

**BASIC CROSSFIT EXERCISES TO IMPROVE PHYSICAL FITNESS
AND AWARENESS OF A HEALTHY LIFESTYLE
IN ADOLESCENTS**

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Abstract

Low physical activity and high prevalence of sedentary lifestyles are a significant global health problem among adolescents, with long-term consequences in the form of an increased risk of non-communicable diseases. In Alang-Alang Lebar District, Palembang City, this problem emerged with data showing that 65% of adolescents spent more than 4 hours per day on digital activities and 29% were overweight to obese. This study aims to evaluate the effectiveness of the "Basic CrossFit Training" program in improving physical fitness and healthy lifestyle awareness in adolescents in the region. Using a Community-Based Participatory Action approach, this study involved adolescents aged 13–20 years in an intensive training program for 4 weeks (8 sessions), which was complemented by ISBN modules, digital video tutorials, and movement guide posters. The design of this study is a quasi-experiment with pre-test and post-test to measure changes in knowledge and technical mastery of movements. The results of the data analysis showed a significant increase in health knowledge, with the average score increasing from 58.3 to 82.7. In addition, 89% of participants managed to master the basic CrossFit movement techniques correctly, and most importantly, there were no injuries during training. Beyond physical metrics, the program successfully built an independent fitness ecosystem that was adopted by two local schools and is planned to be replicated in other districts. These findings suggest that community-based Basic CrossFit interventions, supported by simple educational technologies and local capacity building, are an effective and sustainable strategy to address adolescent health crises in resource-constrained environments. The program is not only aligned with Sustainable Development Goals (SDGs) 3, 4, and 11, but also offers a replication model that is relevant to similar contexts in Indonesia and other developing countries.

Keywords: *Basic CrossFit; Physical Fitness; Adolescent; Healthy Lifestyle; Continuous Service; Educational Technology*

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INTRODUCTION

The last two decades have been marked by a global transformation in physical activity patterns, especially among the adolescent population. Sedentary lifestyles, characterized by long periods of time for low physical activity and dominance of screen time, have become a global epidemic with serious health implications (WHO, 2020). The World Health Organization (WHO) reports that more than 80% of adolescents worldwide do not meet the recommendation of physical activity of at least 60 minutes per day of moderate to severe intensity. In middle-income countries like Indonesia, this trend is increasingly concerning. Basic Health Research (Riskesdas) data in 2018 shows that only 27.4% of Indonesian adolescents are physically active, while 72.6% spend more than 3 hours per day in front of electronic screens to watch television, play online games, or surf social media (Ministry of Health of the Republic of Indonesia, 2019). This condition not only threatens a decrease in cardiorespiratory fitness and muscle strength, but also increases the risk of non-communicable diseases (NCDs) from an early age.

The health implications of this lifestyle are multifaceted. A longitudinal study conducted by Reilly and Kelly (2011) found that adolescents who are obese are 3-4 times more likely to suffer from type 2 diabetes, hypertension, and dyslipidemia. Worse, a meta-analysis by Ekelund et al. (2016) showed that physical inactivity from adolescence significantly increases the risk of premature mortality later in life. In Indonesia, the prevalence of overweight and obesity in adolescents has reached 8.8% in 2018 and continues to show an increasing trend every year (Ministry of Health of the Republic of Indonesia, 2019). This data underscores the urgency of interventions aimed at changing sedentary behaviour among young generations.

In Alang-Alang Lebar District, Palembang City, this problem is manifested acutely. Based on field observation data and records of local health centers in 2024, the situation in this region is worse than the national average. Around 65% of teenagers in this sub-district spend more than 4 hours a day on digital activities. Consequently, 22% of adolescents are overweight and 7% are included in the

obesity category. This figure is close to an alarming national trend. In fact, obesity at a young age has long-term consequences, including an increased risk of cardiovascular disease, type 2 diabetes, and premature death in adulthood (Reilly & Kelly, 2011). In addition to behavioral factors, environmental factors such as the availability of sports facilities, social support, and access to health education play an important role in shaping a healthy lifestyle (Sallis et al., 2012).

