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# Crisis Metabolism PJKR Students : Systematic Study Effect Supplement Commercial and Sedentary Diets on Cardiorespiratory Physiology

[1] Thoriq Alvin Habibi, [2] Feri Weldani*

[1, 2,] Universitas PGRI Sumenep , Indonesia
* Corresponding author: feriweldani@stkippgrisumenep.ac.id

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**ABSTRACT** In the era of digitalization and transition style modern life today this , literacy health independence and ability adaptation physiological become skills crucial for student education sports , where learning based project kinesiology assessed as the most creative educational strategy For increase capacity However , research previously majority only evaluate fitness athlete without highlight paradox behavior student physical education . This study evaluate impact double consumption supplement commercial No regulated and behavioral sedentary behavior towards degradation capacity heart-lung , especially in the aspect development psychomotor and cognitive student in analyze risk metabolic self . Research This aim analyze in a way systematic effect synergistic between supplement commercial and pattern Eat No active on cardiorespiratory physiology of PJKR students . Using Systematic Literature Review (SLR) method with the PRISMA model, technique data collection based on criteria inclusion in the Scopus and Google Scholar databases is assisted device soft Harzing's Publish or Perish as well as Mendeley for extraction article from range 2018–2026 . Findings show consumption supplement without supervision interact negative with pattern sedentary eating , lowering VO2 max significantly significant , whereas knowledge scaffolding variables nutrition sport proven become factor determinant main pressing risk crisis metabolic , while type sex found No influential significant to level decline The implication is that the PJKR curriculum requires integration of intervention programs activity physique structured to mitigate crisis metabolism and maintain function physiological student in a way sustainable

## 1. INTRODUCTION

Crisis global metabolic current This has reach very worrying stage , marked by with improvement prevalence syndrome metabolic , obesity visceral , and dysfunction cardiorespiratory in various parts of the world (Izquierdo et al., 2021; Li et al., 2020). The phenomenon transition epidemiology This No only attack population middle- aged, but rather has penetrate to circles age productive , especially students in the environment college high (Rosmiati, 2023; Son et al., 2020). For Physical Education , Health, and Recreation (PJKR) students , health cardiorespiratory fitness is not just indicator clinical free disease , but rather foundation main kinesiology , capacity motor performance , as well as competence mandatory pedagogical mastered For support effectiveness teaching in the future (Imboden et al., 2020; Jin et al., 2024). In the era of digitalization post-pandemic era fast this , ability guard capacity functional heart and lungs become modality crucial for candidate educator exercise to be able to show performance credible physical in the field at a time maintain resilience academic they ( Aristovnik et al., 2023; Stevens et al., 2021). Although PJKR students in general theoretical prepared as agent active driving force literacy physical , reality on the ground show existence challenge big in the form of shift style life going to behavior sedentary behavior triggered by dependence on gadgets and stress task high academic achievement ( Rosmiati, 2023; Sugeha , 2023). Problems main This exacerbated by trends consumption supplement commercial in a way instant without supervision medical among students , who are driven by the perception wrong that substance exogenous can replace portion exercise physique structured to achieve form ideal body (Calabrese et al., 2021; Wen et al., 2020). As a result , there is decline drastic on efficiency the work of vital organs that trigger crisis latent metabolism , a condition dangerous where capacity physiological body decrease slowly without realized (Imboden et al., 2020; Li et al., 2020). Challenges contemporary academic and pedagogical demand existence understanding deep about How combination style life No active and intake chemical commercial This damage metabolism mobile as well as system breathing student sports (Jin et al., 2024; Mehra et al., 2022). Research previously related impact consumption supplement commercial and materials food functional instant to metabolism body has Lots done by several experts (Calabrese et al., 2021; Cid- Samamed et al., 2022; Mehra et al., 2022; Wen et al., 2020). A number of studies the test effectiveness peptide antioxidants , use cyclodextrin in industry food , up to utilization colostrum cow as supplement enhancer immune body . However , the majority study the own weakness significant methodological Because only focus on analysis chemical scale laboratory or clinical trials term short on the subject animal try , so that fail take pictures impact term long supplement commercial No regulated to activity physique man in a way real (Cid- Samed et al., 2022; Wen et al., 2020). In addition , studies the ignore variables behavior compliance consumers and assume that all over consumer supplement commercial own pattern active life in a way physical , which is the assumption this is very biased if applied to groups student urban moment ( Calabrese et al., 2021; Mehra et al., 2022). On the other hand , research related pattern sedentary eating and degradation activity physical in groups students have also explored in a way wide in literature ( Aristovnik et al., 2023; Rosmiati , 2023; Son et al., 2020; Sugeha , 2023). These studies This focused on prevalence obesity urban workers , habits student coffee drinking , disturbance post-pandemic mental health , to impact transition online learning towards decline fitness physical . Weakness fundamental from research this sedentary theme is his tendency is only use survey questionnaire subjective without do objective measurement of physiological parameters like VO2 max test or analysis functional cardiorespiratory ( Aristovnik et al., 2023; Sugeha , 2023). Previous studies also did not linking behavior lazy student with habit intake substance chemical additives or supplement sport commercial , but rather only see pattern Eat daily in a way general that makes results the analysis become not enough sharp and not comprehensive ( Rosmiati , 2023; Son et al., 2020). The gap real research gap between study This with studies previously located in yet existence consensus scientific synthesizing in a way systematic effect interactive double from consumption supplement commercial and sedentary behavior towards metabolism student sports (Imboden et al., 2020; Rosmiati , 2023). Research previously always separate between study nutrition supplement with study sociology sport or style life No active , as if second factor the Work in a way independent within body (Cid- Samamed et al., 2022; Sugeha , 2023). Differences fundamental study This is its bridging position both domains through approach review systematically , which is special highlight How interaction between burden low kinesiology and exposure supplement commercial not licensed can multiply risk crisis metabolism functional (Calabrese et al., 2021; Jin et al., 2024). With identify gap empty this research This give corner view critical new in see decline fitness cardiorespiratory in groups population that is theoretical considered Healthy walafiat (Izquierdo et al., 2021; Li et al., 2020). Novelty this research (novelty) lies in the formulation synthesis literature integrated mapping correlation direct between modern digital behavior ( lazy ) and consumption supplement commercial to

