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NEEDS ANALYSIS FOR DEVELOPING A CONSTRAINTS-LED TRADITIONAL GAME TO COMBAT SEDENTARY LIFESTYLES IN ELEMENTARY STUDENTS

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ABSTRACT
The global epidemic of sedentary lifestyles and excessive gadget use has severely degraded the physical fitness of elementary school students, specifically their agility and cardiovascular endurance. While traditional games like Gobak Sodor offer motor skill benefits, they often lack precise physiological intensity control and utilize passive elimination systems. This study aims to develop and evaluate "Go Ben," a modified Gobak Sodor game designed using the Constraints-Led Approach (CLA) to combat sedentary behaviors. Employing the Borg and Gall Research and Development (R&D) methodology, the study involved Grade 5 students across five elementary schools in the Cirebon region. Participants were selected utilizing a purposive sampling technique, which initially involved a sample of 12 to 15 students for the preliminary field test, before expanding to a main sample of 60 students for operational field testing. The CLA framework was applied to manipulate task, environmental, and individual constraints, replacing passive elimination with active penalties and introducing cognitive tools like "Magic Cards". Following expert validation that scored the model at 95.3% feasibility, a quasi-experimental Pretest-Posttest Control Group Design was conducted on the 60 sampled students. The results demonstrated that the "Go Ben" intervention significantly enhanced agility, with median shuttle run times decreasing from 12.45 to 11.24 seconds ($p < 0.001$). Additionally, cardiovascular endurance improved significantly, with median Bleep Test scores rising from 18.54 to 20.00 ($p < 0.001$), successfully outperforming conventional physical education methods ($p = 0.045$). Ultimately, this CLA-modified game serves as a highly effective, continuous-flow physical training instrument designed to optimize students' physical conditioning, prevent early obesity, and simultaneously preserve local cultural heritage.

Keywords: agility; cardiovascular endurance; constraints-led approach; physical education; traditional game

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INTRODUCTION

The world is currently facing a serious public health crisis characterized by an epidemic of sedentary lifestyles among the younger generation. According to recent data, over 80% of children and adolescents globally fail to meet the minimum recommended daily physical activity required to maintain fundamental physical fitness (World Health Organization, 2024). In Indonesia, this issue is equally alarming; the 2024 Sports Development Index reported that more than 60% of elementary school students fall into the poor and very poor fitness categories (Kementerian Pemuda dan Olahraga Republik Indonesia, 2024). This crisis is primarily exacerbated by rapid digital advancements and excessive gadget use, which currently reaches 5 to 7 hours daily, drastically reducing students' Moderate-to-Vigorous Physical Activity (MVPA). Consequently, students suffer from a systematic degradation of physical components, particularly in their cardiovascular endurance and agility, leading to early fatigue, poor classroom concentration, and increased risks of early obesity (Septiani, 2025).

Despite the urgent need for movement during the children's golden period of motor development, conventional physical education often remains monotonous and fails to provide adequate physiological workloads. A preliminary study conducted at SDN 1 Rawaurip revealed that 53.55% of students scored below the "Good" standard in the Indonesian Student Fitness Test or TKSI

(Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi, 2022). Furthermore, observational data indicated that 15% of the students experienced early obesity, which directly correlated with poor movement efficiency and slow agility performance, evidenced by shuttle run times averaging over 14.2 seconds.

Traditional games, such as Gobak Sodor, have been empirically proven to stimulate fundamental motor skills and agility through dynamic stop-and-go and lateral movements (Ardiansyah & Suherman, 2021). However, in its original form, Gobak Sodor lacks precise physiological intensity control and utilizes a direct elimination system, which inadvertently forces unfit students to become passive spectators. To address this methodological gap, a structural modification using the Constraints-Led Approach (CLA) is highly necessary.

CLA offers a novel pedagogical framework by manipulating task, environmental, and individual constraints to trigger independent motor adaptation (Renshaw et al., 2023). By expanding the play area, introducing cognitive tools like "Magic Cards," and replacing passive elimination with active shuttle run penalties, the modified game ensures all students remain in the optimal aerobic training zone. Therefore, this needs analysis aims to establish a foundational framework for developing "Go Ben"—a CLA-based modified Gobak Sodor game designed to effectively combat sedentary lifestyles, improve agility and cardiovascular endurance, and preserve local cultural heritage among elementary students.

This study aims to develop and evaluate "Go Ben," a modified Gobak Sodor game using the Constraints-Led Approach to combat sedentary behaviors among elementary school students. By establishing a foundational framework, the research seeks to effectively improve agility and cardiovascular endurance. Ultimately, it strives to optimize physical conditioning, prevent early obesity, and simultaneously preserve local cultural heritage during physical education.

