The research articles analyzed were found through five databases: Web of Science, Scopus, SportDiscuss, Proquest and Google Scholar. The articles used the following criteria: (a) peer-reviewed studies in indexed international journals, (b) Sport Education Model implemented in isolation or compared with others, (c) findings focused on physical activity or fitness, (d) elem entary–college or related setting research, and (e) published in English or Spanish. The associated keywords (sport education, models based- practice, pedagogical models, physical activity, and fitness) were used in different combinations. A total of 21 articles were identified through the search process and analyzed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. Articles were initially categorized according to the following dimensions: country of origin, purposes, data collection, length of season, participants (grade,

gender, age), and findings. The results demonstrated Sport Education Model strong relationship and feasibility to promote moderate/vigorous physical activity and health-related fitness components through non-sports contents in academic and non-academic settings.
Keywords: Sport Education, Physical Activity, Health-related Fitness

INTRODUCCIÓN

Los niveles de actividad física y componentes de aptitud relacionados a la salud continúan siendo una gran preocupación en los entornos escolares. A pesar de que las lecciones de educación física se imparten durante 12 años desde los niveles de primaria hasta secundaria (Shape America, 2014), los estudiantes no están cumpliendo con los niveles apropiados de actividad física (AF) y aptitud física. Es esencial que los niños realicen al menos 60 minutos diarios de actividad física y 150 minutos semanales para prevenir enfermedades coronarias. La literatura científica ha identificado que el 80% de los adolescentes no alcanzan las recomendaciones de la Organización Mundial de la Salud (OMS). Además, esta preocupación se extiende cuando los estudiantes llegan al nivel de educación superior, donde 1 de cada 3 universitarios presenta obesidad en la actualidad (Bailey et al., 2020). Como un esfuerzo significativo, investigadores de todo el mundo han implementado diferentes intervenciones a través de las escuelas (Barroso y Ries, 2023), programas extracurriculares y clubes deportivos para promover la AF y la aptitud física, tratando de reducir esta conducta sedentaria. Específicamente, en entornos de primaria-secundaria, los modelos pedagógicos han surgido como una posible respuesta para promover estilos de vida activos y saludables. Ciertamente, la mayoría de las características de los modelos pedagógicos contribuyen con factores esenciales, que incluyen la motivación (Gil-Arias et al., 2020) y el disfrute (Guijarro et al., 2020), que están fuertemente relacionados con la mejora de los niveles de actividad física. Aunque se han realizado varias revisiones sistemáticas del Modelo de Educación Deportiva (SEM, por sus siglas en inglés) (Araujo et al., 2014; Evangelio et al., 2018; Chu y Zhang, 2018), la relación del Modelo de Educación Deportiva con la AF y la aptitud física como resultados aún no ha sido revisada.

La educación deportiva (SE) es un modelo pedagógico (PM) que simula una temporada de deportes auténtica, incluyendo afiliación a equipos, competencia formal, registro de datos, unidades denominadas temporadas, festividades y una posterior ceremonia de premiación (Siedentop et al., 2020). A pesar de que el SEM es un modelo centrado en el estudiante con el propósito de inspirar a personas entusiastas, competentes y alfabetizadas, la literatura emergente se ha centrado en maximizar los niveles de AF y aptitud física dentro de este modelo. Hastie et al. (2020) reconocen el Modelo de Educación Deportiva (SEM) como una herramienta valiosa para promover la agenda de Shape America de 50 millones centrada en aumentar la actividad física de los niños. A través de los años, el modelo de Educación Deportiva ha ido evolucionando gradualmente con intervenciones que incluyen: la aptitud física relacionada con la salud, el CrossFit y otros conceptos basados en la aptitud (Pritchard et al., 2015; Sibley, 2012; Wahl-Alexander y Morehead, 2020; Ward et al., 2017). En este sentido, la importancia de evaluar los beneficios del SEM en relación con los dominios mencionados anteriormente es esencial para promover estilos de vida saludables. Por lo tanto, el objetivo del estudio fue examinar la relación del modelo de Educación Deportiva con resultados reportados en la actividad física y aptitud.

MÉTODO

Se utilizaron las directrices del Informe Preferido para Revisiones Sistemáticas y Metaanálisis (PRISMA) para la selección de los estudios (Moher et al., 2009). Se llevó a cabo una búsqueda sistemática en cinco bases de datos científicas (Web of Science, Scopus, Sport Discuss [SD] - EBSCO, ERIC y Google Scholar) desde los años 2017 a 2022. Estas bases de datos fueron seleccionadas porque incluían artículos de educación física publicados en revistas indexadas,

incluyendo el Journal Citation Report (JCR) y publicaciones similares (por ejemplo, el Scimago Journal Rank-SJR). Las estrategias de búsqueda utilizadas en las cinco bases de datos mencionadas incluyeron una combinación de las siguientes palabras clave: educación deportiva, práctica basada en modelos, actividad física, aptitud física y educación física. Los artículos seleccionados cumplieron con los siguientes criterios: (a) estudios revisados por pares en revistas indexadas, (b) Modelo de Educación Deportiva implementado de manera aislada o comparado con otros, (c) hallazgos centrados en la actividad física o la aptitud física, (d) investigación en entornos de educación primaria a universitaria o relacionados, y (e) publicados en inglés o español. La búsqueda inicial arrojó 922 publicaciones (ver figura 1), de las cuales se recuperaron 855 resúmenes después de aplicar los criterios de exclusión en cuanto a los títulos y resúmenes, estudios duplicados y aquellos que no se centraban en la Educación Deportiva. Cada investigador revisó de forma independiente los estudios dos veces para comparar los resultados con los de otros miembros del equipo de investigación. Al segundo nivel de criterios de exclusión, se revisaron los artículos de acuerdo a los siguientes criterios: (a) estudios no revisados por pares en revistas indexadas, lecciones prácticas, artículos que no fueran en inglés o español y texto completo. En este nivel, se recuperaron un total de 33 artículos. En una segunda revisión, se eliminaron los artículos de Educación Deportiva que no se centraban en resultados de actividad física o aptitud física, lo que resultó en 24 artículos. Finalmente, se excluyeron los artículos que eran intervenciones híbridas del SEM. A partir de esta revisión, un total 21 artículos fueron seleccionados para una revisión completa. Las referencias y citas de los estudios finales fueron revisadas en busca de posibles artículos que no se incluyeron durante la búsqueda inicial. Para analizar toda la información de los 21 artículos incluidos en esta revisión, se realizó un análisis de contenido. La información se extrajo utilizando el análisis de contenido de los artículos basado en una guía de revisión sistemática (Harris et al., 2014). Las categorías de revisión se definieron a priori por el primer autor basado en estudios previos de revisión del SEM: autores, objetivos del estudio, país, participantes, deportes jugados o contenido, duración de la temporada, recopilación de datos y resultados.

Para evaluar la calidad de los artículos seleccionados en esta revisión sistemática, se consultó la Lista de Comprobación para Medir la Calidad de los Estudios, la Declaración de Fortalecimiento del Informe de Estudios Observacionales y la Declaración Consolidada de Informes de Ensayos. Se utilizó una lista de comprobación adaptada de la Declaración de Fortalecimiento del Informe de Estudios Observacionales para evaluar la calidad de los artículos finales. Esta decisión se basó en que estudios previos que han evaluado la calidad de los artículos con instrumentos adaptados (Araújo et al., 2014; Chu y Zhang, 2018; Hastie y Casey, 2014) para asegurar la obtención de artículos relevantes y obtener una puntuación de calidad para los estudios. Por lo tanto, la calidad de los artículos se evaluó en función de los siguientes criterios: (a) descripción del programa; (b) revista JCR/SJR; (c) descripción metodológica detallada; (d) muestra o número de participantes; y (e) duración (SEM) de la implementación. Cada ítem se puntuó del '0' al '2' utilizando estos criterios (ver Tabla 1). La puntuación total de calidad de todas las publicaciones seleccionadas se calculó sumando el número de ítems positivos entre '0' y '10'. Las investigaciones se clasificaron de la siguiente manera: (a) baja calidad: una puntuación menor a '3'; (b) calidad moderada: una puntuación entre '4' y '6'; y (c) alta calidad: una puntuación de '7' o más (ver Tabla 1). Como resultado, 21 estudios finales se clasificaron como de alta calidad. En este proceso, los investigadores examinaron cada estudio de forma independiente dentro de la lista de comprobación de calidad (ver tabla 1). Se calculó un promedio para cada estudio dentro de las puntuaciones individuales de los tres investigadores para determinar la calidad de los estudios. Por ejemplo, la descripción del programa se puntuó con 2 puntos si (¿el estudio ofrecía una descripción detallada del programa?): '0': no se incluyó; '1': descripción breve y no detallada. En cuanto a la inclusión en JCR/SJR (¿se publicó el estudio en una revista indexada en JCR o SJR?), las opciones de puntuación fueron '0': si no estaba indexado en

JCR/SJR; '1': indexado en otras bases de datos; '2': indexado en JCR/SJR. Las puntuaciones de metodología se basaron en si el artículo informaba detalladamente el proceso metodológico utilizado: '0': no se informó; '1': informado pero impreciso (no completamente); '2': descripción exhaustiva informada. Los criterios de puntuación de la muestra de los estudios (número de participantes) se establecieron de la siguiente manera: '0': menos de 10 participantes; '1': de 10 a 50 participantes; '2': más de 50 participantes. Finalmente, la puntuación de la duración del SEM se estableció de la siguiente manera: '0': menos de ocho lecciones; '1': de nueve a 14 lecciones; '2': más de 15 lecciones.

Evaluación de la calidad de la selección final de artículos

Tabla 1

Quality Score Checklist.

Research	Program Description	JCR/SJR	Methodology	Sample	Len-gth	Total Score	Quality Level
Hastie & Trost (2002)	2	1	2	2	2	9	HQS
Parker & Curtner-Smith (2005)	2	2	2	1	1	8	HQS
Hastie et al. (2009)	2	2	2	1	2	9	HQS
Hastie et al. (2012)	2	2	2	1	2	9	HQS
Perlman (2012)	2	2	2	1	2	9	HQS
Pritchard et al. (2015)	2	1	2	1	2	8	HQS
Ward et al. (2017)	2	1	2	2	2	9	HQS
Wahl-Alexander & Morehead (2017)	2	1	2	2	2	9	HQS
Wahl-Alexander & Chomentowski (2018)	2	1	2	1	2	8	HQS
Pritchard et al. (2019)	2	1	2	1	2	8	HQS
Rocamora et al. (2019)	2	1	2	2	2	9	HQS
Segovia & Gutierrez (2020)	2	1	2	2	2	9	HQS
Casado-Robles et al. (2020)	2	1	2	2	1	8	HQS
Puente-Maxera et al. (2020)	2	1	2	2	2	9	HQS
Wahl Alexander et al. (2020)	2	1	2	1	2	8	HQS
Guijarro et al. (2020)	2	1	2	2	2	9	HQS
Shu et al. (2021)	2	2	2	2	1	9	HQS
Choi et al. (2021)	2	1	2	2	1	8	HQS
Hiu & Hastie (2021)	2	1	2	1	2	8	HQS
Wahl-Alexander & Camic (2022)	2	2	2	2	2	10	HQS
Layne et al. (2022)	2	1	2	2	1	8	HQS

Note: Program description (did the research offer a detailed description of the program?): ‘0′: not included; ‘1′: brief and undetailed description,; ‘2′: detailed description. JCR/SJR inclusion (was the study published in a journal indexed on the JCR or SJR?): ‘0′: not indexed by SJR/JCR; ‘1′: indexed on other database; ‘2′: indexed on SJR/JCR. Methodology (did the paper report in detail the methodological process used?): ‘0′: not reported; ‘1′: reported but imprecise (not completely); ‘2′: exhaustive description reported. Sample (number of participants): ‘0′: fewer than 10 participants; ‘1′: 10 to 50 participants; ‘2′: more than 50 participants. Length (duration): ‘0′: fewer than eight lessons; ‘1′: nine to 14 lessons; ‘2′: more than 15 lessons. JCR, Journal Citation Report; SJR, Scimago Journal Rank; HQS: high-quality study, MQS: moderate quality study

RESULTADOS

Esta sección proporciona un resumen y discusión del estudio en términos de examinar la relación del Modelo de Educación Deportiva con los resultados de la actividad física y la aptitud física. En el momento de esta revisión, se identificaron un total de 21 artículos que cumplen con los criterios de inclusión. En esta revisión sistemática, se discuten los países de los estudios, el propósito, el contenido, los participantes, la recopilación de datos y los hallazgos clave (ver tabla 2). Revisiones sistemáticas previas del SEM han seleccionado las subsecciones mencionadas anteriormente.