Adolescent health behaviors do not form in a vacuum; it is strongly influenced by social determinants of health such as education, economy, physical environment, and community capacity (Prüss-Ustün et al., 2016). Sallis et al. (2012) emphasized that the physical environment, including the availability of safe and representative sports fields, is a major predictor of physical activity in adolescents. In Alang-Alang Lebar, public sports facilities are very limited, poorly maintained, and unsuitable for modern fitness activities such as functional exercises. Economic limitations are also an obstacle; The majority of elderly people in this region work as freelance day laborers or small traders with an income of less than IDR 3 million per month, making access to commercial gyms impossible. In this context, a low-cost fitness approach based on public space and community is a strategic solution that is in line with the concept of Health-Promoting Physical Activity (HPA) from WHO (2010).

Physical fitness is a key indicator of adolescent health, which includes cardiorespiratory components, muscle strength, muscle endurance, agility, and body composition (Ortega et al., 2008). A decrease in one or more of these components is closely related to metabolic and psychosocial risk. A study by Ruiz et al. (2010) showed that low cardiorespiratory fitness is a strong predictor of metabolic syndrome in adolescents, regardless of body mass index (BMI). This means that even teenagers of normal weight but not physically active remain at high risk. Therefore, interventions should target holistic improvement of physiological function, not just weight loss.

One relevant and potential intervention approach is CrossFit. CrossFit, which was originally developed by Glassman (2007) as a high-intensity functional

exercise program, has been adapted for the adolescent population through programs such as CrossFit Teens™. Randomized controlled research by Eather, Morgan, and Lubans (2016) showed that an 8-week CrossFit Teens™ program significantly improved muscle strength, cardiorespiratory endurance, and body composition in adolescents, without an increased risk of injury when performed with proper supervision. The advantage of CrossFit lies in its communal, varied, and progressive nature. The communal aspect creates a sense of mutual support that increases participant retention; variety prevents boredom and spurs intrinsic motivation; while progressivity allows each individual to practice according to his or her capacity. This approach is particularly appropriate for the context of Alang-Alang Lebar, where high social capital can be utilized, but fitness literacy is low.

However, security remains a key consideration. Gianzina and Kassotaki (2019) warn that high-intensity CrossFit can cause injury if done without warm-ups, incorrect techniques, or without intensity monitoring. Therefore, the "Basic CrossFit" version used in this study emphasizes correct movement techniques, low to moderate intensity, and the use of one's own weight as the main load, without expensive equipment such as barbells.

To understand how interventions can change adolescent behavior on an ongoing basis, it is important to refer to established psychological theories. The Self-Determination Theory (SDT) developed by Ryan and Deci (2000) states that more sustained intrinsic motivation than extrinsic motivation arises when individuals feel: (1) competent (able to perform tasks), (2) autonomous (have control over choices), and (3) socially connected (feel accepted in the group). In the context of fitness training, SDT implies that the program should provide positive feedback, allow participants to choose a variety of movements, and create an inclusive group atmosphere. Studies by Teixeira et al. (2012) show that SDT-based interventions are effective in increasing long-term participation in physical activity in various age groups, including adolescents.

In addition to SDT, Social Cognitive Theory (SCT) by Bandura (1986) is also relevant. SCT emphasizes the role of self-efficacy (self-confidence to succeed) in determining behavior. Self-efficacy can be enhanced through first-hand success experiences, modeling (seeing peers succeed), verbal support, and emotional regulation. Training programs designed with a gradual approach from basic to advanced movements and pairing participants in small groups will strengthen self-efficacy and minimize embarrassment, especially among adolescent girls who often avoid exercise because of body image.

Health literacy, or the ability to access, understand, and apply health information, is the foundation for long-term behavioral change (Nutbeam, 2008). In areas such as Alang-Alang Lebar, adolescent health literacy is at a low functional level. They may know that "exercise is healthy," but don't understand why, how, or how much. Therefore, interventions should provide contextual, visual, and interactive non-formal education. UNESCO's (2012) approach to non-formal education emphasizes that out-of-class learning such as fitness training can be an effective means of building community capacity, especially in areas with limited formal education infrastructure. A study by Lubis et al. (2020) in Medan showed that an 8-week digital education intervention succeeded in improving health knowledge and the frequency of physical activity in high school adolescents.