METHOD

This research employs a Research and Development (R&D) methodology based on the Borg and Gall model to systematically create and validate a modified traditional game called "Go Ben". This R&D design was chosen because its circular and comprehensive nature allows for continuous improvement of the educational product through structured field trials. The development procedure is adapted into several strategic stages, initiating with research and information collection via field observation and literature review. It proceeds to curriculum planning, developing the preliminary "Go Ben" prototype using a Constraints-Led Approach (CLA), and conducting a small-scale preliminary field test. Subsequently, the model undergoes main product revision based on expert validation, main field testing, operational product revision, and an operational field test utilizing a quasi-experimental design, culminating in final product revision and dissemination.

The study focuses on elementary school students in Grade 5, also known as Phase C. During the preliminary field test, purposive sampling was used to select 12 to 15 students at SD Negeri 1 Rawaurip. The operational field testing was expanded to include 60 students across five elementary schools in the Cirebon region. This stage utilized a Pretest-Posttest Control Group Design, dividing the subjects into an experimental group that received the modified game intervention and a control group that followed conventional physical education methods.

Data collection involves both qualitative and quantitative methods. Qualitative data is obtained through field observations and validation questionnaires from material, learning, and media experts. Quantitative data relies on physical fitness assessments to evaluate the intervention's effectiveness. Agility is measured using the 4 x 10-meter Shuttle Run test, capturing the students' ability to change direction rapidly. Meanwhile, cardiovascular endurance is accurately assessed using the Multistage Fitness Test, commonly known as the Bleep Test. Finally, the study guarantees research quality

through expert judgment for product validity and test-retest methods for physical instrument reliability.

RESULT

Here is the table summarizing the physiological results of the intervention, followed by a detailed narration based on the study's findings.

Table 1.
Table summarizing the physiological results of the intervention

Fitness Component	Group	Pre-test Median	Post-test Median	Statistical Significance (p-value)
Agility (Shuttle Run)	Experimental ("Go Ben")	12.45 seconds	11.24 seconds	$p < 0.001$
Agility (Shuttle Run)	Control (Conventional PE)	12.00	12.30	$p = 0.061$
Cardiovascular Endurance (Bleep Test)	Experimental ("Go Ben")	18.54	20	$p < 0.001$
Cardiovascular Endurance (Bleep Test)	Control (Conventional PE)	18.88	18.76	$p = 0.045$ (Between-group comparison)

The findings of the study demonstrate the successful development and significant effectiveness of the modified traditional game "Go Ben" (Gobak Sodor Benteng).

Development and Validation

Initial needs analysis at SD Negeri 1 Rawaurip revealed that students' physical fitness was severely lacking, with an average shuttle run time of 14.8 seconds (very poor agility) and a Bleep Test score of Level 4, Shuttle 2 (poor cardiovascular endurance). The "Go Ben" model was systematically developed using the Constraints-Led Approach (CLA) to manipulate environmental, task, and individual constraints. Expert validations from physical education, learning, and media experts resulted in an average feasibility score of 95.3%, categorizing the product as "Very Feasible" for field implementation.

Preliminary field testing showed that the game successfully elevated students' heart rates to the ideal aerobic training zone of 160-175 beats per minute. Based on these initial trials, vital operational revisions were made to prevent extreme fatigue, including reducing the penalty from four shuttle runs to two, widening the cone distance to 1.5 meters for safety, and decreasing the total active playing time to two 15-minute innings. A quasi-experimental study involving 60 students compared the "Go Ben" intervention (experimental group) with conventional physical education methods (control group). The experimental group demonstrated a significant enhancement in agility, with their median shuttle run time dropping from 12.45 seconds to 11.24 seconds ($p < 0.001$). In contrast, the control group's improvement was not statistically significant ($p = 0.061$). The experimental group showed a significant increase in their median Bleep Test scores, improving from 18.54 to 20.00 ($p < 0.001$). While the control group also saw an increase, post-test comparisons confirmed that the experimental group achieved significantly better endurance levels than the control group ($p = 0.045$).

CONCLUSION

The development of the "Go Ben" model proves that traditional games can be effectively revitalized into precise, scientific physical training instruments. By utilizing the Constraints-Led Approach (CLA), the game successfully removes the passive elimination system of traditional Gobak Sodor, replacing it with active penalties and strategic cognitive tasks like "Magic Cards". This continuous flow ensures that students remain in the Moderate-to-Vigorous Physical Activity (MVPA) zone without realizing they are undergoing intense physical conditioning.

The statistical evidence confirms that the "Go Ben" model is highly effective and superior to conventional physical education methods in systematically improving both the agility and

cardiovascular endurance of elementary school students. Ultimately, this modified game serves as a practical, engaging, and culturally relevant solution to combat the sedentary lifestyle epidemic among the younger generation.

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