Países

El país de origen de cada estudio se determinó en función de la ubicación del estudio y no de la ubicación de origen del autor. Trabajos anteriores (Hastie et al., 2011) determinaron que la mayoría de las investigaciones de las temporadas de Educación Deportiva ocurre en los Estados Unidos (más del 76%). Sin embargo, la revisión de los entornos mostró una extensión a otros países que implementaron el SEM en relación con los resultados de la actividad física y la aptitud física. Como se puede observar, el 71,4% de los estudios se originaron en los Estados Unidos, mientras que el 23,8% se llevaron a cabo en España y el 4,8% en China. No se encontraron representaciones de otros entornos internacionales.

Las investigaciones realizadas en los Estados Unidos se han centrado en resultados de aptitud física enfatizado en gran medida los niveles de educación primaria y universitaria, excluyendo el nivel de secundaria. A pesar de que se han aplicado intervenciones de SEM con diferentes propósitos (por ejemplo, habilidades, conocimiento, motivación) en el nivel de secundaria, rara vez se han aplicado con propósitos dirigidos hacia la actividad y la aptitud física. En cuanto a la aptitud física como resultado de la temporada, solamente el estudio de Pritchard et al. (2015) exploró participantes de la escuela secundaria. De todos los resultados de estos estudios en los Estados Unidos, solo uno informó resultados inesperados en los que la aplicación del SEM no alcanzó el nivel de actividad física requerido o mostró diferencias significativas (Parker y Curtner-Smith, 2005). En el momento de esta revisión, España no había informado del desarrollo de investigaciones del SEM con la aptitud física o la actividad física como resultados a nivel universitario o fuera de un entorno académico.

Propósito

Un análisis detallado mostró que el propósito principal de cada estudio (ver tabla 2) varía ampliamente. El énfasis principal de los estudios van desde (a) examinar el impacto de la Educación Deportiva en los niveles de aptitud aeróbica de los estudiantes (Hastie et al., 2009; Wahl-Alexander y Chomentowski, 2018) (b) los niveles de actividad física durante la temporada (Parker y Curtner-Smith, 2005; Pritchard et al., 2015; Pritchard et al., 2019; Ward et al., 2017), (c) comparar los resultados de la Educación Deportiva en la actividad física con otros enfoques de enseñanza (Guijarro et al., 2020; Rocamora et al., 2019), (d) identificar formas de aumentar la actividad de los estudiantes (Shu et al., 2021; Hastie et al., 2012; Wahl-Alexander et al., 2020) y (e) examinar el impacto en poblaciones vulnerables (Hastie y Trost, 2002; Wahl-Alexander y Camic, 2022). Un total de 15 estudios se centraron en la actividad física como resultado principal con diferentes propósitos, validando el aumento en los estudios de SEM que lo utilizan como un modelo pedagógico que promueve un estilo de vida activo. Específicamente, 10 de los 15 estudios se desarrollaron en los Estados Unidos, cuatro en España y uno en China. Aunque había muchas similitudes en cuanto a los propósitos principales de las temporadas de SEM, se observó una mayor diversidad en cuanto al contenido utilizado en cada iteración (ver tabla 2).

Contenido

Predominantemente, se han implementado contenidos basados en deportes con resultados de actividad física o aptitud física a lo largo de las temporadas de modelo de Educación

Deportiva. Nueve estudios exploraron juegos de invasión, seis utilizaron un enfoque basado en la aptitud física, dos utilizaron juegos de red/pared, y uno implementó unidades innovadoras "Juegos alrededor del mundo" (Puente-Maxera et al., 2020) y una unidad de "Habilidades motoras parkour" (Shu et al., 2021). Entre las categorías de juegos de invasión, el baloncesto, el fútbol americano y el fútbol se han implementado de manera constante para mejorar los resultados de la actividad física. El contenido basado en la aptitud física se ha centrado principalmente en intervenciones de CrossFit, salto de cuerda y juegos basados en Entrenamientos de Intervalos de Alta Intensidad (HIIT, por sus siglas en inglés).

Participantes

La mayoría de los estudios identificados se llevaron a cabo en entornos académicos (primaria-secundaria), a excepción de dos estudios en campamentos residenciales (Wahl-Alexander y Morehead, 2020; Wahl-Alexander y Camic, 2022). Los participantes de los estudios se clasificaron como (a) nivel primario/elemental (siete), (b) nivel de escuela intermedia (seis), (c) nivel de secundaria (dos), (d) nivel universitario (cuatro) y (e) fuera de entornos académicos (dos; consulte la Tabla 2). Hastie y sus colegas instan a los académicos a continuar realizando investigaciones para evaluar el modelo en diversos contextos (por ejemplo, escuelas, programas extracurriculares, campamentos) y ampliar su aplicación a grupos de edades universitaria. Desde esta llamada, cuatro estudios han explorado la actividad física y la aptitud física a nivel universitario, centrándose únicamente en examinar el impacto del modelo de educación deportiva en los niveles de actividad física y aptitud. A pesar de la falta de exploración de los beneficios extendidos del modelo en otros escenarios, los resultados han promovido y mejorado consistentemente los niveles de actividad física en todos los entornos académicos y externos. Respecto a las duraciones de las temporadas, Siedentop et al. (2020) mencionan que una temporada exitosa de educación deportiva consiste en 12 a 15 lecciones para intervenciones en escuelas primarias e intermedias, con una duración mínima de 30 a 40 minutos cada una. En el caso de entornos de secundaria, 20 lecciones (de 45 minutos cada una) parecen ser ideales. La mayoría de las temporadas basadas en deportes cumplen con las recomendaciones de Siedentop et al. (2020) y logran los resultados esperados de los estudios (consulte la Tabla 2). Sin embargo, las duraciones mencionadas anteriormente se enfocan en temporadas basadas en deportes, lo que difiere de las temporadas basadas en aptitud física. En este caso, Siedentop et al. sugirieren un semestre completo (18-20 semanas) para lograr cambios significativos en los componentes de la aptitud física relacionados con la salud. Algunos estudios han seguido las sugerencias de duración de la aptitud física (Pritchard et al., 2015; Wahl-Alexander y Chomentowski, 2018; Ward et al., 2017). Igualmente, la duración de las temporadas han sido variadas, donde identificamos las dos temporadas más cortas tenien 7 y 10 lecciones,(Parker y Curtner-Smith, 2005; Layne et al., 2022) respectivamente, y la más larga (Wahl-Alexander y Chomentowski, 2018) con 26 en el nivel universitario. La duración promedio de las temporadas de educación deportiva en España con la aptitud física o la actividad física como resultado fue de 15 lecciones, en comparación con los Estados Unidos, donde fue de 17.

Colección de Datos

En estos estudios, las pruebas de aptitud física y los podómetros/acelerómetros fueron las dos herramientas de instrumentación más utilizadas (consulte la Tabla 2). Específicamente, para evaluar el efecto en los indicadores de aptitud física relacionados con la salud, se empleó la prueba FITTNESSGram (por ejemplo, pruebas de flexiones, abdominales y PACER) para determinar la eficacia de las temporadas basadas tanto en deportes como en aptitud física. El porcentaje de grasa corporal consistentemente se midió utilizando un Analizador de Composición Corporal Tanita BC-418. Se utilizaron acelerómetros (ActiGraph) y podómetros para explorar la calidad y duración de la actividad física dentro de las temporadas, además de utilizar

la observación sistemática (SOFIT). Como una característica común, los tres estudios (Parker & Curtner-Smith, 2005; Choi et al., 2021; Chu et al., 2021) utilizaron la observación sistemática (SOFIT) donde informaron que los particpantes no alcanzaron los niveles de actividad física durante la intervención del modelo Educación Deportiva. El Sistema de Observación de Juego y Recreación (SOPARC), un instrumento de observación sistemática para evaluar la actividad física y las características de las personas y el entorno asociado en parques y entornos de recreación, se utilizó en solo un estudio.

DISCUSIÓN

Este estudio tuvo como objetivo analizar la relación del Modelo de Educación Deportiva con la actividad física y la aptitud física como resultados de temporadas. Como resultado de esta investigación, el SEM demuestra la capacidad de adherirse estrechamente a los niveles recomendados de actividad física en varios entornos académicos (primaria, secundaria y universidad); sin embargo, hasta la fecha, sigue la falta de evidencia de su efectividad fuera de entornos académicos, en diferentes países y poblaciones específicas (por ejemplo, raza, estudiantes con discapacidad). La mayor contribución de esta revisión sistemática es la adaptabilidad del Modelo de Educación Deportiva en diferentes entornos, poblaciones y contenidos para alcanzar resultados favorables en la actividad física y la aptitud, lo que permite a los investigadores desarrollar estudios futuros para mejorar y promover estilos de vida saludables.

