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Vigorous Intermittent Lifestyle Physical Activity (VILPA) and Its Association with Cardiovascular Disease, Cancer and Premature Mortality Risk in Physically Inactive Adults: A Narrative Review

Dominik Tarczyński
ORCID: https://orcid.org/0009-0004-5307-0130
dominik.tarczynski02@gmail.com
Medical University of Lublin

Natalia Zięba
ORCID: https://orcid.org/0009-0005-4554-9536
natalia.zieba03@gmail.com
Medical University of Lublin

Mateusz Czech
ORCID: https://orcid.org/0009-0008-6980-6930
mateuszcz102@gmail.com
Medical University of Lublin

Miłosz Cisłak
ORCID: https://orcid.org/0009-0006-3999-6185
milosz.cislak@gmail.com
Medical University of Lublin

Michał Chojęta
ORCID: https://orcid.org/0009-0007-0911-971X
michalchojeta9@gmail.com
Medical University of Lublin

Jakub Czmok
ORCID: https://orcid.org/0009-0006-0869-9305
Kubel2003@gmail.com
Medical University of Lublin

Dominika Ciesielska
ORCID: https://orcid.org/0009-0007-8548-1112
dciesielska600@gmail.com
Medical University of Lublin

Anna Mazur
ORCID: https://orcid.org/0009-0001-2568-0781
mazurania2801@gmail.com
Medical University of Lublin

Mikołaj Brzusek
ORCID: https://orcid.org/0009-0005-6266-6988
mrib3002@gmail.com
Medical University of Lublin

Katarzyna Kociuba
ORCID: https://orcid.org/0009-0003-1265-2452
katarzyna.kociuba1115@gmail.com
Medical University of Lublin

Wiktoria Biskup
ORCID: https://orcid.org/0009-0000-6500-0915
wik.b2001@gmail.com
Medical University of Lublin

Corresponding Author: Dominik Tarczyński, dominik.tarczynski02@gmail.com

Abstract

Background

Vigorous intermittent lifestyle physical activity (VILPA) consists of very short bouts of vigorous effort embedded in daily routines and may be a feasible way to increase activity in adults who do not exercise.

Aim

This narrative review summarizes evidence linking VILPA with mortality, cardiovascular outcomes, and cancer incidence in physically inactive adults, and discusses mechanisms, implementation, and limitations.

Materials and methods

A non-systematic search of PubMed, Scopus, and Google Scholar identified studies published in 2020-2026 on VILPA, short vigorous bouts, exercise snacks, stair climbing, and interruptions of prolonged sitting.

Results

Accelerometer-based cohort studies indicate that brief daily VILPA is associated with lower all-cause, cardiovascular, and cancer mortality, lower risk of major adverse cardiovascular events, and lower cancer incidence in non-exercising adults. Indirect evidence from exercise snacks and sitting-interruption studies supports biological plausibility through favorable effects on cardiorespiratory fitness, glycemic control, insulinemia, postprandial metabolism, and vascular responses.

Conclusions

VILPA may be a simple, low-cost, and realistic entry point to increase physical activity in inactive adults, but it should complement rather than replace standard physical activity recommendations. Further intervention studies are needed to establish causality, safety, optimal dose, and long-term effectiveness.

Key words: VILPA; vigorous intermittent lifestyle physical activity; exercise snacks; physical activity; sedentary behavior; cardiovascular disease; cancer; mortality; accelerometry

1. Introduction

Chronic disease risk reduction requires not only knowledge of the health relevance of physical activity, but also strategies that can be realistically implemented by individuals who have not previously exercised [1, 2]. VILPA proposes a shift in perspective: rather than starting with formal exercise training, it uses short bouts of vigorous effort that occur during ordinary daily situations [1-3].

This concept is particularly relevant for physically inactive adults, because barriers related to time, motivation, lack of equipment, and low self-efficacy often limit participation in conventional exercise programs [4-6]. In qualitative studies, inactive individuals described VILPA as a more

attainable approach than planned exercise, especially when activity could be linked to everyday responsibilities [5, 6].