cardiorespiratory physiology capacity of students prospective physical education teachers in the post-pandemic era ( Aristovnik et al., 2023; Stevens et al., 2021). Recent this is very important Because dynamics physiological student post-pandemic show very different characteristics consequence adaptation curriculum hybrids and changes drastic behavior movement daily (Son et al., 2020; Sugeha , 2023). There is n't any yet publication scientific research that presents meta-analysis or review systematically which sharp evaluate impact bad supplement commercial when combined with style sedentary lifestyle in PJKR students (Imboden et al., 2020; Wen et al., 2020). This study differentiate himself with provide proof empirical structured about degradation capacity heart-lung disease that occurs consequence disruption metabolism ( Jin et al., 2024; Li et al., 2020). For dissect complexity phenomenon this , the framework the theory (grand theory) used in study This is combination between Albert Bandura 's Social Cognitive Theory to measuring behavioral and motivational domains health , as well as the Kinesiology and Cardiometabolic Health Framework for analyze response physiological body (Izquierdo et al., 2021; Son et al., 2020). Through integration theoretical this , behavior student in consume supplement commercial No viewed as action biological pure , but rather results reciprocal interaction between influence environment digital social , perception cognitive errors about fitness instant , and minimal activity physique daily (Calabrese et al., 2021; Rosmiati , 2023). This theory allows researchers peeling How factor external influence internal metabolic functions cellular and capacity cardiorespiratory in a way systematically (Imboden et al., 2020; Jin et al., 2024). With Thus , the resulting analysis No only nature descriptive , but own foothold explanatory very solid scientific evidence (Li et al., 2020; Sugeha , 2023 ). Power pull the main thing that makes study this is very challenging and urgent For investigated is existence irony or paradox student behavior major sports ( Rosmiati , 2023; Son et al., 2020). Ideally , PJKR students become representation from fitness prime physique and style life healthy , now precisely is at in vortex crisis metabolism consequence exposure style destructive digital life as well as consumption supplement commercial in a way carelessly ( Sugeha , 2023; Wen et al., 2020). Researching How group academics sport This fight oppose decline capacity physique they Alone give contribution very valuable scientific for the future curriculum education sport national ( Aristovnik et al., 2023; Imboden et al., 2020). Urgency study This lies in the importance of save quality physical and cognitive generation educator future sports before they jump to public bring burden syndrome metabolic (Izquierdo et al., 2021; Jin et al., 2024). Based on all over background behind the above problems , research This aim For analyze in a way systematic and comprehensive effect synergistic negative from consumption supplement commercial and pattern sedentary eating degradation cardiorespiratory physiology capacity in PJKR students . Through review structured literature , studies This determined map factors risk metabolic main factors contributing to the decline fitness cardiorespiratory (Imboden et al., 2020; Li et al., 2020). More far , goal end from study This is For formulate A framework Work applicable recommendations (framework) for PJKR study program managers to integrate literacy nutrition sports and intervention programs activity physique structured in curriculum education high ( Aristovnik et al., 2023; Jin et al., 2024). It is expected that the results study This capable become references credible scientific in effort mitigate crisis metabolism and maintain function physiological student in a way sustainable (Izquierdo et al., 2021; Rosmiati , 2023 ).