Beneficios y desafíos en los resultados de actividad física y aptitud

Se informaron niveles más altos de AFMV (actividad física moderada a vigorosa) para las temporadas basadas en deportes (Hastie y Trost, 2002; Perlman, 2012; Pritchard et al., 2019; Wahl y Morehead, 2017), así como las temporadas basadas en la aptitud (Hastie et al., 2012; Pritchard et al., 2017; Ward et al., 2017) demostrando los beneficios de implementar el SEM. La mayoría de los estudios informaron que los estudiantes pasaron al menos el 60% de su tiempo de lección en AFMV y se redujo su tiempo de inactividad. Predominantemente, los estudios sobre resultados de aptitud física mostraron una mejora significativa en los componentes de la aptitud relacionados con la salud (ARFS) como capacidad aeróbica, fuerza y resistencia muscular (Ward et al., 2017), donde todos alcanzaron los niveles saludables recomendados. Al mismo tiempo, se identificó evidencia de los beneficios del SEM en términos de aumentar el número de pasos diarios fuera de un entorno académico (Hastie et al., 2012; Wahl-Alexander y Camic, 2022). Sin embargo, las versiones de temporadas de deportes múltiples y modificados (fútbol mini) enfrentaron desafíos para alcanzar los niveles de actvídad física recomendados (Casado-Robles et al., 2020). Algunos académicos, como Pennigton (2019), han explicado que estos resultados pudieran deberse a que las características del SEM relacionadas con la instrucción y el tiempo limitado resultan en menos aptitud relacionada con la salud y actividad física. Agregar más tareas a una temporada de Educación Deportiva se desvía de los propósitos de la actividad física y la aptitud; la importancia de equilibrar las tareas y las habilidades deportivas (práctica) con la duración de la temporada es relevante en una temporada basada en deportes. Ciertamente,los roles del SEM pudieran influir en los niveles de actividad física debido a las diferentes tareas que realizan los estudiantes en la temporada. Oliveros y Fernández-Rio (2022) encontraron en su intervención que los roles no jugadores como estudiantes jueces/árbitros mostraron niveles significativamente más altos de sedentarismo. Estos hallazgos muestran la importancia de que los profesores tengan un sólido conocimiento del SEM e integren estrategias adicionales, como indicaciones, para alcanzar niveles de actividad física y aptitud física en entornos no académicos.

Educación Deportiva en diferentes países y contenidos

La mayoría de los estudios en Estados Unidos demostraron la validez del Modelo de Educación Deportiva (SEM) en todos los entornos académicos y externos, como los campamentos de verano. Como se mencionó, los niveles de actividad física vigorosa (MVPA, por sus siglas en inglés) en los Estados Unidos alcanzaron al menos el 60% del tiempo de la lección, excluyendo el estudio de Parker y Curtner-Smith (2005). Este resultado podría explicarse por la falta de experiencia de profesores en formación, que aplicaron adecuadamente la versión del SEM. Las intervenciones basadas en contenido de fitness (Hastie et al., 2012; Pritchard et al., 2015; Ward et al., 2017) alcanzaron de manera confiable los niveles recomendados de actividad física y mejoraron significativamente los componentes de la aptitud relacionada con la salud (HRF, por sus siglas en inglés) en todos los entornos académicos y en dos entornos externos. Países internacionales, como España, han comenzado a aplicar el modelo en diferentes contextos para fomentar la actividad física y la aptitud entre los participantes. Sin embargo, no se encontraron intervenciones fuera de entornos académicos durante este revsión estudio.

A través de esta revisión sistemática, los propósitos de los estudios fueron variados. Las temporadas de SEM centradas en contenido de fitness han demostrado contribuciones positivas a las necesidades psicológicas básicas (Carriedo et al., 2022). Además, se identificaron estudios que se centran en las diferencias de género en los niveles de actividad física y aptitud donde se destacan a estudiantes desmotivados (Perlman, 2012) o perfiles de aptitud saludable (Wahl-Alexander & Camic, 2022). En comparación con los enfoques de enseñanza tradicionales, el SEM ha logrado con éxito alcanzar niveles apropiados de actividad física y aptitud física en diferentes contenidos de lecciones (Perlman, 2012; Guijarro et al., 2020). Esto es consistente con la afirmación de Metzler (2011) sobre los beneficios de los modelos centrados en el estudiante, que permiten una mayor participación activa y roles de liderazgo. A pesar de, que el SEM desarrollan personas auténticas, competentes y alfabetizadas a través de fases y roles brindan suficiente espacio para la participación de los estudiantes en los niveles de actividad física y aptitud física. Varios estudios (Perlman, 2012; Rocamora et al., 2019) informaron diferencias en los niveles de actividad física a lo largo de las fases del SEM (pretemporada); sin embargo, esto no explicó la desaceleración de los niveles que se observó (Curtner & Smith, 2005) en la fase final. Las diferencias en la actividad física entre las fases del SEM pudieran explicarse por la motivación de los participantes para obtener puntos durante las fases de competencia (Wahl-Alexander & Camic, 2022) o por los niveles de habilidad de los participantes al ejecutar las destrezas. Puente-Maxera (2020) identifica la fase de pretemporada como la fase más activa que contribuye a la AFMV, así como a los METs. Interesantemente, el contenido de la temporada fue uno no tradicional conocido como "Juegos alrededor del mundo". Los académicos han sugerido estrategias para optimizar la actividad física utilizando el SEM con contenido no relacionado con el fitness (Hastie et al., 2012; Wahl-Alexander & Smart, 2020), lo que puede mejorar los resultados de la actividad física a través de fases no competitivas (por ejemplo, afiliación, festividad). A pesar de la variedad de propósitos de los estudios, todavía urge la necesidad de investigar desde otras perspectivas el SEM y su relación con los niveles de aptitud y actividad física. En nuestro conocimiento hasta la fecha de hoy no se han realizado estudios que investiguen las diferencias en los niveles de aptitud física según los roles del SEM y solo uno con niveles de actividad física (Oliveros & Fernandez-Rio, 2022). Se podría establecer la hipótesis que los estudiantes se sienten más motivados desempeñando o cambiando los roles del SEM durante la temporada, lo que puede dar lugar a diferencias en los niveles de actividad física y aptitud física. Este argumento pudiera respaldarse con la teoría de la autodeterminación (Ryan & Deci, 2000), que afirma que la motivación intrínseca y el disfrute se correlacionan fuertemente con niveles más altos de actividad física. Otros autores, como Pérez-Pueyo et al. (2020), identifican la importancia de reforzar el elemento de evaluación formativa dentro del SEM. A través de una temporada de fitness de SEM, el desempeño de los roles de los estudiantes (por ejemplo, oficiales, jueces) puede

evaluar la calidad de las rutinas de ejercicios. Estas acciones pueden resultar en ejercicios de mayor calidad y, por lo tanto, en mejores resultados de aptitud física.

Fidelidad del modelo de Educación Deportiva en los resultados de actividad física y aptitud física

En lo que respecta a la duración de las lecciones y fidelidad, el tiempo total en minutos de actividad física y pasos fue variedad, lo cual podría ser relevante para la fidelidad de los resultados de actividad física y aptitud física centrados en el SEM. Por medio de los estudios de esta revisión sistemática se identificó un promedio de aproximadamente 600 minutos por temporada en contenido basado en fitness en comparación con 700 minutos en contenido basado en deportes. Siedentop et al. (2020) sugieren que la duración de una temporada del SEM debe diseñarse teniendo en cuenta el entorno y los resultados esperados. Como se mencionó, los autores sugieren que las temporadas de contenido de fitness deben durar entre 18 y 20 semanas. Esta afirmación puede ser una limitación al aplicar el SEM con fines de actividad física y aptitud física en las escuelas desde niveles primarios hasta superior, donde los cursos de Educación Física se imparten solo dos o tres veces por semana. Sin embargo, la integración de técnicas de motivación, habilidades simplificadas o tecnologías puede abordar la brecha en las temporadas cortas de SEM para ayudar a mejorar los niveles de actividad física. Layne et al. (2022) alcanzaron niveles más altos de actividad física con el SEM en una temporada de saltar la cuerda de solamente siete lecciones con estudiantes de cuarto grado. Estas afirmaciones pueden justificarse por la participación de los participantes en destrezas motrices cerradas en lugar de abiertas que involucran muchos contenidos basados en deportes. Varios estudios respaldan este planteamiento (Albers y Lewis, 2020; Fernández-Río et al., 2022; Yang et al., 2020) donde han reportado beneficios de intervenciones cortas de saltar la cuerda para promover la actividad física, la motivación y la intención de ser físicamente activo. Ciertamente, el cumplir y garantizar las recomendaciones de la Organización Mundial de la Salud (OMS) (2020) relacionadas con la actividad física (acumular al menos 150 minutos semanales a lo largo de la temporada) será esencial para cualquier intervención del SEM los fines de actividad física.

En términos sobre los diferentes diseños de investigación, Hastie et al. (2011) señalan la necesidad de expandir otros para confirmar la validez y confiabilidad del SEM. La mayoría de los participantes de los estudios provienen de entornos académicos de primaria-secundaria, excluyendo contextos no tradicionales como clubes deportivos o programas extracurriculares. Típicamente, todos los estudios se informaron a través de medidas de pre y post-prueba y estudios cuasiexperimentales, lo que demuestra una actualización basada en el diseño de investigación del SEM basada en las recomendaciones de Hastie. Diseños cuasiexperimentales rigurosos han validado los beneficios del SEM en contenido basado en deportes y lo han comparado con el enfoque de instrucción directa. La fidelidad del modelo se confirmó en todos los estudios a través de las sugerencias de descripciones detalladas de Hastie y Casey (2014). Sin embargo, aún es necesario desarrollar unas herramientas de validación para medir las percepciones de los estudiantes sobre la fidelidad del SEM y sus características centrales (Burgueño et al., 2021). Por último, no se encontraron estudios en varios lugares (países) durante esta revisión, y dichos estudios pueden contribuir sustancialmente a la validez y confiabilidad del SE en diferentes culturas y poblaciones.

A pesar del esfuerzo riguroso para revisar la relación del Modelo de Educación Deportiva con la actividad física y la aptitud física, hay algunas limitaciones en este estudio que deben considerarse para investigaciones futuras. Como se mencionó, el objetivo de este estudio fue analizar la relación del Modelo de Educación Deportiva con la actividad física y la aptitud física, no se contempló un análisis detallado de las fases de la temporada (pretemporada, competición formal (tiempo y días por semana). Se informaron los géneros de los participantes en los estu-

dios, pero no se compararon en cuanto a los resultados de actividad física y aptitud física. Aunque se incluyeron hallazgos relacionados con marcadores de aptitud física, no se analizaron ni compararon los resultados de mejoras en el índice de masa corporal (IMC), lo que podría ser una fuente valiosa de información para la validez del SEM en cuanto a resultados de aptitud física.

CONCLUSIONES

La adaptabilidad del modelo de Siedentop ha demostrado una fuerte relación positiva con los resultados de la actividad física y la aptitud física utilizando contenidos no deportivos en varios entornos. Luego de esta revisión sistemática, es evidente que el SEM contribuye significativamente a alcanzar las recomendaciones de niveles de actividad física en las escuelas (primaria-secundaria) y nivel universitario en comparación de los estilos de enseñanza tradicionales cuando se implementa adecuadamente en términos de la duración (Siedentop, 2020). La adaptabilidad del modelo para ser implementado a través de contenido deportivo y no deportivo logró al menos un 60% de AFMV en el tiempo de las lecciones en la mayoría de los estudios. En cuanto a los resultados de la aptitud física, el 100% de los estudios informaron mejoras significativas en la mayoría de los marcadores relacionados con la salud física, lo que demostró su fiabilidad constante. Estas afirmaciones representan un paso importante que demuestra la evolución de la Educación Deportiva como modelo pedagógico para la promoción de estilos de vida saludables en entornos escolares y no académicos. La importancia de una formación adecuada en SEM, la fidelidad del modelo, la duración de la temporada (700 minutos o más) y las recomendaciones para optimizar los niveles de actividad física en temporadas basadas en deportes desempeñan un papel vital en una implementación más fiable. A pesar de su evolución en lo que respecta a la actividad física y la aptitud, se necesita más investigación para validar la efectividad del modelo en otros entornos y lugares (países) y con contenidos diferentes.