The relevance of VILPA has increased with the development of wearable devices, which enable more accurate measurement of short and dispersed movement bouts than traditional questionnaires [1, 7, 8]. Accelerometry has made it possible to demonstrate that short bouts of vigorous physical activity in daily life may be associated with lower risk of death, cardiovascular events, and cancer incidence [1, 9-11].

The following sections discuss the definition of VILPA, direct epidemiological evidence, indirect mechanistic evidence from related short-bout activity models, practical aspects of implementation, and limitations of the current evidence among physically inactive adults [1, 2, 12, 13].

2. Definition and measurement of VILPA

Vigorous Intermittent Lifestyle Physical Activity refers to short bouts of activity performed at vigorous intensity, not as exercise training, but as part of daily activities such as fast stair climbing, brisk walking, or carrying heavier objects [1-3]. The empirical foundations of the VILPA definition are based on analyses of the time required to elicit physiological and perceived exertional responses corresponding to vigorous intensity during activities of daily living [3].

Unlike planned physical exercise, VILPA does not require special clothing, infrastructure, or dedicated time; therefore, it may be particularly attractive for individuals who do not identify themselves as exercisers [2, 4, 5]. Research on the MovSnax application indicates that messages promoting short and specific activity bouts can be delivered in the user's everyday environment [4].

In cohort studies, VILPA is measured mainly using wrist-worn accelerometry, which allows researchers to identify short bouts of vigorous activity that cannot be reliably reconstructed through self-report [1, 7, 11]. At the same time, interpretation of wearable device data requires caution, because accelerometers quantify movement intensity and duration but do not always identify the exact context in which the activity is performed [3, 7, 8].

More broadly, wearable-based studies show that physical activity intensity may have independent health relevance, and that different movement patterns can be compared in terms of their associations with mortality, cardiometabolic disease, and cancer [7, 8].

3. Direct evidence on VILPA

3.1. VILPA and mortality

The most important study on VILPA and mortality is the UK Biobank analysis, in which short activity bouts measured by wearable devices were associated with lower risk of all-cause, cardiovascular, and cancer mortality among non-exercising adults [1]. These findings are relevant to public health because associations were observed at very small daily doses of activity, which corresponds to the character of a minimalist strategy [1, 2].

The external validity of these observations is strengthened by a US wearable-based cohort, in which VILPA was also associated with lower mortality risk among adults [14]. Replication in a distinct population is important because it reduces the likelihood that the observations are attributable only to the specificity of a single database or a single measurement algorithm [1, 7, 14].

Nevertheless, it should be emphasized that most mortality data come from observational studies and therefore do not definitively establish causality [1, 2, 14]. The reported associations may partly reflect unmeasured differences in health status, functional capacity, or broader health behaviors between individuals who can and cannot perform short vigorous bouts in daily life.

3.2. VILPA and cardiovascular outcomes

With regard to cardiovascular outcomes, a study on major adverse cardiovascular events is particularly important, because VILPA was associated with lower MACE risk and the analysis suggested possible sex-related differences [10]. These findings are consistent with a prospective study on short bouts of incidental physical activity, in which higher intensity of brief bouts was associated with lower risk of MACE and mortality among people who did not exercise [11].

The potential relevance of VILPA to cardiovascular risk may also be related to the possibility of partially attenuating adverse associations of sedentary behavior with cardiometabolic outcomes [16]. Koemel et al. examined whether incidental physical activity could offset the deleterious associations of sedentary behavior with MACE, thereby linking brief daily activity with the problem of prolonged sitting [16].

Current cardiovascular findings should therefore be interpreted as evidence of association rather than proof that VILPA directly prevents cardiovascular disease. Their value lies in identifying a

potentially feasible pattern of activity that may be relevant for people who are not engaged in structured exercise.

3.3. VILPA and cancer incidence

The most important oncological source is the UK Biobank study published in JAMA Oncology, in which VILPA was inversely associated with cancer incidence among adults who did not engage in regular exercise [9]. The significance of this finding lies in the fact that the analyzed activity was not formal exercise but part of everyday functioning, which increases the potential population relevance of this activity pattern [2, 9].