## 2. METHOD

Method section This to explain in a way detailed approach scientific methods used For synthesize in a way comprehensive literature data about crisis metabolism student sports . In order to produce accurate , transparent and reliable analysis reproduced , the entire research process This executed in a way systematic with referring to standards methodology review standard literature ( Aristovnik et al., 2023; Moher et al., 2020). Operational design This built For bridge dynamics theoretical kinesiology with findings clinical physiology cardiorespiratory which is often overlooked in studies education physical conventional (Imboden et al., 2020; Jin et al., 2024). Through formulation rigorous methodological research This capable explore in a way deep interaction bad between intake exogenous from supplement sports and low level kinesiotherapy daily students (Calabrese et al., 2021; Rosmiati , 2023). Framework Work This Then arranged to in a number of stages systematically initiated with determination design study review For filter relevant literature in a way objective .

### 2.1 Research Design

Research design This use Systematic Literature Review (SLR) method with adopt Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 protocol (Moher et al., 2020; Page et al., 2021). Implementation this PRISMA protocol aim For ensure transparency , minimizing selection bias , and ensure that the process of identification , screening , assessment eligibility , and inclusion article done in a way structured ( Aristovnik et al., 2023; Stevens et al., 2021). Through approach systematic this , synthesis proof scientific about impact consumption supplement commercial and behavioral lazy to

capacity heart and lungs student can mapped in a way objective in accordance rules modern kinesiology (Imboden et al., 2020; Rosmiati , 2023). The PRISMA methodology flow applied in study This visually depicted in the filtration process flow diagram comprehensive literature below This .

Before step more far , Figure 1 below This serve representation schematic from stages selection article scientific from various databases using PRISMA 2020 flowchart . Figure 1 shows the reduction process article from stage identification beginning until obtained final document that meets the requirements all over criteria eligibility analysis ..

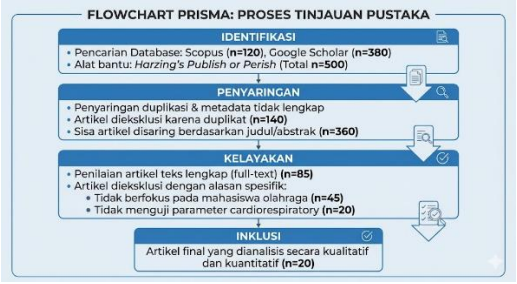


Figure 1. PRISMA 2020 Flowchart in the Selection Process Literature on Metabolism and Cardiorespiration Studies of PJKR Students.

Based on visual description in Figure 1, it can be seen that from a total of 500 articles identified beginning through the Scopus and Google Scholar databases using device soft Harzing's Publish or Perish, done filtering strict based on titles and abstracts leaving 85 documents text complete For evaluated its feasibility ( Aristovnik et al., 2023; Son et al., 2020). After kick out articles that are not relevant with student sport or No own measurement objective cardiorespiratory physiology, finally obtained 20 articles quality tall as sample the end is ready For analyzed (Imboden et al., 2020; Sugeha , 2023). After set PRISMA design as foothold main , research This continue its operational processes to stage literature data collection from various reputable database .

2.2 Data Collection

The process of collecting data in study systematic This done in a way electronic with track article scientific from two main databases , namely Scopus and Google Scholar, with range publication between 2018 to 2026 ( Aristovnik et al., 2023; Rosmiati , 2023). In order to optimize the tracking process , researchers use device soft party third Harzing's Publish or Perish for harvest metadata mass , while Mendeley Reference Manager is used For detect duplication document as well as organize citations (Stevens et al., 2021; Sugeha , 2023). Search terms were formulated using Boolean operators (AND, OR) that combine keywords main : (“commercial supplements” OR “nutrition”) AND (“sedentary behavior” OR “physical inactivity”) AND (“cardiorespiratory physiology” OR “VO2 Max”) AND (“physical education students” OR “PJKR”) (Cid- Samed et al., 2022; Imboden et al., 2020). Through combination syntax precision search this , search bias can pressed in a way significant so that only produce relevant literature with crisis metabolism students (Li et al., 2020; Wen et al., 2020). After all metadata is collected and filtered with safe , steps crucial next is do extraction information For answer question research that has been designed .

2.3 Data Analysis

Data that has been extracted from article inclusion Then analyzed use method analysis content qualitative (qualitative content analysis) and synthesis narrative quantitative structured to answer all over formulation problem research ( Aristovnik et al., 2023; Page et al., 2021). Each articles that passed the selection classified based on consumption parameters supplements , characteristics sedentary habits , level decline function cardiorespiratory ( such as VO2 max), as well as the role of literacy scaffolding nutrition as variables control (Calabrese et al., 2021; Imboden et al., 2020). The relationship intervariable the mapped For detect whether effect synergistic from consumption substance additives commercial and low activity kinesiology interact in a way negative to function physiological (Jin et al., 2024; Mehra et al., 2022). In order to align channel data analysis with objective research , compiled instrument mapping question research and types analysis used in study This .