Un crecimiento en la expansión de la investigación ha confirmado su viabilidad como un modelo pedagógico emergente para promover niveles recomendados de actividad física y aptitud física. No obstante, a pesar de los resultados positivos en las temporadas basadas en deportes, algunos países han enfrentado desafíos para cumplir con los niveles de actividad física requeridos. Algunas temporadas de contenido deportivo han arrojado resultados inesperados al enfocarse en múltiples temporadas (Casado-Robles et al., 2020), modificar versiones deportivas o estar a cargo de profesores sin experiencia (Parker y Curtner-Smith, 2005). La importancia de proporcionar un adiestramiento adecuado para los profesores en formación y principiantes de Educación Física que implementan el SEM es esencial para obtener resultados exitosos en la actividad física y la aptitud. Se necesita más investigación sobre la educación deportiva en relación con los resultados de la actividad física y la aptitud, que considere intervenciones en entornos de múltiples lugares (países), los roles del SEM en las diferencias en los niveles de actividad física y aptitud, las hibridaciónes de intervenciones con el SEM para promover los niveles de actividad física, los desafíos de principantes en su implementación y recomendaciones para maximizar la actividad física a través de temporadas basadas en deportes y múltiples temporadas.

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Tabla 2
Sport Education studies focused on physical activity and health-related fitness.

Authors and Country	Purpose	Participants	Contents	Data Collection	Key Findings
Hastie & Trost (2002) USA	Determine the extent to which the SEM can provide sufficient opportunities for developing moderate-to-vigorous physical activity (MVPA)	Middle School 90 students	Floor Hockey 22 lessons 50 minutes per lesson 1100 minutes season	Actigraph GT3X	Students a total of 31.6 % MVPA during the season or 63.2% of lesson time
Parker & Curtner-Smith (2005) USA	Compare physical activity levels of SEM and traditional unit	Middle School 2 pre-service teachers 6,7,8 graders	Mini football 10 lessons 32 minutes per lesson 1 lesson per week 320 minutes season	The System for Observing Fitness Instruction Time (SOFIT)	During sport education seasons, students in the traditional unit spent slightly more than the recommended 50% of lesson time in MVPA (Class A 64.45%, Class B, 67.55%).
Hastie, Buchanan, Wadsworth & Sluder (2009) USA	Examine the impact of an obstacle course SEM on student aerobic Fitness level	Elementary Fifth graders 48 students 23 boys/25 girls	Track and Field 15 lessons 3 days per week 40 minutes per lesson 600 minutes season	Fitnessgram (Pacer)	Significant improvement in the number of laps and runs and number of students in the healthy fitness zone
Hastie et al. (2012) USA	This study examined the effectiveness of three conditions in which 48 fourth-grade students were prompted to be physically active out of school.	Elementary level Fourth Grade 48 students 28 girls and 20 boys	Rope-jumping 15 lessons 30 minutes 450 minutes season	Omron HJ-720ITC pocket pedometer	This suggests that using prompts and group-oriented contingencies within Sport Education appears to be an effective and authentic context for promoting independent (i.e., free play) out-of-school physical activity (5356.2 steps).
Perlman (2012) USA	Examine physical activity differences between amotivated students engaged in the SEM compared to traditional PE class	Middle school 9th grade 69 students 24 boys/45 girls	Basketball 14-15 lessons 2/3 days per week 50 minutes per lesson 725 minutes season	Actigraph GT3X	The SEM provides amotivated students with increased opportunities to engage in higher physical activity levels.

Authors and Country	Purpose	Participants	Contents	Data Collection	Key Findings
Pritchard et al. (2015) USA	Change in fitness, content knowledge, physical activity	High Schools 32 students 13 males/19 females	Crossfit 20 lessons 2/3 days per week 90 minutes per lesson 1800 minutes season	Actigraph Fitnessgram	Significant increase in aerobic capacity, push up, and students achieve 60.47 moderate to vigorous physical activity.
Ward et al. (2017) USA	The study aimed to determine the extent to which an SEM of fitness could provide in-class MVPA recommended levels.	Elementary level 166 participants 76 boys/90 girls	Fitness (Crossfit challenge) 20 Lessons 5 days per week 30 minutes per lesson 600 season minutes	Fitnessgram Actigraph GT3X	Students spent an average of 54.5% of the lesson in MVPA.
Wahl-Alexander & Morehead (2017) USA	Examining physical activity (PA) levels have of children who participate in traditional or summer day camps.	Summer Camp 83 Participants 6 and 7 graders	Flag football 17 lessons 3 times per week 60 minutes per lesson 1020 minutes season	SOPARC	Campers who participated in Sport Education spent more time (61.6%) engaged in moderate to vigorous activity than campers in the traditional activity unit (42.2%). In addition, campers spent less time idly within Sport Education (27.9%) than its counterpart (39.5%).
Casado-Robles et al. (2020) SPAIN	To assess the effect of a sport education season on the retention of the physical activity levels during recess time.	Secondary Level 10 and 12th grade 91 students 46 boys and 45 girls	Irregular Soccer/Basketball 12 lessons 50 minutes 600 minutes season	Actigraph GT3X	There were no physical activity improvements or significant differences.
Wahl-Alexander & Chomentowski (2018)	The study aims to determine the change in college students' aerobics fitness level through the Sport Education.	College level 47 students	Fitness 26 lessons 75 minutes 1,950 minutes season	PACER 1-mile test	Statistic significantly improved mile time and pacer score.
Pritchard et al. (2019) USA	To investigate the impact of SEM on game performance, content knowledge, and physical activity.	College level 38 Students 23 males 15 female	Badminton 19 lessons 80 minutes 4 days per week	Actigraph	Participants achieve 60.10% in moderate-vigorous physical activity.

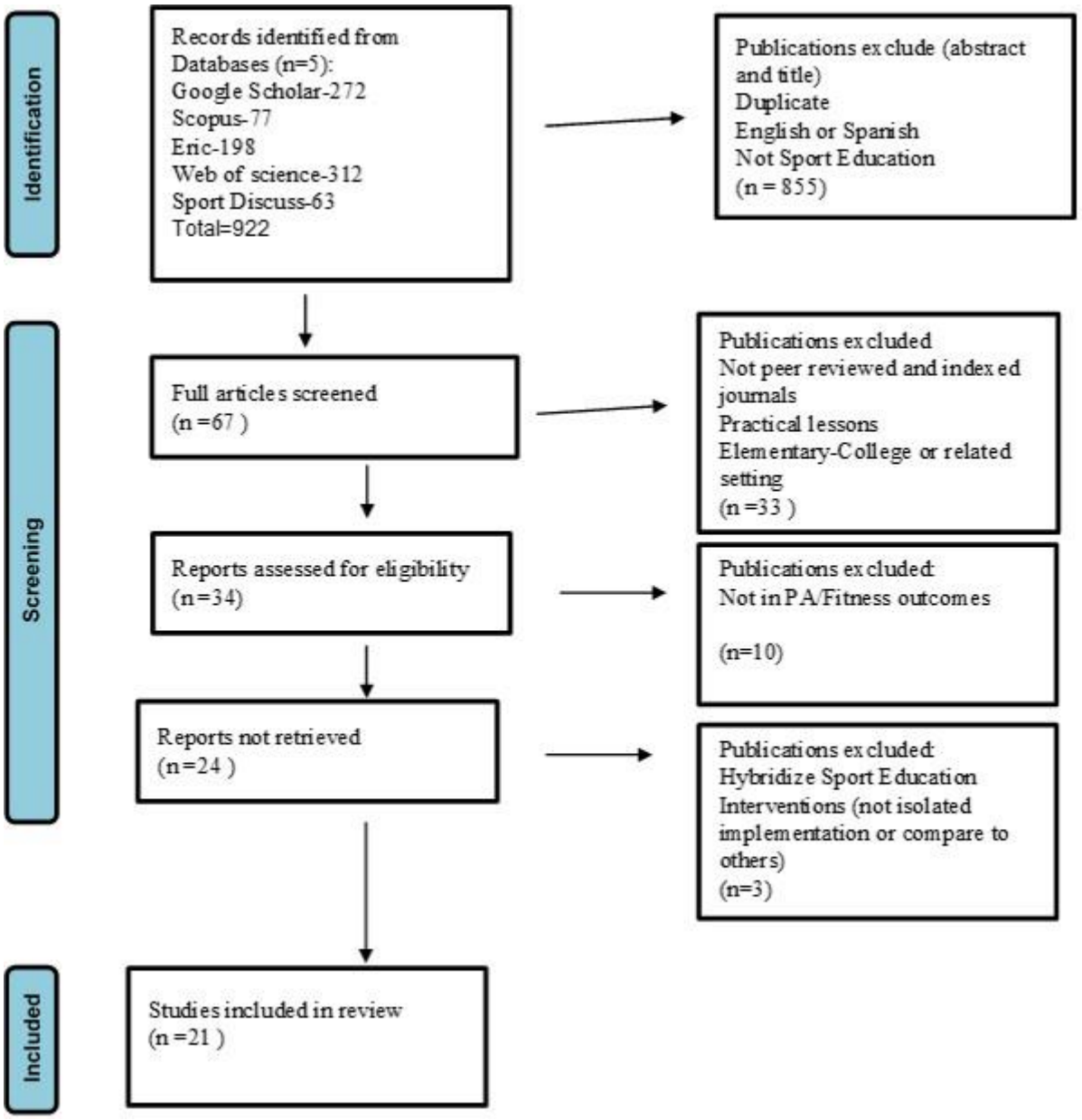
Authors and Country	Purpose	Participants	Contents	Data Collection	Key Findings
Rocamora et al. Vilo (2019) USA	Assess the effects of two instructional approaches, Direct instruction and Sport Education in physical activity levels, game performance, and friendship goals	Elementary Level 88 students 44 boys/44 girls	Handball 15 lessons 45 minutes 3 times per week 675 minutes season	Actigraph GT3X	Students who experienced the SEM had significantly higher light and moderate-vigorous physical activity levels.
Segovia & Gutierrez (2020) USA	The study aimed to evaluate the effects on schoolchildren's body composition of game-based high-intensity training (GB-HITT) program delivered during physical education by comparing the SEM and	Elementary 154 students 81 boys/73 Girls	Game-Based (HITT) 15 lessons 45 Minutes 3 times per week 675 minutes season	Tanita BC-418Body Composition Analyser	The results showed significant differences between the experimental group and control (p>.001) in waist circumference and body fat percentage.
Puente-Maxera, Mendez-Gimenez & Martinez de Ojeda (2020) SPAIN	To objectively analyze PA levels (sedentary, light, moderate, vigorous, and moderate to vigorous	Middle School Seventh grade 71 students 38 boys/33 girls	Games from around the world 18 lessons	Actigraph GT3X	Across the entire season, 64% of lesson time engages in MVPA. Significant differences concerning gender (higher in boys). Pre-season was shown as the most active phase contributing to MVPA, as well to counts and METs
Wahl Alexander, Malecki & Smart (2020) USA	The study evaluated the effect of three conditions in which 34 sixth-grade students were prompted to accumulate as much activity during a Sport Education Season.	Middle Schools 34 students 15 boys/9 girls	Badminton 15 lessons 30 minutes 450 minutes season	Yamax Digi walker pedometer	Students achieved higher levels of activity in the prompts and prompts plus independent group-oriented contingencies within Sport Education (1505 steps)