The mechanisms linking short bouts of vigorous movement with lower cancer risk remain indirect, but may include improved body weight regulation, insulin sensitivity, cardiorespiratory fitness, and the overall cardiometabolic profile [12, 13, 21, 22]. Broad analyses of wearable device-measured activity indicate that movement intensity may be relevant to the risk of chronic diseases, including cancer, even when the total volume of activity is limited [7, 8].

Current oncological data should be interpreted with caution because they are derived mainly from observational analyses and may be affected by residual health-related, social, and behavioral confounding [2, 8, 9]. Nevertheless, the direction of the findings is consistent with the broader literature on physical activity intensity, sedentary behavior, and chronic disease risk [7, 12, 13, 17].

Table 1. Summary of selected studies included in the review.

Study	Evidence type	Design/population	Main focus	Main contribution
Stamatakis et al. [1]	Direct VILPA	UK Biobank cohort, non-exercising adults	Mortality	VILPA associated with lower all-cause, CVD and cancer mortality
Stamatakis et al. [9]	Direct VILPA	UK Biobank accelerometry study	Cancer incidence	VILPA associated with lower cancer incidence in non-exercising adults
Stamatakis et al. [10]	Direct VILPA	Accelerometry-based cohort analysis	MACE	Association between VILPA and lower cardiovascular event risk; sex differences considered
Koemel et al. [14]	Direct VILPA	US wearables-based cohort	Mortality	External confirmation of lower mortality risk associated with VILPA
Ahmadi et al. [3]	Definition/measurement	Physiological/exertional assessment	Definition	Empirical basis for identifying vigorous

Study	Evidence type	Design/population	Main focus	Main contribution
				responses in daily living activities
Thogersen-Ntoumani et al. [4, 5]	Implementation	App evaluation and focus groups	Behavioral implementation	Barriers, enablers and digital promotion of VILPA
Pang et al. [6, 23, 24]	Implementation	Pilot RCT and qualitative implementation studies	Retirement transition	Feasibility and stakeholder views on VILPA interventions
Gillen/Rafiei/Caldwell et al. [18-20]	Indirect/mechanistic	Experimental studies	Mechanisms	Metabolic and vascular effects of breaking up sitting and stair-climbing snacks

Source: Own elaboration based on references [1, 3-6, 9, 10, 14, 18-20, 23, 24].

4. Indirect and mechanistic evidence from related short-bout activity models

The studies discussed in this section should be treated as indirect evidence. They do not always examine VILPA in the strict sense, because many involve structured exercise snacks, stair-climbing protocols, or planned interruptions of prolonged sitting. However, they are useful for assessing biological plausibility, because they test short bouts of activity that resemble the intensity or duration of VILPA.

4.1. Exercise snacks and cardiometabolic effects

Studies on exercise snacks suggest that short bouts of exercise can improve selected cardiometabolic health parameters [12, 13, 22, 25]. An intervention interrupting prolonged sitting with exercise snacks in adults with obesity affected body composition and plasma metabolomics, suggesting a broader metabolic impact than a transient increase in energy expenditure alone [21].

Interrupting sitting with short walks or repeated chair stands reduced postprandial insulinemia in healthy adults, which may be relevant to the development of insulin resistance [18]. Short bouts of stair climbing used as exercise snacks induced beneficial metabolic effects after prolonged sitting, which corresponds to some everyday forms of VILPA but remains a structured experimental model [19].

The randomized trial by Yin et al. indicated that exercise snacks may be a time-efficient alternative to moderate-intensity continuous training for improving cardiorespiratory fitness in physically inactive adults [26]. The meta-analysis by Rodriguez et al. suggests that exercise snacks improve

physical fitness and selected cardiometabolic health parameters in inactive individuals, although the magnitude of effects depends on the protocol and population [22].

4.2. Breaking up prolonged sitting and vascular responses

Sedentary behavior is an important context for interpreting VILPA because many short bouts of vigorous activity occur as interruptions to prolonged sitting or low activity [16, 17]. The review and meta-analysis by Loh et al. showed that interrupting prolonged sitting with physical activity has favorable effects on glucose, insulin, and triacylglycerols, providing mechanistic support for short movement-break strategies [17].