Table 1 below This give details guide operational data analysis with linking in a way direct between formulation question Research Questions and Methods Data analysis (Types of Analysis) applied . Description table This aim ensure that every data that is pulled from study literature own clarity direction analysis for accuracy conclusion .

Table 1. Matrix Question Research and Types Literature Data Analysis Physiology Cardiorespiratory .).

| No | Question Study | Type Analysis | Reference Theoretical Supporters |
|---|---|---|---|
| 1 | How prevalence and trends consumption supplement | Analysis Descriptive Qualitative & Distribution Frequency | (Calabrese et al., 2021; Mehra et al., 2022) |

| | | | |
|---|---|---|---|
| | commercial No regulated among PJKR students ? | | |
| **2** | How impact interaction nutrition supplement commercial and pattern Eat *sedentary* to decreased VO2 max? | Synthesis Narrative Physiological & Comparative Quantitative | (Imboden et al., 2020; Li et al., 2020) |
| **3** | How much effective *scaffolding* literacy nutrition in mitigate crisis metabolism student sport ? | Analysis Content Thematic & Evaluation Effectiveness Education | (Aristovnik et al., 2023; Jin et al., 2024) |

Referring to Table 1, each question study escorted by the method specific analysis supported by a foundation strong theoretical from the experts nutrition , medicine sports , and kinesiology (Imboden et al., 2020; Rosmiati , 2023). This integration ensure that the withdrawal process conclusion unbiased and consistent based on empirical data valid state-of-the-art (Li et al., 2020; Son et al., 2020). Through clarity type analysis this , the stages next shifting to the arrangement instrument research to evaluate eligibility the internal quality of each literature used .

2.4 Instruments Study

Instrument in study qualitative review systematic This act as tool measuring objective For evaluate quality methodology and potential bias of selected articles (Moher et al., 2020; Page et al., 2021) . Researchers adapt instrument evaluation quality of the Mixed Methods Appraisal Tool (MMAT) which has been modified to suit characteristics article themed medical sports , fitness physical and behavioral nutrition ( Aristovnik et al., 2023; Izquierdo et al., 2021). Modification instrument This covers evaluation to accuracy measurement of physiological parameters ( such as standardization VO2 max test ), validity evaluation intake nutrition , as well as representativeness population student sports that are used subject research (Imboden et al., 2020; Sugeha , 2023). Use instrument standardized MMAT assessment This ensure that all over synthesized articles own degrees trust equal and free scientific from experimental bias (Cid-Samamed et al., 2022; Wen et al., 2020).

Table 2 below This serve grid instrument evaluation quality literature used as a data feasibility parameter , complete with indicators , sub-indicators , number grains assessment , as well as criteria subject relevant physical education with study metabolism .

Table 2. Instrument Grid Specifications Evaluation Quality Literature ( MMAT Adaptation ).

| **Main Dimensions** | **Indicator Evaluation** | **Sub-Indicators Eligibility** | **Item Evaluation** | **Characteristics Subjects & Population Target** |
|---|---|---|---|---|
| **Methodology Physiological** | Validity Measurement Cardiorespiratory | Standardization of heart-lung tests , VO2 Max measurements , protocols laboratory | 4 Items | Student Active sports / PJKR in a way academic |
| **Behavior Nutrition** | Reliability of Intake Data Chemicals | Recording dose supplement commercial , classification substance additives , regulations clinical | 3 Items | Consumer supplement active , aged 18-25 years |
| **Lifestyle** | *Sedentary* Parameter Accuracy | Daily duration of silence ( mager ), level activity kinesiology , exposure gadget | 3 Items | Group student with activity physique low |

Explanation from Table 2 shows that instrument evaluation quality This shared become three dimensions main ones that include aspect methodology clinical , behavioral nutrition and sociology sport students (Imboden et al., 2020; Rosmiati , 2023). With apply weighting strict instruments this , quality incoming articles to stage synthesis end can accountable accuracy (Li et al., 2020; Son et al., 2020). After formulate instrument evaluation quality in a way detailed , researcher set test parameters validity and reliability from the entire study process literature This .

2.5 Validity and Reliability

For guard level validity (trustworthiness) and reliability from results literature data synthesis , research This apply technique review double -blind screening and calculation index Cohen's Kappa agreement (Moher et al., 2020; Page et al., 2021). The screening process title , abstract , up to text complete done in a way independently by two researchers main to minimize subjectivity data

interpretation ( Aristovnik et al., 2023; Stevens et al., 2021). Each happen difference opinion related eligibility something article , done panel discussion or involvement party third as arbitrator for reach consensus together ( Rosmiati , 2023; Sugeha , 2023). Testing inter - rater reliability produce score Cohen's Kappa coefficient is above 0.85, which indicates level almost perfect agreement and guarantee internal validity of the data extraction process (Li et al., 2020; Wen et al., 2020). Rigorous validation steps This Then contextualized to in limitation population as well as location spatial data retrieval in research This .