Authors and Country	Purpose	Participants	Contents	Data Collection	Key Findings
Guijarro et al. (2020) SPAIN	The objectives of this study were to evaluate the PA in two pedagogical models in PE lessons and the differences in the teaching process phases. In addition, PA differences were checked in terms of gender to determine each model's contribution to the MVPA in primary education students.	Primary Education Fifth and sixth grade 84 students 43 boys/41 girls	Basketball 15 lessons 45 minutes 3 times per week 675 season minutes	Anthropometry (Tanita DC-430 MA S) ActiGraph GT3X	The results showed that Sport Education helped achieve a greater MVPA percentage than the Direct Instruction in both genders, with a varying contribution of the different phases.
Shu et al. (2021) USA	This study aimed to investigate the effect of the generalization of participation in parkour from physical education classes to organized parkour recess.	Elementary school Third-grade 143 students 64 girls/79 boys	Parkour (Motor Skills Activities) 12 lessons 20 minutes (daily) 5 times per week 240 minutes season	System for Observing Children's Activity and Relationship during Play	Boys achieved significantly higher MVPA than girls in physical education (47% vs. 42%, $p = .045$), organized parkour recess (73% vs. 65%, $p = .003$), and traditional recess (56% vs. 36%, $p < .001$). Children MVPA through performing parkour-specific skills in organized parkour recess generated on average 22% of
Choi et al. (2021) CHINA	The study examined how lesson content and teacher interaction contribute to university students' physical activity levels during physical education lessons.	College Students 202 students 8 courses	Sport courses Basketball Volleyball Handball Woodball Badminton 90 minutes 900 minutes season 10 lessons 1 per week	The System for Observing Fitness Instruction Time (SOFIT)	The student-participants engaged in an average of 38.77 (±18.78) moderate-to-vigorous physical activity (MVPA) minutes, which did not meet the 50% lesson time recommendation.

Authors and Country	Purpose	Participants	Contents	Data Collection	Key Findings
Hiu & Hastie (2021) USA	This study examined the impact of including a formal requirement of achieving predetermined energy expenditures as part of students' participation grades during a Sport Education–based college physical education class.	College Students 18 students 6 females/2 males	Net Sports 15 lessons 3 times per week 50 minutes 750 minutes season	Heart Zone Blink 3.0 Sensor	Results showed that the average calorie consumption across the semester well exceeded the daily targets, while the percentage of students who reached the daily challenge cutoff ranged from 77% to 100% (average = 87%).
Wahl-Alexander & Camic (2022) USA	The purpose of the study was to examine health-related fitness levels and physical activity trends of adolescents participating in a fitness-based sport sport education season in a camp setting.	Summer camp 71 male campers	Fitness 19 lessons 7 weeks	Fitnessgram Yama Digiwalker Pedometers	Findings significant decrease for the NI/NI-Health Risk Group. Both groups increased push-ups and progressive aerobic cardiovascular endurance run test scores.
Layne et al. (2022) USA	The study aimed to examine the effectiveness of student learning/performance through MBI and technology to impact MVPA and jump rope performance.	Elementary level fourth grade 130 participants 61 girls/49 boys	Fitness (Jumprope) 7 lessons 60 minutes 420 minutes season	Accelerometers Heart monitors	Results from this research show that 4th-grade students spent more MVPA time SEM jump rope unit compared to a traditional.

Figura 1

SEM Physical Activity and Fitness Articles Search and Selection Processs.



Evaluación de la Actividad y Aptitud Física en el Modelo de Educación Deportiva: Revisión Sistemática

Evaluating Physical Activity and Fitness in Sport Education: A Systematic Review

Luis Estrada-Oliver[1*], Zachary Wahl-Alexander[2], Anthony Melendez-Nieves[1] & Olvin Rosado[3]
University of Puerto Rico[1]; University of Northern Illinois[2]; Wright State University[3]
*Autor para correspondencia: luis.estrada2@upr.edu

ABSTRACT
The sport education model is the most widely researched and implemented pedagogical model in the physical education field. As a pedagogical model that promotes enthusiastic, competent, and literate people through sports has evolved with non-sports content, practical lessons, and physical conditioning to promote physical activity and fitness. The aim of this study study was to examine the Sport Education Model relationship with physical activity and fitness outcomes. The research articles analyzed were found through five databases: Web of Science, Scopus, SportDiscuss, Proquest and Google Scholar. The articles used the following criteria: (a) peer-reviewed studies in indexed international journals, (b) Sport Education Model implemented in isolation or compared with others, (c) findings focused on physical activity or fitness, (d) elementary–college or related setting research, and (e) published in English or Spanish. The associated keywords (sport education, models based- practice, pedagogical models, physical activity, and fitness) were used in different combinations. A total of 21 articles were identified through the search process and analyzed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. Articles were initially categorized according to the following dimensions: country of origin, purposes, data collection, length of season, participants (grade, gender, age), and findings. The results demonstrated Sport Education Model strong relationship and feasibility to promote moderate/vigorous physical activity and health-related fitness components (cardiovascular) through non-sports contents in academic and non-academic settings.
Keywords: Sport Education, Physical Activity, Health-related Fitness

RESUMEN
La Educación Deportiva es el modelo pedagógico más reconocido e investigado en el campo de la Educación Física. Como modelo pedagógico promueve personas entusiastas, competentes, y alfabetizadas por medio del deporte, ha evolucionado con diversos contenidos no deportivos, lecciones prácticas y acondicionamiento físico promoviendo la actividad física y aptitud. El objetivo del estudio fue examinar la relación del modelo de Educación Deportiva con resultados reportados en la actividad física y aptitud. Los artículos analizados fueron encontrados de 5 bases de datos: Web of Science, Scopus, SportDiscuss, Proquest and Google Scholar. Los criterios de inclusión incluyen: a) artículos revisados por pares en revistas indexadas b) intervenciones del modelo de Educación Deportiva o comparaciones con otros c) hallazgos dirigidos a la actividad o aptitud física d) nivel primaria-universitario y relacionados y e) artículos publicados en inglés o español. Se utilizaron palabras asociadas (Educación Deportiva, Modelos de Enseñanza, Modelos Pedagógicos, Actividad Física, y Aptitud Física) en diferentes combinaciones. En total, se identificaron 21 artículos a través del proceso de búsqueda y se analizaron utilizando las guías Preferred Reporting Items for Systematic Reviews and Meta-Analyses. Inicialmente, los artículos se categorizaron de acuerdo a las siguientes dimensiones: ciudad de origen, propósito del estudio, recopilación de datos, duración de la temporada, participantes (grado, género, edad) y resultados. Los resultados demostraron la fuerte relación y adaptabilidad del modelo de Educación Deportiva para promover la actividad física moderada-vigorosa y los componentes de la aptitud física por medio de contenidos no deportivos en escenarios escolares y no escolares.
Palabras clave: Educación Deportiva; Actividad Física; Aptitud relacionada a la Salud

INTRODUCTION

Physical activity and health-related fitness markers levels still been a huge concern for K-12 and higher education students. In spite of physical education lessons are taught for over 12 years through K-12th grade (Shape America, 2014), students are not showing appropriate physical activity (PA) and fitness levels. The importance of performing at least 60 minutes daily for kids and 150 minutes weekly for 5-17 years old is essential for the prevention of coronary diseases. Research have identified that 80% of the adolescents are not achieving World Health Organization (WHO) recommendations (van Slujis et al., 2021) Moreover, this concern extends when students reach the higher education level, in which 1 of 3 collegiates have obesity presently (Bailey et al, 2020). As a strong effort, researchers around the world have implement different interventions through schools, extracurricular programs, sports club to promote PA and fitness trying to reduce sedentarism behaviors. Specifically, in K-12 settings pedagogical models have emerge as a possible answer to promote healthy active life-styles. Mostly, of these PMs features contributes within essential factors including motivation (Gil-Arias et al. 2020), and enjoyment (Guijarro et al., 2020) that are strong related with the improvement of physical activity levels. Although several systematic reviews of the SEM have been conducted (Araujo et al., 2014; Evangelio et al., 2018; Chu & Zhang, 2018) the relationship of the Sport Education Model regarding PA and fitness as outcomes has not been reviewed yet.

Sport education (SE) is a pedagogical model (PM) that simulates an authentic sports season, including team affiliation, formal competition, record keeping, units referred to as seasons, festivities, and a subsequent award ceremony (Siedentop et al., 2020). Despite the fact that the SEM is a student-centered model within the purposes to inspire enthusiastic, competent, and literate people, emergent literature has focused on maximizing PA and fitness levels within this model. Hastie et al. (2020) recognized the sport education model (SEM) as a valuable tool for promoting the Shape America 50-million agenda focused on increasing children's physical activity. Health-related fitness, CrossFit, and other fitness-based concepts have gradually been implemented and researched (Pritchard et al., 2015; Sibley, 2012; Wahl-Alexander & Morehead, 2020; Ward et al., 2017). In this sense, the importance of evaluate the SEM benefits regarding the abovementioned domains is essential for promoting healthy life-styles. Therefore, the aim of this study was to examine the Sport Education Model relationship with physical activity and fitness outcomes.

METHOD

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were used for the selection of the studies (Moher et al., 2009). A systematic search of five scientific literature databases (Web of Science (WoS), Scopus,Sport Discuss [SD]- EBSCO, ERIC, and Google Scholar) was conducted from the years 2017 to 2022. These databases were selected because they included physical education articles published in indexed journals, including the Journal Citation Report (JCR) and similar publications (e.g., the Scimago Journal Rank-SJR). The search strategies used in the five aforementioned databases, including a combination of the following keywords: *sport education*, *models-based practice*, *physical activity*, *fitness*, *and physical* education. The articles used the following criteria: (a) peer-reviewed studies in indexed journals (b) SEM implemented in isolation or compared with others, (c) findings focused on physical activity or fitness, (d) elementary–college or related setting research, and (e) published in English or Spanish. The initial search resulted in 922 publications (see figure 1), of which 855 abstracts were retrieved after application of the exclusion criteria regarding the titles and abstracts, duplicate studies and not focus in Sport Education. Each researcher independently reviewed the studies twice to compare the results with those of other research team members. Some Sport Education systematic reviews were used to avoid missing any possible studies. At the second level of exclusion criteria, articles were reviewed through the following criteria: (a) not peer-reviewed studies in indexed journals, practical lessons, articles not in English or Spanish and not full text. In this level, a total of 33 articles were retrieved. As a second screening, Sport Education articles that not focused on physical activity or fitness outcomes were removed resulting in 24 articles. Finally, articles which were hybridized SEM interventions were excluded.

From this screening, only 21 articles were selected for full review. The references and citations from the final studies were searched for possible articles not included during the initial search. In order to analyze all the information from the 21 articles included in this review, a content analysis was performed. Information was extracted using content analysis of the articles based on a systematic review guideline (Harris et al., 2014). Review categories were defined a priori by the first author based on previous SEM reviews studies: authors, study purposes, country, participants, sport(s) played or content, season length, data collection and results.