The potential vascular component arises from the fact that short bouts of more intense effort may increase blood flow and shear stimuli acting on the endothelium [20]. In the study by Caldwell et al., hourly stair sprints improved femoral artery shear patterns, which may be one mechanism linking brief movement stimuli with cardiovascular risk markers, although not all endothelial function indicators improved [20].

In practice, VILPA may therefore be relevant because it can increase the intensity of daily activity, interrupt sitting time, and modify acute postprandial metabolic responses [11, 16-19]. This interpretation remains cautious because mechanistic studies often use protocols that are more structured than spontaneous daily-life VILPA.

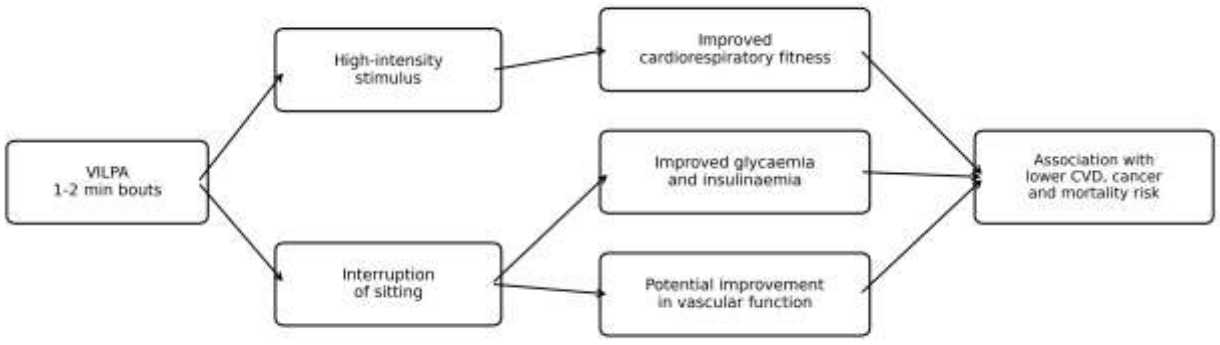

Figure 1. Conceptual model of possible pathways linking VILPA with health-related outcomes. Own elaboration based on references [1, 2, 13, 17-21, 24].

5. Practical implementation and behavioral aspects

Implementation of VILPA requires simple messages, because the concept of intensity may be unclear or discouraging for inactive individuals [5, 6]. The focus group study by Thogersen-Ntoumani et al. showed that barriers include low self-confidence, safety concerns, and difficulty recognizing when activity is sufficiently intense [5].

At the same time, participants in qualitative studies indicated that VILPA may be acceptable if it is brief, specific, flexible, and linked to daily responsibilities [5, 6]. The perspective of adults transitioning into retirement showed that this group may perceive VILPA as a way to maintain physical function without the need to engage in a formal exercise program [6].

The MovSnax application is an example of a digital attempt to promote VILPA through short activity suggestions adapted to everyday life [4]. Studies by Pang et al. emphasized the importance of refining interventions in collaboration with stakeholders and testing them in a pilot randomized trial among adults transitioning into retirement [23, 24].

Practical recommendations should be based on concrete examples, such as fast stair climbing, accelerating walking over a short distance, carrying shopping energetically, or performing household tasks dynamically [3-5]. In older adults, individuals with chronic diseases, cardiac symptoms, or an increased risk of falls, VILPA should be implemented gradually and preceded by safety assessment, because VILPA-specific interventions remain limited [6, 23, 24].

6. Limitations and future directions

6.1. Limitations of this narrative review

This article is a narrative review, not a systematic review. Therefore, it was not based on a registered protocol, did not follow a full PRISMA procedure, and did not include a formal risk-of-bias assessment or quantitative synthesis. The selection of studies was guided by relevance to VILPA and closely related short-bout activity models, which may introduce selection bias.

The search was limited to PubMed, Scopus, and Google Scholar, and only publications from 2020 to 2026 were considered. Although preference was given to freely available full texts, the review may not include all relevant unpublished, non-English, or less accessible studies. Consequently, the conclusions should be interpreted as a structured narrative synthesis rather than a definitive estimate of effect.