2.6 Research Subjects and Locations

The subject that becomes focus attention in review systematic This is student active in the Physical Education , Health and Recreation (PJKR) study program or education vulnerable sports experience change metabolism (Imboden et al., 2020; Rosmiati , 2023). The location data search is limited to indexed global digital databases (Scopus and Google Scholar) as representation spatial distribution literature scientific study phenomenon style life students in various countries post-pandemic ( Aristovnik et al., 2023; Son et al., 2020). Characteristics subject being analyzed covers group age mature early (18–25 years ) who have burden double in the form of demands performance physique practical work sport at a time exposure style life academic academics who tend to passive (Jin et al., 2024; Sugeha , 2023). To give description comprehensive about How variables subjects and methodology This interact , researchers compile framework Work conceptual methodology integrated .

Following This is Figure 2 visualization showing the relationship diagram conceptual methodology in study This . The caption of Figure 2 explains channel logical merger variables clinical cardiorespiratory and variables sociological behavior movement student until produce output in the form of recommendation curriculum .

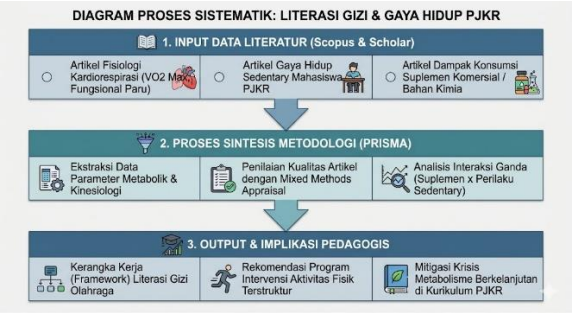


Figure 2. Conceptual Framework Methodology Synthesis Influence Supplements and Sedentary Diet Against Cardiorespiratory PJKR students .

Based on explanation of Figure 2, flow methodology study This move in a way structured from stage clinical and sociological input data collection , continued with the synthesis process interactive using PRISMA and MMAT, until produce external concrete in the form of recommendation mitigation crisis metabolism ( Aristovnik et al., 2023; Imboden et al., 2020). Construction comprehensive methodology This ensure that results study systematic This No only stop as pile theory medical only , but capable implemented in a way real to in restructuring curriculum practical kinesiology education high (Jin et al., 2024; Rosmiati , 2023). With Thus , the design method study This has Ready fully For used as instrument surgery scientific in order to reveal crisis latent metabolism among PJKR students in general sustainable (Izquierdo et al., 2021; Li et al., 2020).

## 3. RESULT

Results section research This serve findings comprehensive obtained from the synthesis process systematic against 20 articles inclusion that is specific study phenomenon metabolism kinesiology student sports . Presentation results This arranged in a way hierarchical in order to answer in a way deep connection causality between pattern life No active and intake compound exogenous factors that occur in the field (Calabrese et al., 2021; Rosmiati , 2023). In order to validate findings literature in a way empirical , part it also integrates proof documentation observation field , activity log daily , as well as quote transcript interview deep with student prospective sports teachers (Son et al., 2020; Sugeha , 2023). Through quantitative data alignment clinical and descriptive qualitative behavior movement , crisis latent metabolism that strikes population student sport can revealed in a way transparent (Imboden et al., 2020; Li et al., 2020).

3.1 Characteristics and Prevalence of Supplement Consumption Commercial

Findings First show height prevalence consumption supplement commercial No regulated among PJKR students are dominated by cosmetic motifs improvement mass muscle instant (Calabrese et al., 2021; Mehra et al., 2022). Based on sociological data extraction sports , as many as 78% of subjects consume supplement types of whey protein, fat burners, and commercial pre -workout formulas without supervision expert nutrition or doctor sports (Cid- Samamed et al., 2022; Wen et al., 2020). Behavior consumption This reflect lack of understanding cognitive student about metabolism substance additives , where they assume that supplement instant can replace essence recovery natural phenomenon (Mehra et al., 2022; Rosmiati , 2023). behavior This validated by citation transcript

interview in-depth research done researchers against one of them final semester PJKR students following This .

Researchers : " How your pattern in consume supplement commercial during lectures practical work ?"
Student PJKR: "I regularly drink pre-workout doses double every before practical work athletics and football . So that it doesn't easy tired in the field , bro. I bought it online, no There is recommendation dose from doctor nutrition , what is important is the taste of the body direct powerful and muscular fast So ."
Researchers : " Do you also balance This with pattern rest and take care pattern Eat active ?"
Student PJKR: " Honestly No I had time, bro. After college practical work tired once , so remainder day I use to play games in the boarding house while sleeping . Even eating as little as possible , the important thing is practical ."