For the quality of the articles selected of this systematic review was consulted the Checklist for Measuring Study Quality, the Strengthening the Reporting of Observational Studies Statement, and the Consolidated Standards of Reporting Trials Statement. An adapted checklist from the Strengthening the Reporting of Observational Studies Statement was used to assess the quality of the final articles. This decision was based due, previous studies have assess the quality of articles with adapted instruments (Araújo et al., 2014; Chu & Zhang, 2018; Hastie & Casey, 2014) to ensure the attainment of relevant articles and obtain a quality score for the studies. Hence, the quality of the articles was assessed within the following criteria: (a) description of the program; (b) JCR/SJR journal; (c) detailed methodological description; (d) sample or number of participants; and (e) length (SEM) of the implementation. Each item was scored from '0' to '2' using these criteria (see Table 1). The total quality score from all selected publications was calculated by adding the number of positive items between '0' and '10.' Investigations were classified as follows: (a) low quality: a score lower than '3'; (b) moderate quality: a score between '4' and '6'; and (c) high quality: a score of '7' or higher (see Table1). As a result, 21 final studies were classified as high quality. In this process, the researchers examined each study independently within the quality score checklist (See table 1). A mean average was calculated for each study within the individual scores of the three researchers to determine the quality of the studies. For example, program description was score with 2 points if (did the research offer a detailed description of the program?): '0′: not included; '1′: brief and undetailed description. In terms, of JCR/SJR inclusion (was the study published in a journal indexed on the JCR or SJR?): scoring options were '0′: if not indexed by JCR/SJR; '1′: indexed with other database; '2′: indexed on JCR/SJR. Methodology scores were based if the paper report in detail the methodological process used?): '0′: not reported; '1′: reported but imprecise (not completely); '2′: exhaustive description reported. Sample of the studies (number of participants) scoring criteria were established within the following: '0′: fewer than 10 participants; '1′: 10 to 50 participants; '2′: more than 50 participants. Finally, the SEM length scoring (duration) within: '0′: fewer than eight lessons; '1′: nine to 14 lessons; '2′: more than 15 lessons.

Final Article Selection and Quality Assessment

Table 1

Quality Score Checklist.

Research	Program Description	JCR/SJR	Methodology	Sample	Length	Total Score	Quality Level
Hastie & Trost (2002)	2	1	2	2	2	9	HQS
Parker & Curtner-Smith (2005)	2	2	2	1	1	8	HQS
Hastie et al. (2009)	2	2	2	1	2	9	HQS
Hastie et al. (2012)	2	2	2	1	2	9	HQS
Perlman (2012)	2	2	2	1	2	9	HQS
Pritchard et al. (2015)	2	1	2	1	2	8	HQS
Ward et al. (2017)	2	1	2	2	2	9	HQS
Wahl-Alexander & Morehead (2017)	2	1	2	2	2	9	HQS
Wahl-Alexander & Chomentowski (2018)	2	1	2	1	2	8	HQS
Pritchard et al. (2019)	2	1	2	1	2	8	HQS
Rocamora et al. (2019)	2	1	2	2	2	9	HQS
Segovia & Gutierrez (2020)	2	1	2	2	2	9	HQS
Casado-Robles et al. (2020)	2	1	2	2	1	8	HQS
Puente-Maxera et al. (2020)	2	1	2	2	2	9	HQS
Wahl Alexander et al. (2020)	2	1	2	1	2	8	HQS
Guijarro et al. (2020)	2	1	2	2	2	9	HQS
Shu et al. (2021)	2	2	2	2	1	9	HQS
Choi et al. (2021)	2	1	2	2	1	8	HQS
Hiu & Hastie (2021)	2	1	2	1	2	8	HQS
Wahl-Alexander & Camic (2022)	2	2	2	2	2	10	HQS
Layne et al. (2022)	2	1	2	2	1	8	HQS

Note: Program description (did the research offer a detailed description of the program?): ‘0′: not included; ‘1′: brief and undetailed description,; ‘2′: detailed description. JCR/SJR inclusion (was the study published in a journal indexed on the JCR or SJR?): ‘0′: not indexed; ‘1′: indexed on SJR; ‘2′: indexed on JCR. Methodology (did the paper report in detail the methodological process used?): ‘0′: not reported; ‘1′: reported but imprecise (not completely); ‘2′: exhaustive description reported. Sample (number of participants): ‘0′: fewer than 10 participants; ‘1′: 10 to 50 participants; ‘2′: more than 50 participants. Length (duration): ‘0′: fewer than eight lessons; ‘1′: nine to 14 lessons; ‘2′: more than 15 lessons. JCR, Journal Citation Report; SJR, Scimago Journal Rank; HQS: high-quality study, MQS: moderate quality study

RESULTS

This section provides a summary and discussion of the study in terms to examine the Sport Education Model relationship with physical activity and fitness outcomes. At the moment of this review a total 21 articles were identify and comply within the inclusion criteria. For this systematic review, the countries of the studies, purpose, content, participants, data collection and key findings are discussed (See table 2). Previous reviews of the SEM have selected the above-mentioned sub-sections.

Countries of the Studies

Each study’s country of origin was determined by the study location and not by the author’s location of origin. Previous work (Hastie et al., 2011) determined that most SE-season research occurred in the United States (over 76%). However, the settings review exhibited an extension to other countries that implemented the SEM within PA and fitness outcomes. As seen, 71.4% of studies originated in the United States, while 23.8% occurred in Spain, and 4.8% occurred in China. Representations from other international settings were not found.

Research conducted in the United States focusing on fitness outcomes has emphasized elementary and college levels, largely excluding high school settings. Despite SEM interventions

for different purposes (e.g., skills, knowledge, motivation) implemented at the high school level, PA and fitness were rarely applied. In terms of fitness as a seasonal outcome, only Pritchard et al. (2015) explored high school level participants. Across all of these studies' results, in the United States, only one has reported unexpected outcomes in which the application of the SEM does not reach the required PA level or shown significant differences (Parker & Curtner-Smith, 2005). At the moment of this review, Spain has not reported the development of SEM research with fitness or PA as outcomes at the college level or outside an academic setting.

Purpose and Content

Thorough analysis showed that the primary purpose of each study (Table 2) varied greatly. The primary emphasis ranged from (a) examining the impact of SE on students' aerobic fitness levels (Hastie et al., 2009; Wahl-Alexander & Chomentowski, 2018) to (b) PA levels during the season (Parker & Curtner-Smith, 2005; Pritchard et al., 2015; Pritchard et al., 2019; Ward et al., 2017), (c) comparing SEM PA outcomes with other teaching approaches (Guijarro et al., 2020; Rocamora et al., 2019), (d) identifying ways to elevate student activity (Shu et al., 2021; Hastie et al., 2012; Wahl-Alexander et al., 2020), and (e) examining the impact on vulnerable populations (Hastie & Trost, 2002; Wahl-Alexander & Camic, 2022). A total of 15 studies focused on PA as a primary outcome for different purposes, validating the increase in SEM studies using a PM that promotes a physically active lifestyle. Specifically, 10 of the 15 were developed in the United States, while four were developed in Spain, and one was developed in China. Although there were many similarities among the primary purposes of the SEM seasons, greater diversity was observed in terms of the content used during each iteration (Table 2).

Content

Predominantly, sports-based content has been implemented with PA or fitness outcomes through SE seasons. Nine studies explored invasion games, six employed a fitness-based approach, two utilized net/wall games, and one implemented innovative "Games around the world" (Puente-Maxera et al., 2020) and one "Motor skills parkour" (Shu et al., 2021) units. Among the invasion game categories, basketball, flag football, and soccer have been consistently implemented to improve PA outcomes. Fitness-based content primarily focuses on CrossFit, jump rope, and game HITT-based interventions.

Participants

Most of the studies identified were conducted in academic (K–12) settings, excepting two studies on residential camps (Wahl-Alexander & Morehead, 2020, Wahl-Alexander & Camic, 2022). The participants of the studies were classified as (a) elementary/primary level (seven), (b) middle school level (six), (c) high school level (two), (d) college level (four), and e) outside academic settings (two; see Table 2). In 2011, Hastie and his colleague urged scholars to continue conducting research evaluating the model in various contexts (i.e., schools, after-school programs, camps) and expanding its application to college-age groups. Since this call, four studies have explored PA and fitness at the collegiate level, with the focus only on examining impact of the SEM on PA and fitness levels. Despite the lack of exploration of the extended benefits of the SEM in other scenarios, the outcomes consistently promoted and improved PA levels across all academic and external settings.

Siedentop et al. (2020), mentioned that a good SEM season works around 12 to 15 lessons for elementary and middle school interventions with a duration of 30 to 40 minutes each at a minimum. In the case of high school settings, 20 lessons (45 minutes each) appears to be ideal. Most sports-based seasons comply with Siedentop et al. (2020) recommendations and achieve the expected outcomes of the studies (see Table 2). Nonetheless, the lengths mentioned earlier are emphasized in sports-based content, which differs by fitness season. In this case, Siedentop et al. suggested an entire semester (18–20 weeks) for fitness outcomes to significantly change

health-related fitness components. Some studies followed fitness length suggestions (Pritchard et al., 2015; Wahl-Alexander & Chomentowski, 2018; Ward et al., 2017). In addition, the length of the seasons varied, with the two shortest lessons having 7 and 10 lessons, respectively (Parker & Curtner-Smith, 2005; Layne et al., 2022) and the longest one (Wahl-Alexander & Chomentowski, 2018) having 26 at the college level. The average length of the SE seasons reported in Spain with fitness or PA as the outcome was 15 lessons, compared to the United States as a setting, with 17.

Data Collection

In these studies, fitness testing and pedometers/accelerometers were the two most widely used instrumentation tools (see Table 2). Specifically, to evaluate the effect on health-related fitness markers, the FITNESSGram (e.g., pushup, sit-up, and PACER tests) was employed to determine the effectiveness of both sports- and fitness-based SE seasons. Body fat percentage was measured using a Tanita BC-418 Body Composition Analyzer. Accelerometers (ActiGraph) and pedometers were employed to explore the quality and duration of PA within seasons, in addition to using systematic observation (SOFIT). As a founded commonality, the three studies (Parker & Curtner-Smith, 2005; Choi et al., 2021; Chu et al., 2021) used the systematic observation (SOFIT) and reported not requiring PA levels during the SE intervention. The system for observing play and recreation (SOPARC), a systematic observation instrument for assessing PA and associated people and environmental characteristics in parks and recreation settings, was used in only one study.

DISCUSSION

This study aimed to analyze the Sport Education model relationship within physical activity and fitness as seasonal outcomes. As a result of this research, SEM demonstrates the ability to closely adhere to physical activity recommendation levels in various academic settings (elementary, secondary, and collegiate); however, to date, there remains minimal evidence of its effectiveness outside academics, countries, and specific populations (e.g., race, disabled students). The biggest contribution of this systematic review is the feasibility of the Sport Education Model to different settings, populations and contents for physical activity and fitness outcomes, allowing researchers to develop future studies to improve and achieve healthy lifestyles.