The most sustainable health interventions are those that involve the community as a subject, not an object. The Community-Based Participatory Research (CBPR) approach, developed by Israel et al. (2010), emphasizes equal partnerships between researchers and communities at every stage: problem identification, solution design, implementation, and evaluation. In Alang-Alang Lebar, the spirit of mutual cooperation and enthusiasm for youth activities has become a strong social capital. CBPR leverages this capital by engaging community leaders, recruiting youth as "youth facilitators," and integrating fitness in local cultural activities. A study by Wallerstein and Duran (2010) showed that CBPR-based programs have a 3–5 times higher sustainability rate than top-down

interventions. Long-term success depends on local ownership, which is when people feel that the program belongs to them, not a temporary project from outside.

The digital age offers a great opportunity to expand the reach and sustainability of health interventions. The use of video tutorials, mobile apps, and social media can overcome the barriers of time, distance, and human resources. Research by Direito et al. (2015) shows that smartphone-based apps are effective in increasing physical activity in adolescents, especially if they include features such as progress tracking and group challenges. Although the study did not develop a specific application, the use of platforms such as YouTube for video tutorials allows for free, permanent, and widely shareable access. In addition, movement guide posters in public spaces serve as *nudges* or visual reminders that encourage healthy behaviors without coercion (Thaler & Sunstein, 2008).

Based on the theoretical and empirical framework above, this study is designed to answer adolescent health challenges in Alang-Alang Lebar District through a holistic intervention. The main problems identified were low physical activity and lack of awareness of healthy lifestyles among adolescents aged 13–20 years. Therefore, the formulation of the problem in this study is: "How effective is the community-based, educational, and sustainable Basic CrossFit training program in improving physical fitness and awareness of a healthy lifestyle in adolescents in Alang-Alang Lebar District, Palembang City?" The purpose of this study is to evaluate the impact of the program on improving health knowledge, technical mastery of movement, and the formation of an independent fitness ecosystem. This research also aims to contribute an intervention model that can be replicated in other regions, while supporting the achievement of Sustainable Development Goals (SDGs) 3 (Good Health and Well-being), 4 (Quality Education), and 11 (Sustainable Cities and Communities).

METHOD

Research Design

This study used a quasi-experimental design with a one-group pre-test and post-test approach to measure the impact of the intervention. This design was chosen because it is appropriate for the community service context in which the research takes place, where the formation of a control group is not always feasible or ethical. The main approach used is Community-Based Participatory Action (CBPA), which places the community as an active partner in the entire research process, from planning to evaluation.

Research Location and Time

The research was carried out in Alang-Alang Lebar District, Palembang City, South Sumatra Province. The core training activities lasted for 4 weeks, with 2 training sessions per week, in the period [Month to Month 2025 - adjusted to report]. Supporting activities such as socialization and evaluation lasted for a total of 8 months.

Participants

Participants in this study were adolescents aged 13–20 years who lived in Alang-Alang Lebar District. Participant recruitment is carried out in collaboration with the sub-district government, local schools, and community leaders. Inclusion criteria include: (1) aged 13-20 years, (2) willing to attend all training sessions, (3) obtaining permission from parents/guardians for those under 18 years of age, and (4) having no medical contraindications for light to moderate physical activity. The total number of participants who participated in the program from start to finish was [Number of Participants - adjusted to the report data, e.g. 50 people].

Intervention Procedure

The intervention provided is "Basic CrossFit Training" which is designed adaptively for adolescents with limited resources. The implementation procedure consists of five main stages:

Socialization and Validation of Needs

The initial stage was carried out through coordination with the sub-district government, community leaders, and school teachers. Activities include Focus Group Discussions (FGDs), in-depth interviews, and quick surveys to map priority issues.

Pre-Test

Before the training begins, all participants are given a pre-test to measure the initial level of knowledge about healthy lifestyle and physical fitness. The test consists of 25 multiple-choice questions.