6.2. Limitations of the included evidence

The main limitation of the current literature is the predominance of observational studies, which can demonstrate associations between VILPA and health outcomes but cannot prove causality [1, 9-11, 14]. Residual confounding is possible, because individuals capable of performing short bouts of vigorous activity may differ from completely inactive individuals in health status, functional capacity, environment, and health behaviors [1, 2, 9].

A second limitation is the shortage of long-term randomized VILPA intervention trials with clinical endpoints [2, 23]. Available interventional studies more often concern exercise snacks, stair climbing, or interruptions to sitting than VILPA in the strict sense, and therefore provide important but indirect mechanistic support [17-22, 26].

A third issue is dose standardization, because the minimum number of bouts, duration, and intensity of VILPA that are optimal for different age, sex, and clinical risk groups remain unknown [2, 3, 10]. Future studies should compare different implementation models, address safety in individuals with chronic diseases, and assess whether effects can be sustained over months and years [4, 6, 23, 24].

Further research should also combine accelerometry with clinical data, biomarkers, and assessment of activity context, because information about movement intensity alone does not fully explain mechanisms or practical conditions for implementation [3, 7, 8]. An important future direction is the development of digital tools that not only measure activity but also help identify opportunities for short bouts of effort in real time [4, 24].

7. Discussion

The accumulated evidence indicates that VILPA may be one of the most practical ways to increase activity among people who do not engage in regular exercise [1, 2, 4, 5]. Its strength lies in combining a minimal entry threshold with the potentially substantial health relevance of short bouts of vigorous effort [1, 9-11].

The most convincing direct findings concern mortality, cancer incidence, and cardiovascular events, because they were obtained in large cohorts with objective activity measurement [1, 9-11, 14]. Indirect evidence from exercise snacks, stair-climbing protocols, and sitting-interruption

studies complements this picture by showing possible mechanisms involving improvements in fitness, glucose metabolism, insulinemia, and vascular responses [12, 17-22, 25, 26].

However, VILPA should not be presented as a complete substitute for traditional physical activity recommendations, but rather as a realistic starting point for individuals who are not ready for regular exercise training [2, 4, 5]. This interpretation is consistent with implementation studies, in which the acceptability of VILPA depended on simplicity, flexibility, safety, and the possibility of embedding activity into the daily rhythm [4-6, 23, 24].

From a public health perspective, VILPA may complement traditional recommendations because it does not require sports infrastructure or substantial financial resources [1, 2]. It seems most justified to describe it as a strategy of "starting with short vigorous movement", particularly in populations with low activity levels, high sitting time, and limited readiness for formal exercise [5, 6, 16].

8. Conclusions

VILPA may represent a promising and practical approach for increasing physical activity because it uses short bouts of vigorous activity performed in daily life without the need to plan exercise training. Cohort data indicate an association between VILPA and lower risk of mortality, cardiovascular events, and cancer incidence among non-exercising adults.

Mechanistic support for this concept comes mainly from indirect studies on exercise snacks, stair climbing, and sitting interruptions, which show favorable effects of short activity stimuli on fitness, glycemic control, insulinemia, and selected vascular responses. The current state of evidence supports considering VILPA as a realistic first step toward increasing physical activity, but not as a complete replacement for standard movement recommendations.

Further studies should determine the optimal dose, safety, long-term effectiveness, and best implementation models of VILPA in populations differing in age, health status, and clinical risk.

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Author's Contribution Statement

Conceptualization: Dominik Tarczyński, Mateusz Czech
Methodology: Anna Mazur, Dominika Ciesielska
Software: Not applicable
Check: Jakub Czmok
Investigation: Jakub Czmok, Katarzyna Kociuba
Sources: Dominik Tarczyński, Natalia Zięba
Data curation: Wiktoria Biskup
Formal analysis: Michał Chojęta, Mikołaj Brzusek, Miłosz Cisłek
Supervision: Dominik Tarczyński
Writing -rough preparation: Mikołaj Brzusek, Dominik Tarczyński, Wiktoria Biskup
Writing -review and editing: Miłosz Cisłek, Katarzyna Kociuba
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