Benefits and Challenges within Physical Activity and Fitness Outcomes

Higher levels of MVPA were reported for sport-based seasons (Hastie & Trost, 2002; Perlman, 2012; Pritchard et al., 2019; Wahl & Morehead, 2017), as well as fitness-based seasons (Hastie et al., 2012; Pritchard et al., 2017; Ward et al., 2017) demonstrated the benefits of implementing the SEM. Most of the studies reported that students spent at least 60% of their lesson time on MVPA, and their idle time was reduced. Predominantly, fitness outcomes studies have shown significant improvement in the HRF components aerobic capacity, strength, and muscular endurance (Ward et al., 2017), all of which reached healthy levels. Furthermore, there is evidence of SEM benefits in terms of increasing the number of daily steps outside an academic setting (Hastie et al., 2012; Wahl-Alexander & Camic, 2022). However, the multi-sport and modified (mini-soccer) season versions faced challenges in reaching the recommended PA levels (Casado-Robles et al., 2020). Scholars, as Pennignton (2019), have explained that SE features related to instruction and limited time result in less health-related fitness and PA. Adding more tasks to a Sport Education season will deviate from the purposes of PA and fitness; the importance of balancing tasks and sport skills (practice) with the length of the season is relevant in a sports-based content season. Moreover, SEM roles may influence physical activity levels due the different task that students roles perform in the season. Oliveros and Fernandez-Rio (2022) founded in their intervention that non-playing roles as judge/referee students showed significantly higher levels of sedentary physical activity. These findings exhibit the importance of teachers having a strong SEM background and integrating additional strategies, like prompts, to reach PA and health-related fitness levels in non-academic settings.

Sport Education across Countries and Contents

Most studies in the US have demonstrated the SEM's validity across all academic and external settings as summer camps. As mentioned, MVPA levels in the US reached at least 60% of the lesson time, excluding Parker and Curtner-Smith's (2005) study. This result may be explained by the lack of experience of pre-service teachers, who properly applied the SEM version. Fitness-based content interventions (Hastie et al., 2012; Pritchard et al., 2015; Ward et al., 2017) reliably reached PA-recommended levels and significantly improved HRF through all academic settings and two outside settings. International sites, such as Spain, have begun to apply the model in different contexts to engage and promote PA and fitness among their participants. Nonetheless, studies outside academic settings were not found during this study.

Through this systematic review the purposes of the studies were varied. Fitness content SEM seasons have demonstrated positive contributions for the basic psychological needs (Carriedo et al., 2022). Moreover, studies that focus on PA and fitness level differences have emphasized gender (Guijarro et al., 2020), unmotivated students (Perlman, 2012), or healthy fitness profiles (Wahl-Alexander & Camic, 2022). Compared to traditional teaching approaches, SEM has successfully achieved good PA and health fitness levels across different lesson content (Perlman, 2012; Guijarro et al., 2020). This is consistent with Metzler's (2011) statement of the benefits of student-centered models, which allow more active participation and leading roles. Despite this, SEM outcomes develop authentic, competent, and literate people through phases and roles that provide sufficient space for student engagement in PA and fitness levels. Several studies (Perlman, 2012; Rocamora et al., 2019) reported PA level differences across the SEM phases (pre-season); however, this did not explain the lull that was observed (Curtner & Smith, 2005) in the final phase. PA differences among SEM phases can be explained by participants' motivation for scoring points during competition phases (Wahl-Alexander & Camic, 2022) or the skill levels of the participants. One study Puente-Maxera (2020) identify the pre-season phase as the most active phase contributing to MVPA, as well to counts and METs. Interestingly, the content of the season was non-traditional content known "Games Around de World". Scholars have suggested strategies to optimize PA using the SEM with non-fitness content (Hastie et al., 2012; Wahl-Alexander & Smart, 2020), which can improve PA outcomes through non-competitive phases (e.g., affiliation, festivity). Despite, the variety of the studies purposes still needed more perspectives to be researched within the SEM for fitness and physical activity outcomes. In our knowledge, to date there none studies that have been conducted regarding SEM roles fitness level differences and only one with PA levels (Oliveros & Fernandez-Rio, 2022). Students may be comfortable performing or switching SEM roles during the season, which can result in PA and fitness level differences. This argument can be support by the self-determination theory (Ryan & Deci, 2000), which states that intrinsic motivation and enjoyment are strongly correlate with higher PA levels.

Sport Education Fidelity within Physical Activity and Fitness Outcomes

Regarding the length of the lessons, the total time in minutes of physical activity and steps varied, which could be relevant for the fidelity of the SEM-focused PA and fitness outcomes. An average of approximately 600 minutes per season was reported through fitness-based content compared with 700 minutes with sports-based content. Siedentop et al. (2020) suggested that SEM season length must be designed in consideration of the setting and outcomes. As mentioned the authors suggest Fitness content seasons must work around 18–20 weeks. This statement can be a limitation when applying the SEM for physical activity and fitness purposes in K-12 schools, where Physical Education courses are taught only two or three times per week. The integration of motivation techniques, simplified skills, or technologies may address the gap in short SEM seasons to help improve PA levels. Layne et al. (2022) reached higher PA levels with the SEM in a seven-lesson jump rope season with fourth-grade students. These statements may be justified by participants engaging in a closed skills rather than an open skills involving sports-

based content. Several studies (Albers & Lewis, 2020; Fernandez-Rio et al., 2022; Yang et al., 2020) have demonstrated the benefits of short jump-rope interventions to promote physical activity, motivation, and intention to be physically active. Complying with and ensuring the World Health Organization (WHO) (2020) recommendations related to PA (accumulating at least 150 minutes weekly throughout the season) will be essential for physical activity purposes.

Hastie et al. (2011) noted that the need to expand other research designs remains to confirm the validation and reliability of the SEM. Most of the participants of the studies comes from K-12 academic settings, excluding non-traditionals as sports clubs or extracurricular programs. Typically, all studies were reported through pre and post-test measures and quasi-experimental studies, demonstrating a research design-based update of the SEM based on Hastie's recommendations. Rigorous quasi-experimental designs have validated the benefits of the SEM within sports-based content and compared it to the direct instructional approach. The fidelity of the model was confirmed across all studies by the researchers through Hastie and Casey's (2014) suggestions of detailed descriptions. Developing a validation tool to measure students' perceptions of the fidelity of the SEM and its core features is still needed (Burgueño et al., 2021). No multi-site-setting (country) studies were found during this review, and such studies can contribute substantially to SE validity and reliability across different cultures and populations.

Despite the rigourous effort to review Sport Education model relationship with physical activity and fitness outcomes, there are some limitations in this study that can be attending for future research. As mentioned, the aim of this study was to analyze the relationship of the Sport Education Model with physical activity and fitness, a detailed analysis of the season phases (preseason, formal competition (time and days per week) were not contemplated. The genders of the participants of the studies were reported but not compared regarding the physical activity and fitness outcomes. Although, health fitness related markers findings were included, body mass index (BMI) improvements results were not analyzed and compare which can be a valuable source of information for SEM validity within fitness outcomes.

CONCLUSIONS

The feasibility of Siedentop's model has demonstrated a strong positive relationship with physical activity and fitness outcomes using non-sports contents in various settings. After this systematic review, it is evident that the SEM highly contribute to achieve physical activity levels recommendations in K-12 and college settings rather than traditional teaching styles when its appropriate implemented in terms of the length (Siedentop, 2020). The feasibility of the model to be implemented through sport and non-sport content achieved at least 60% of MVPA in lessons time in most of the studies. In terms, of fitness outcomes 100% of the studies reported significant improvements in most of the health fitness related markers demonstrated its consistent reliability. These statements, represent an important step demonstrating the evolution of the Sport Education as a pedagogical model for the promotion of healthy life styles in K-12 and non-academic settings. The importance of proper SEM training, the model's fidelity, the season's length (700 minutes or more), and recommendations for optimizing PA levels in sports-based seasons play a vital role in more reliable implementation. Despite its evolution in regard to physical and fitness, more research is needed to validate the effectiveness of the model in other settings (countries) and different contents.

A growing expansion of research has confirmed its viability as an emerging pedagogical model for promoting recommended physical activity and fitness levels. Notwithstanding, the sports-based seasons positive outcomes, some countries have faced challenges in complying within the required physical activity levels. Some sport content seasons have shown unexpected results when emphasizing multiple seasons (Casado-Robles et al., 2020), modifying sports versions or being led by inexperienced teachers (Parker and Curtner-Smith's, 2005). The importance to provide properly mentoring for PE pre-service and beginners teachers implementing the SEM it is essential for successful physical activity and fitness results. Further research regarding the sport education in relation to physical activity and fitness outcomes must consider intervention within multi-site settings, the SEM's role in differences in physical activity and fitness levels, hybridizing interventions with the SEM to promote PA levels, challenges to the implementation of PT, and recommendations for maximizing PA through sports-based and multiple seasons.

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Table 2
Sport Education Studies focused on Physical Activity and Health-related Fitness.