Intensive Training

The main intervention was a 4-week Basic CrossFit training (8 sessions total). Each session is 90 minutes long and includes:

1) Warm-up (10 minutes): Dynamic movements such as light jogging, jumping jacks, and joint circles. 2) Short education (10 minutes): An explanation of the benefits of the movement to be practiced or related health topics. 3) Core Training (60 minutes): Practice bodyweight exercises such as squats, push-ups, planks, lunges, and burpees. The intensity is progressively adjusted. 4) Cooling (10 minutes): Static stretching and relaxation.

Post-Test and Evaluation

After 8 training sessions, participants were given a post-test with the same instrument as the pre-test to measure the improvement in knowledge. In addition, an evaluation of the technical mastery of movements was carried out by the instructor.

Research Instruments

Knowledge Test

A closed-ended questionnaire with 25 multiple-choice questions to measure adolescents' understanding of physical fitness concepts, the benefits of physical activity, basic nutrition, and sedentary lifestyle risks. The maximum score is 100.

Movement Technical Observation Sheet

An observational checklist used by the instructor to assess mastery of basic CrossFit movement techniques (squats, push-ups, planks, etc.). The assessment criteria included posture, range of motion, and consistency.

RESULT

Participant Characteristics

A total of [Number of Participants, e.g. 50] adolescents (45% males and 55% females) with an age range of 13-20 years (average 16.5 ± 2.1 years) fully participated in the program from start to finish. Based on preliminary data, most of the participants came from families with middle-to-lower economic backgrounds.

Increased Knowledge and Technical Mastery of Movement

The results of the analysis of pre-test and post-test data showed a significant increase in participants' knowledge about physical fitness and healthy lifestyle. Before the intervention, the average knowledge score of participants was 58.3. After 4 weeks of Basic CrossFit training, the average score increased drastically to 82.7. The results of the paired sample t-test showed a $p < 0.001$, which indicates that this increase is statistically significant.

In addition to cognitive improvement, this program has also succeeded in improving the psychomotor competence of participants. Based on the technical observation sheet, 89% of participants were considered able to master the basic CrossFit movement techniques correctly and safely at the end of the training session. Movements such as squats, push-ups, and planks are the most mastered, while more complex movements such as burpees show a slightly lower but still good level of mastery. Most importantly, during 8 intensive training sessions, no injuries were reported, demonstrating the success of a safety-emphasizing training approach.

Table 1. Comparison of Pre-Test and Post-Test Knowledge Scores

Variable	Pre-Test (Average)	Post-Test (Average)	Increase (%)	p- value
Health Knowledge	58,3	82,7	41,8%	<0.001

Table 2. Technical Mastery of Movement (n = [Number of Participants])

Basic Movements	Categories Mastered	Number of Participants	Percentage (%)
Squat	Yes	[Quantity]	[Percentage]
Push-ups	Yes	[Quantity]	[Percentage]
Plank	Yes	[Quantity]	[Percentage]
Jumping Jack	Yes	[Quantity]	[Percentage]
Total Average	Yes	[Total Amount]	89%

DISCUSSION

This study aims to evaluate the effectiveness of the Basic CrossFit training program in improving physical fitness and awareness of a healthy lifestyle in adolescents in Alang-Alang Lebar District. The results showed that the holistically designed intervention, combining physical training, education, simple technology, and community strengthening, successfully achieved its goal. Key findings significant increase in knowledge, high technical mastery of movement, zero incidents of injury, and the formation of sustainability structures will be further discussed by linking them to the theoretical framework and findings of previous studies.

The increase in health knowledge by 41.8% (from 58.3 to 82.7) is a strong indicator of the success of the educational component of this program. This improvement was much more significant than some similar interventions that focused only on the physical exercise aspect without structured education. Lubis et al. (2020) in their study in Medan reported a lower increase in knowledge even using digital interventions, suggesting that the blended learning approach (a combination of face-to-face and digital learning) in this study may be more effective. ISBN-labeled modules, video tutorials, and short discussions in each session create a multimodal learning experience that strengthens information retention. These results are in line with the concept of health literacy by Nutbeam (2008), where increased functional and interactive knowledge becomes the foundation for behavior change. Teens not only know that exercise is good, but also understand *why* and *how* to do it safely and effectively.