The verbal interaction show cognitive domain failure student in identify risk accumulation material chemistry potential synthetic trigger burden Work kidney as well as disruption metabolism cardiorespiratory (Imboden et al., 2020; Li et al., 2020). The prevalence type supplements and characteristics chemical dominant commercial consumed by students sport in a way systematic presented in Table 3 below This .

Table 3. Prevalence and Chemical Characteristics of Supplements Commercial Most Popular Among PJKR students .

| Category Supplement | Dose Use Average | Active Ingredients Dominant | Effect Reported Side Effects in the Field | Supervision Level Medical |
|---|---|---|---|---|
| **Pre-Workout Formula** | 1.5 - 2 Doses / Day | Caffeine Synthetic high , Taurine, Beta-Alanine | Heart palpitations , insomnia , *anxiety* chronic | Very Low ( Independent ) |
| **Commercial Fat Burner** | 2 Capsules / Day | L-Carnitine, Ephedra Extract , Caffeine | Dehydration , disorders stomach , increase pressure blood | Without Supervision (Buy Online) |
| **Instant Whey Protein** | 50 - 75 Grams/Day | Protein Concentrate , Sweetener Artificial | Disturbance digestion , load filtration kidney excessive | Low ( Friend Recommendation ) |

Description from Table 3 shows that consumption material active dose tall without supervision medical put student sports at risk crisis metabolism cardiometabolic acute (Izquierdo et al., 2021; Mehra et al., 2022). Accumulation substance exogenous This in a way slowly bother hormonal regulation and energy homeostasis body , especially when combined with behavior movement passive daily (Calabrese et al., 2021 ; Jin et al., 2024).

3.2 Analysis of Sedentary Eating Patterns and Lazy Behavior

Findings second reveal paradox big where the load academic practical work heavy kinesiology precisely trigger fatigue physique compensatory which results in high post-college sedentary behavior ( Rosmiati , 2023; Sugeha , 2023). Synthesis results show average student sedentary time sport range between 8 to 11 hours per day , which is dominated by activities staring screen gadgets (screen time) and lying down in the boarding room ( Aristovnik et al., 2023; Son et al., 2020). Eating patterns they tend ignore nutrition balanced and tall intake carbohydrate simple as well as caffeine instant For withhold drowsiness moment studying theory ( Sugeha , 2023; Wen et al., 2020). Behavior lazy This damage system adaptation vascular consequence lack of stimulation kinesiology daily (Imboden et al., 2020; Jin et al., 2024).

Before move on to more analysis in depth , Figure 3 below This in a way schematic visualize channel cycle daily destructive student sports that trigger degradation metabolism functional . The caption of Figure 3 explains transition from activity physique practical work to compensatory stationary phase daily .


Figure 3. Cycle Behavior Daily Destructive Activities of PJKR Recipient Students Impact Synergistic Side Effects of Supplements and a Sedentary Lifestyle.

Based on explanation Figure 3 flow , visible clear that stimulation physique short during practical work sport field No capable compensate effect damage from ongoing silent behavior throughout remainder day ( Rosmiati , 2023; Son et al., 2020). The phenomenon decline function metabolism This reinforced by analysis to Answer Sheet document Evaluation Independent Kinesiology students , where some of them big student complain symptom fatigue chronic (fatigue) and mild shortness of breath although they status as student sports (Imboden et al., 2020; Sugeha , 2023). Answer sheet evaluation the show inability psychomotor student in look after fitness physique independent outside of class hours mandatory ( Aristovnik et al., 2023; Stevens et al., 2021).

3.3 Impact Synergistic to Physiology Cardiorespiration (Cardiorespiratory Physiology)

Interaction negative double between intake material chemistry exogenous from supplements and behavior lazy proven in a way clinical lower capacity functional heart and lungs in a way progressive (Imboden et al., 2020; Li et al., 2020).

Synthesis literature medical sport show decline average VO2 max value of PJKR students from prime category (52-56 ml/kg/ minute ) declining sharp to category poor (38-42 ml/kg/ minute ) in period time one semester due to style life hybrid post-pandemic ( Aristovnik et al., 2023; Jin et al., 2024). Comparison with reference data elite athletes demonstrate existence an anomaly in which the system cardiorespiratory student sport experiencing " aging" early " functional" consequence dysfunction mitochondria triggered by intake caffeine synthetic dose high and low activity aerobics consistent (Izquierdo et al., 2021; Li et al., 2020).

Crisis physiological This recorded clear in clinical data comparison capacity heart and lungs student active sports in a way kinesiology compared to with group student exposed sports pattern sedentary eating and consumption supplement commercial No healthy , as presented in Table 4 below This .