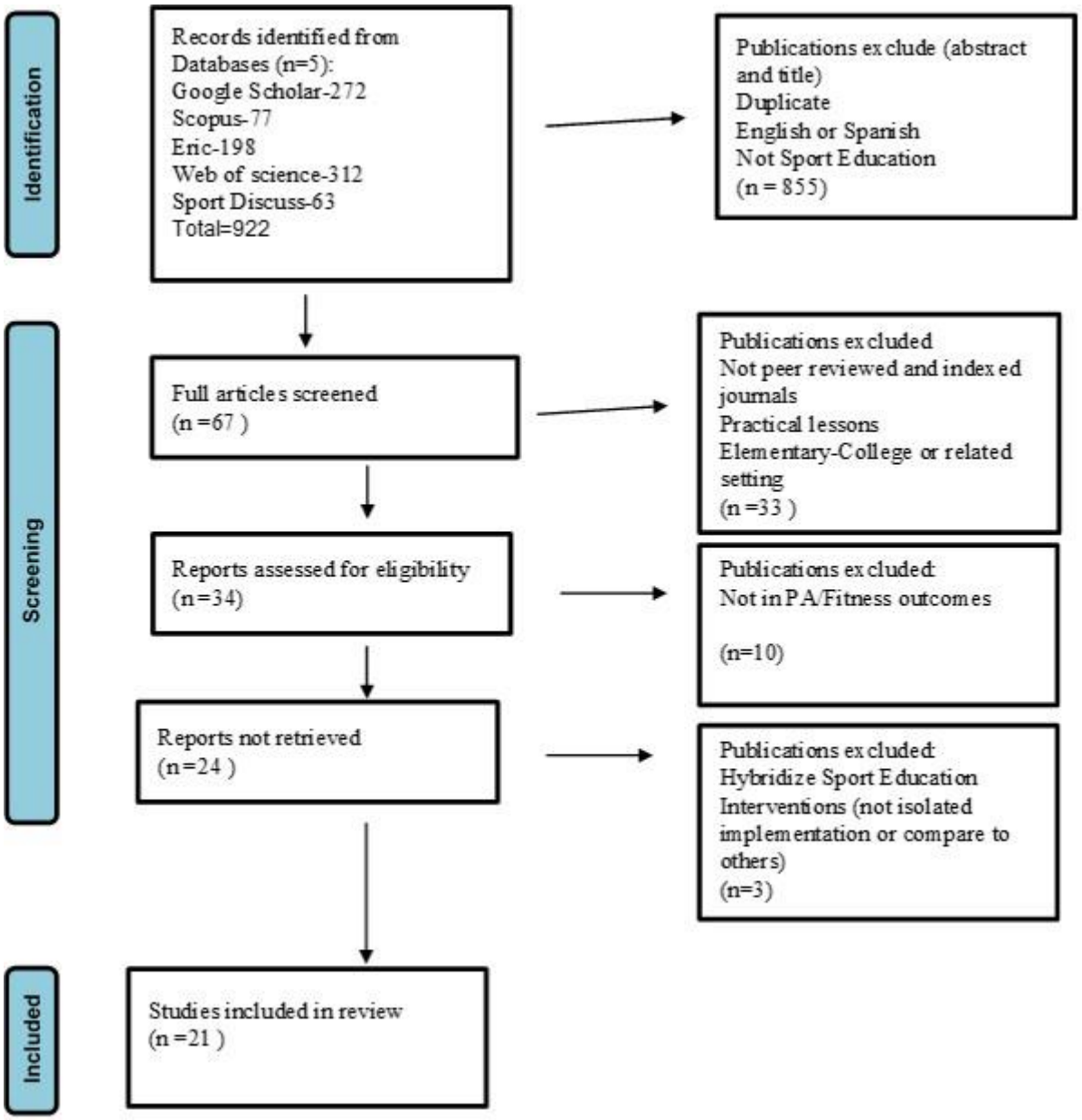
Authors and Country	Purpose	Participants	Contents	Data Collection	Key Findings
Hastie & Trost (2002) USA	Determine the extent to which the SEM can provide sufficient opportunities for developing moderate-to-vigorous physical activity (MVPA)	Middle School 90 students	Floor Hockey 22 lessons 50 minutes per lesson 1100 minutes season	Actigraph GT3X	Students a total of 31.6 % MVPA during the season or 63.2% of lesson time
Parker & Curtner-Smith (2005) USA	Compare physical activity levels of SEM and traditional unit	Middle School 2 pre-service teachers 6,7,8 graders	Mini football 10 lessons 32 minutes per lesson 1 lesson per week 320 minutes season	The System for Observing Fitness Instruction Time (SOFIT)	During sport education seasons, students in the traditional unit spent slightly more than the recommended 50% of lesson time in MVPA (Class A 64.45%, Class B, 67.55%).
Hastie, Buchanan, Wadsworth & Sluder (2009) USA	Examine the impact of an obstacle course SEM on student aerobic Fitness level	Elementary Fifth graders 48 students 23 boys/25 girls	Track and Field 15 lessons 3 days per week 40 minutes per lesson 600 minutes season	Fitnessgram (Pacer)	Significant improvement in the number of laps and runs and number of students in the healthy fitness zone
Hastie et al. (2012) USA	This study examined the effectiveness of three conditions in which 48 fourth-grade students were prompted to be physically active out of school.	Elementary level Fourth Grade 48 students 28 girls and 20 boys	Rope-jumping 15 lessons 30 minutes 450 minutes season	Omron HJ-720ITC pocket pedometer	This suggests that using prompts and group-oriented contingencies within Sport Education appears to be an effective and authentic context for promoting independent (i.e., free play) out-of-school physical activity (5356.2 steps).
Perlman (2012) USA	Examine physical activity differences between amotivated students engaged in the SEM compared to traditional PE class	Middle school 9th grade 69 students 24 boys/45 girls	Basketball 14-15 lessons 2/3 days per week 50 minutes per lesson 725 minutes season	Actigraph GT3X	The SEM provides amotivated students with increased opportunities to engage in higher physical activity levels.

Authors and Country	Purpose	Participants	Contents	Data Collection	Key Findings
Pritchard et al. (2015) USA	Change in fitness, content knowledge, physical activity	High Schools 32 students 13 males/19 females	Crossfit 20 lessons 2/3 days per week 90 minutes per lesson 1800 minutes season	Actigraph Fitnessgram	Significant increase in aerobic capacity, push up, and students achieve 60.47 moderate to vigorous physical activity.
Ward et al. (2017) USA	The study aimed to determine the extent to which an SEM of fitness could provide in-class MVPA recommended levels.	Elementary level 166 participants 76 boys/90 girls	Fitness (Crossfit challenge) 20 Lessons 5 days per week 30 minutes per lesson 600 season minutes	Fitnessgram Actigraph GT3X	Students spent an average of 54.5% of the lesson in MVPA.
Wahl-Alexander & Morehead (2017) USA	Examining physical activity (PA) levels have of children who participate in traditional or summer day camps.	Summer Camp 83 Participants 6 and 7 graders	Flag football 17 lessons 3 times per week 60 minutes per lesson 1020 minutes season	SOPARC	Campers who participated in Sport Education spent more time (61.6%) engaged in moderate to vigorous activity than campers in the traditional activity unit (42.2%). In addition, campers spent less time idly within Sport Education (27.9%) than its counterpart (39.5%).
Casado-Robles et al. (2020) SPAIN	To assess the effect of a sport education season on the retention of the physical activity levels during recess time.	Secondary Level 10 and 12th grade 91 students 46 boys and 45 girls	Irregular Soccer/Basketball 12 lessons 50 minutes 600 minutes season	Actigraph GT3X	There were no physical activity improvements or significant differences.
Wahl-Alexander & Chomentowski (2018)	The study aims to determine the change in college students' aerobics fitness level through the Sport Education.	College level 47 students	Fitness 26 lessons 75 minutes 1,950 minutes season	PACER 1-mile test	Statistic significantly improved mile time and pacer score.
Pritchard et al. (2019) USA	To investigate the impact of SEM on game performance, content knowledge, and physical activity.	College level 38 Students 23 males 15 female	Badminton 19 lessons 80 minutes 4 days per week	Actigraph	Participants achieve 60.10% in moderate-vigorous physical activity.

Authors and Country	Purpose	Participants	Contents	Data Collection	Key Findings
Rocamora et al. Vilo (2019) USA	Assess the effects of two instructional approaches, Direct instruction and Sport Education in physical activity levels, game performance, and friendship goals	Elementary Level 88 students 44 boys/44 girls	Handball 15 lessons 45 minutes 3 times per week 675 minutes season	Actigraph GT3X	Students who experienced the SEM had significantly higher light and moderate-vigorous physical activity levels.
Segovia & Gutierrez (2020) USA	The study aimed to evaluate the effects on schoolchildren's body composition of game-based high-intensity training (GB-HITT) program delivered during physical education by comparing the SEM and	Elementary 154 students 81 boys/73 Girls	Game-Based (HITT) 15 lessons 45 Minutes 3 times per week 675 minutes season	Tanita BC-418Body Composition Analyser	The results showed significant differences between the experimental group and control (p>.001) in waist circumference and body fat percentage.
Puente-Maxera, Mendez-Gimenez & Martinez de Ojeda (2020) SPAIN	To objectively analyze PA levels (sedentary, light, moderate, vigorous, and moderate to vigorous	Middle School Seventh grade 71 students 38 boys/33 girls	Games from around the world 18 lessons	Actigraph GT3X	Across the entire season, 64% of lesson time engages in MVPA. Significant differences concerning gender (higher in boys). Pre-season was shown as the most active phase contributing to MVPA, as well to counts and METs
Wahl Alexander, Malecki & Smart (2020) USA	The study evaluated the effect of three conditions in which 34 sixth-grade students were prompted to accumulate as much activity during a Sport Education Season.	Middle Schools 34 students 15 boys/9 girls	Badminton 15 lessons 30 minutes 450 minutes season	Yamax Digi walker pedometer	Students achieved higher levels of activity in the prompts and prompts plus independent group-oriented contingencies within Sport Education (1505 steps)

Authors and Country	Purpose	Participants	Contents	Data Collection	Key Findings
Guijarro et al. (2020) SPAIN	The objectives of this study were to evaluate the PA in two pedagogical models in PE lessons and the differences in the teaching process phases. In addition, PA differences were checked in terms of gender to determine each model's contribution to the MVPA in primary education students.	Primary Education Fifth and sixth grade 84 students 43 boys/41 girls	Basketball 15 lessons 45 minutes 3 times per week 675 season minutes	Anthropometry (Tanita DC-430 MA S) ActiGraph GT3X	The results showed that Sport Education helped achieve a greater MVPA percentage than the Direct Instruction in both genders, with a varying contribution of the different phases.
Shu et al. (2021) USA	This study aimed to investigate the effect of the generalization of participation in parkour from physical education classes to organized parkour recess.	Elementary school Third-grade 143 students 64 girls/79 boys	Parkour (Motor Skills Activities) 12 lessons 20 minutes (daily) 5 times per week 240 minutes season	System for Observing Children's Activity and Relationship during Play	Boys achieved significantly higher MVPA than girls in physical education (47% vs. 42%, $p = .045$), organized parkour recess (73% vs. 65%, $p = .003$), and traditional recess (56% vs. 36%, $p < .001$). Children MVPA through performing parkour-specific skills in organized parkour recess generated on average 22% of
Choi et al. (2021) CHINA	The study examined how lesson content and teacher interaction contribute to university students' physical activity levels during physical education lessons.	College Students 202 students 8 courses	Sport courses Basketball Volleyball Handball Woodball Badminton 90 minutes 900 minutes season 10 lessons 1 per week	The System for Observing Fitness Instruction Time (SOFIT)	The student-participants engaged in an average of 38.77 (±18.78) moderate-to-vigorous physical activity (MVPA) minutes, which did not meet the 50% lesson time recommendation.

Authors and Country	Purpose	Participants	Contents	Data Collection	Key Findings
Hiu & Hastie (2021) USA	This study examined the impact of including a formal requirement of achieving predetermined energy expenditures as part of students' participation grades during a Sport Education–based college physical education class.	College Students 18 students 6 females/2 males	Net Sports 15 lessons 3 times per week 50 minutes 750 minutes season	Heart Zone Blink 3.0 Sensor	Results showed that the average calorie consumption across the semester well exceeded the daily targets, while the percentage of students who reached the daily challenge cutoff ranged from 77% to 100% (average = 87%).
Wahl-Alexander & Camic (2022) USA	The purpose of the study was to examine health-related fitness levels and physical activity trends of adolescents participating in a fitness-based sport sport education season in a camp setting.	Summer camp 71 male campers	Fitness 19 lessons 7 weeks	Fitnessgram Yama Digiwalker Pedometers	Findings significant decrease for the NI/NI-Health Risk Group. Both groups increased push-ups and progressive aerobic cardiovascular endurance run test scores.
Layne et al. (2022) USA	The study aimed to examine the effectiveness of student learning/performance through MBI and technology to impact MVPA and jump rope performance.	Elementary level fourth grade 130 participants 61 girls/49 boys	Fitness (Jumprope) 7 lessons 60 minutes 420 minutes season	Accelerometers Heart monitors	Results from this research show that 4th-grade students spent more MVPA time SEM jump rope unit compared to a traditional.

Figure 1

SEM Physical Activity and Fitness Articles Search and Selection Processs.