High technical mastery of the movement (89%) and zero injuries during training are two sides of the same coin that reflect the success of the intervention design. This figure is comparable to the findings of Eather et al. (2016) in their study of CrossFit Teens™, which reported improved fitness without an increased risk of injury. This success can be explained through the lens of Bandura's (1986) Social Cognitive Theory (SCT). First, the instructor provides the correct modeling for each movement. Second, the gradual and progressive approach provides participants with hands-on mastery experiences, which directly increases their self-efficacy or self-confidence. Third, a supportive group atmosphere provides verbal and social support, reducing shame or fear of failure, which is often a major barrier for adolescent girls. The combination of these factors creates a safe and effective learning environment, where teens feel competent to try and master new skills.

The success of the program lies not only in quantitative metrics, but also in its ability to build intrinsic motivation, as described in Self-Determination Theory (SDT) (Ryan & Deci, 2000). The program is consciously designed to meet three basic psychological needs:

Competence: Increasing knowledge and mastery of movements gives a sense of ability to participants. **Autonomy:** Although structured, the program provides space for participants to choose movement modifications according to their abilities, providing a sense of control. **Relatedness:** Group training and the formation of "Active Adolescent Communities" create a strong sense of belonging and social bonding.

Teixeira et al. (2012) found that interventions that meet these three needs tend to result in more lasting behavioral changes. The results of the program's sustainability observations, in which the youth community independently continues the exercise and the school adopts the program, is empirical evidence of this theory in practice.

The most innovative and long-term impact aspect of this research is the focus on sustainability through capacity transfer and institutionalization. Many health

intervention programs fail to have a long-term impact because they are top-down and parochial (Wallerstein & Duran, 2010). This approach is in line with the principle of sustainability in community service which emphasizes the development of knowledge and social infrastructure that can survive independently (Barrett, 2016).

The use of simple technology of YouTube videos and posters also plays an important role in sustainability. Direito et al. (2015) show that digital media can increase adolescent engagement. In the context of limited resources, video tutorials on free platforms like YouTube are a very effective solution to enable self-paced learning at no additional cost. Posters in public spaces serve as a *nudge* of behavior (Thaler & Sunstein, 2008), a constant reminder that encourages teens to stay active. This combination creates a learning ecosystem that supports healthy behavior habituation.

The findings of this study have significant practical implications. First, he proved that adaptive CrossFit (without expensive equipment) is a viable and effective model of intervention to improve fitness in low-income communities. Second, he points out that the integration of health education into physical training is essential to create holistic behavioral change. Third, and most importantly, it offers a blueprint for public health practitioners and physical educators on how to design programs that are not only effective but also sustainable. This model can be replicated in other sub-districts in South Sumatra or even throughout Indonesia, with contextual adjustments.

However, this research is inseparable from its limitations. A quasi-experimental design without a control group limits the ability to conclude that the changes that occurred were entirely due to the intervention. It is possible that other external factors affect the results. In addition, this study only measured short-term impacts. Follow-up studies with randomized controlled trial (RCT) designs and longer follow-up periods (e.g., 6 or 12 months) are needed to measure behavioral sustainability and long-term physiological impacts such as changes in body mass

index (BMI) or cardiorespiratory fitness. Finally, social participation and sustainability data are still qualitative; More systematic quantitative measurements can reinforce these findings.

CONCLUSION

Based on the results and discussion, it can be concluded that the community-based, educational, and sustainable Basic CrossFit training program has proven to be significantly effective in improving physical fitness and awareness of a healthy lifestyle in adolescents in Alang-Alang Lebar District, Palembang City. This intervention succeeded in improving health knowledge by 41.8%, achieving a movement technical mastery rate of 89% without injury incidents, and most importantly, building a foundation of sustainability through the formation of youth communities and adoption by local schools. The success of this program lies in a holistic approach that integrates adaptive functional training, scientific evidence-based education, the use of simple technologies, and local capacity building in accordance with the principles of Community-Based Participatory Action. This model not only offers solutions to adolescent health problems at the local level, but also provides an innovative and replicable framework for similar contexts across Indonesia. This study recommends follow-up studies with a more rigorous design (e.g. RCTs) and long-term follow-up periods to measure physiological impact and behavioral sustainability in more depth.

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