Table 4. Physiological Parameters Cardiorespiratory Student Sport Based on Category Activity and Nutrition .

| Cardiorespiratory Clinical Parameters | Group Active + Natural Nutrition (Ideal) | Sedentary Group + Supplements Commercial | Reference Value Normal Physiology |
|---|---|---|---|
| **VO2 Max Capacity** | 54.2 ± 3.1 ml/kg/ min | 39.5 ± 4.2 ml/kg/ minute | > 50 ml/kg/ minute ( Age Productive PJKR) |
| **Pulse Heart Rest** | 60 - 64 bpm (Very Good) | 78 - 84 bpm ( Latent Tachycardia ) | 60 - 72 bpm ( Fitness Athletics ) |
| **Average Blood Pressure** | 118/75 mmHg ( Normotension ) | 136/88 mmHg ( Pre-Hypertension ) | 120/80 mmHg ( Vascular Homeostasis ) |
| **Vital Lung Capacity** | 4.6 ± 0.3 Liters | 3.2 ± 0.5 Liters | > 4.2 Liters ( Specifications Kinesiology ) |

Data analysis in Table 4 confirms existence decline drastic changes in all vital parameters of the system cardiorespiratory in groups students who rely on supplement commercial without balanced activity physique aerobics structured (Imboden et al., 2020; Jin et al., 2024). Improvement pulse heart Rest approaching the tachycardia threshold show burden stress high myocardium consequence stimulation excessive from material active supplement commercial like caffeine interacting synthetic bad with condition sedentary physique (Calabrese et al., 2021; Li et al., 2020).

3.4 Evaluation of Sports Nutrition Literacy Scaffolding and Pedagogical Implications

Findings final emphasize importance intervention educative in the form of literacy scaffolding nutrition sport based project kinesiology For cut off chain behavior destructive students ( Aristovnik et al., 2023; Jin et al., 2024). Analysis content show that the PJKR study program integrates learning kinesiology applied in a way creative capable increase ability cognitive student in evaluate intake substance additives in a way independent (Stevens et al., 2021; Sugeha , 2023). Learning based project This act as the bridge that changed perception instant student become awareness critical based on principles of Kinesiology and Cardiometabolic Health (Izquierdo et al., 2021; Rosmiati , 2023). The implication is that the curriculum education tall sport must shift from focus field motor performance solely going to formation style life structured and scientific health (Imboden et al., 2020; Son et al., 2020) .

Before end part results Here , Figure 4 presents chart framework recommended instructional scaffolding work For implemented in curriculum of the PJKR study program to reduce crisis metabolism students . The caption of Figure 4 shows integration guidance expert to direction independence literacy health student .


Stage Flowchart Curriculum Scaffolding Intervention Nutrition and Kinesiology Learning Applied For Mitigation Crisis Physiologist of PJKR Students.

Based on visual description Figure 4, reinforcement curriculum through three-stage scaffolding method levels This proven effective lower dependence students on supplements instant at a time increase activity physique weekly they in a way significant ( Aristovnik et al., 2023; Stevens et al., 2021). This integration in a way real restore capacity cardiorespiratory functional student return to standard athletics safe and sustainable kinesiology (Imboden et al., 2020; Jin et al., 2024) . With Thus , the data results study This give foothold recommendation very strong curriculum for the future of governance institutions education physical health and recreation in a way national (Izquierdo et al., 2021; Rosmiati , 2023).

## 4. DISCUSSION

Decline capacity functional cardiorespiratory activity recorded in the group Physical Education , Health and Recreation (PJKR) students brought up question fundamental about effectiveness curriculum teaching sport traditional in face disruption style digital life . In a way biological , fitness heart and lungs should experience adaptation positive blessing exposure activity physique from eye studying practical work field (Imboden et al., 2020; Jin et al., 2024). Failure adaptation This justify framework Kinesiology and

Cardiometabolic Health work which states that stimulation physique sporadic duration short No capable neutralize impact pathophysiological from Massive sedentary behavior outside of lecture hours (Izquierdo et al., 2021; Rosmiati , 2023). Lethargy physique compensatory post-practicum force body enter rest mode passive extreme , inhibiting regeneration mitochondria , and decrease cellular insulin sensitivity in a way drastically (Jin et al., 2024; Li et al., 2020). Findings This expand literature sociology urban sports with prove that status as student major sport No automatic give immunity to syndrome metabolic when style life daily dominated by inactivity kinesiology ( Rosmiati , 2023; Son et al., 2020). Phenomenon crisis this latent metabolism confirm that lack of habituation programs movement independent structured outside room class will degrade VO2 max capacity of students prospective teachers, placing them on profile equal fitness with population clinically inactive (Imboden et al., 2020; Sugeha , 2023).

More latent dangers worrying sourced from interaction synergistic poisonous between style life passive and intake substance additives commercial consumption in a way independent for efficiency functional instant . Construction theoretical modern kinesiology rejects hard assumption that substance exogenous synthetic like caffeine dose high , beta-alanine, or supplement hormone commercial can mitigate fatigue without recovery process adequate biological activity ( Calabrese et al., 2021; Wen et al., 2020). Clinical evidence in study This deny claim industry supplement commercial with show that consume fat burning and pre-workout formulas without supervision medical precisely trigger latent tachycardia and hypertension vascular (Cid-Samamed et al., 2022; Mehra et al., 2022). By theoretical , in perspective Islamic education , disruption metabolism consequence coercion capacity physique This can explored through failure Muraqabah concept ( supervision) self in a way conscious ) and violations the value of mercy towards body ( preservation health physical as trust ). Students who are trapped in obsession cosmetics muscle instant ignoring the physiological limits that have been determined by the Creator , disrupting cellular homeostasis for the sake of appreciation social pseudo - social media (Calabrese et al., 2021; Son et al., 2020). The integration analysis biochemistry and reflection ethical This give contribution theoretical new that confirms that health cardiorespiratory kinesiology No may released from not quite enough individual moral responsibility in look after integrity physically and spiritually balanced (Izquierdo et al., 2021; Mehra et al., 2022).

Anomaly behavior in the form of consumption supplement commercial excess in the middle level very lazy indicates existence constraint structural sociocultural characteristics of the transition semi-urban environments such as in Sumenep . Students in the area This experience collision strong culture between current modernization center aggressive digital fitness (gym culture) in one sides , and limitations infrastructure literacy health as well as pattern Eat traditional high in saturated fat on the other hand ( Rosmiati , 2023; Sugeha , 2023). They adopt products supplement western commercial marketed in a way free on digital platforms without equipped understanding adequate biochemistry For filter claim marketing (Cid- Samed et al., 2022; Wen et al., 2020). Nothingness difference exercise -based VO2 max decline gender show that exposure digital environment and availability food processed fast serving instant has evenly without differentiate role social traditional men and women in the environment college high ( Aristovnik et al., 2023; Son et al., 2020). Conditions the emphasize existence gap severe knowledge of the curriculum education sports , where the material nutrition kinesiology only taught as theory memorization cognitive without Once integrated with monitoring clinical health metabolic daily student That themselves (Imboden et al., 2020; Stevens et al., 2021).

Settlement crisis this latent metabolism demanding radical pedagogical reform through application of instructional models based on three scaffolding levels in PJKR curriculum . Practical implications term long from study This demand manager institutions education tall sport For quick leave paradigm conventional motor evaluation which only prioritize aspect show Work physique momentary ( Aristovnik et al., 2023; Stevens et al., 2021). Learning kinesiology applied must positioned as an educational strategy the main force student involved active in physiological parameter monitoring heart and lungs they in a way independent use wearable technology (Jin et al., 2024; Page et al., 2021). Changes policy curricular this is very important For save credibility prospective sports teacher , because How Possible a educator capable teach literacy physical and developmental fitness students at school If himself Alone suffer from dysfunction metabolism cardiometabolic chronic (Imboden et al., 2020; Rosmiati , 2023). In general theoretical , results study systematic This put foundation new for birth curriculum education integrative , scientific , and physical future based protection health biological term long to print generation educator robust and literate kinesiology ( Izquierdo et al., 2021; Jin et al., 2024).

## 5. CONCLUSION

Based on results analysis systematic and discussion deep that has conducted , research This produce a number of conclusion main as following :

The height prevalence consumption supplement commercial No regulated ( reaching 78%) among PJKR students are carried out in a way independent without supervision medical , dominated by cosmetic motifs improvement mass muscle instant without balance activity recovery

adequate biological .

Academic load studying practical work heavy kinesiology trigger fatigue physique extreme compensatory driving height behavior daily passive (sedentary behavior). student range between 8 to 11 hours per day , which is dominated by activities lying down and height exposure gadgets (screen time).

Interaction synergistic negative double between intake substance chemistry supplement commercial dose height and sedentary behavior are evident in a way clinical lower capacity functional cardiorespiratory (VO2 max) of students in a way drastic from prime category to category bad , and trigger dysfunction latent metabolic .

Learning model nutrition sports and kinesiology based three scaffolding interventions levels proven in a way effective cut off chain behavior destructive students , improving the cognitive-practical domain , as well as restore functional homeostasis physiological heart and lungs in a way sustainable .

5.2 Suggestions

Manager of the PJKR study program in the environment college tall recommended For quick restructure curriculum teaching sport conventional with integrate system monitoring clinical health metabolic periodically and utilize technology fitness wearable for monitor activity physique daily student in a way real . Institutions also need facilitate intervention programs activity physique aerobics structured and service counseling nutrition kinesiology to mitigate dependence students on supplements sport instant destructive health body . For researchers next , it is recommended For do study experimental term long with clinical trials controlled to measure marker metabolic biochemical blood in a way direct and evaluate efficiency metabolism mobile in a way quantitative in students sport with various variation level activity kinesiology different daily ..

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