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Housework-based exercise versus conventional exercise on health-related fitness of adolescent learners

Jem Cloyd M. Tanucan[1ABCDE], Marino A. Garcia[2ABCD], Marlon T. Bojos[3ABCD]

[1, 3]*College of Teacher Education, Cebu Normal University, Philippines*
[2]*College of Arts and Sciences, Cebu Normal University, Philippines*

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Abstract

Background and Study Aim: There is a void in the literature comparing the fitness effects of housework-based exercise (HBE) and conventional exercise (CE), including studies that adapt housework into an exercise program. This study examines the effectiveness of HBE and CE on adolescent learners' health-related fitness (HRF) and compares the effectiveness of the two exercises.

Material and Methods: This study uses a parallel-group, randomized controlled trial with 120 adolescent learners; 60 are in the HBE group, and 60 are in the CE group. The participants in the HBE group exercised using housework activities, while the participants in the CE group exercised by doing push and pull, squats, lunges, leaps and jumps, planks, etc. The participants in both groups trained for at least an hour every weekday for 12 weeks under the supervision of qualified fitness instructors.

Results: The findings show that HBE improves the fitness levels of adolescent learners, albeit it has no significant improvement in their BMI. Furthermore, HBE significantly improves the cardiorespiratory fitness of females more than males. Finally, CE outperforms the HBE in producing more significant and favorable fitness effects.

Conclusions: When planned, implemented, and monitored carefully as an exercise program, doing housework is just as good as doing traditional exercise for keeping or improving adolescent learners' fitness. Furthermore, the findings indicate that HBE may be more appropriate for females because it involves household-related tasks that they traditionally perform.However, CE produces more positive and significant fitness effects. Thus, teachers can use HBE in the remote exercise activities of their learners along with CE.

Keywords: adolescent, conventional exercise, fitness, housework-based exercise, randomized controlled trial

Introduction

Since 2012, physical inactivity has been viewed as a pandemic [1], with 28% of the world's population, or around 1.4 billion people, remaining inactive [2]. Physical inactivity is rising, particularly among adolescents [3, 4, 5, 6]. Along with the rise of sedentary behavior [7], this problem has become a significant risk factor for noncommunicable diseases [8, 9, 10], and it is responsible for 9% of premature deaths, chronic disability, and a significant economic burden. Before the COVID-19 pandemic [2, 11, 12] reported that 1 in 3 adults and 3 in 4 adolescents worldwide did not meet the guidelines for physical activity. This figure appears to have gotten worse with the pandemic, following the closure of several businesses and schools as well as the strict implementation of social isolation measures at home [13, 14]. Many studies have shown that sedentary habits or a reduction in physical activity can impact a person's overall fitness level, including the reduction of muscular strength, agility, and flexibility, poor cardiorespiratory endurance, and body composition [15, 16,17]. Hence, it is crucial to take action to remain active and continue to enhance personal fitness and health despite being isolated at home.

For people to remain active, engaging in various movement practices is crucial [18]. It needs a solid personal decision and deliberate action to be active and healthy. There are limitless ways to be physically active. To avoid confusion about what physical activities to do, a person can choose between active participation in conventional exercises (CE) and more participation in daily physical activities like housework-based exercises (HBE) or household activities. By "conventional exercises", it means the basic exercise movements of push and pull, squats, lunges, leaps and jumps, planks, etcetera, done through body weight management or exercise equipment. CE has many benefits, and some of them improve health-related fitness (HRF) factors like body mass index (BMI), cardiovascular endurance, flexibility, and muscular strength and endurance [19, 20, 21, 22, 23]. CE also lowers the risk of heart disease, helps control blood sugar and insulin, helps people stop smoking, improves mental health and mood, and sharpens skills like thinking, learning, and making decisions [24]. Other researchers have said that it increases walking speed, gait, and physical activity while reducing pain, improving

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range of motion and connective tissue flexibility, and reducing functional restrictions [25].

On the other hand, to encourage individuals to have at least some physical activity, the focus has changed from structured forms of exercise to lifestyle activities that may be incorporated into one's typical daily routines [26]. Cleaning the floor, cleaning windows, doors, and walls, moving furniture, getting water, doing laundry, washing dishes, climbing stairs, and other household activities all require physical effort; hence, calorie burn from these movements adds up. According to [27], non-exercise activity thermogenesis, or the energy expenditure from activities other than structured sports and exercises, can add up to 2000 kcal of extra energy consumed over the basal metabolic rate. Likewise, [28] found that lifestyle activities, like taking the stairs, when done actively, may have a similar impact on various health outcomes to sustained, structured exercise. This idea suggests that if planned, implemented, and monitored carefully as an exercise program, doing housework is just as good as doing traditional exercise for keeping or improving fitness. It is interesting to research the subject of HBE's fitness advantages because previous studies have found that these activities, as well as work and transportation activities, have only marginal health advantages compared to CE [29, 30]. However, most of these studies did not conduct an intervention approach that compared the two exercises, making it difficult to establish causality and comparability. Additionally, while there are studies linking housework activities to certain aspects of fitness [29, 31, 32] and a small number of studies associating housework exercises with psychological variables [33], there is a void in the literature that adapts housework into an exercise program for fitness. Furthermore, it is essential to stay active by engaging in HBE since it is inexpensive, reasonably safe, and widely accepted by the general public.

Regular physical activity is essential for maintaining health during quarantine [34, 35]. The house served as the hub of activities during this pandemic [36], and the researchers believe that people must exercise, whether conventionally or housework-based. In addition, the pandemic offers either threats or opportunities to people. Taking it as a threat would escalate physical inactivity and psychological distress [37], worsening the already ill-fated situations of many. Using it as an opportunity would lead to new ways of doing things and, more importantly, would get more people moving, especially adolescents whose physical activity is affected by excessive Internet gaming [38] and social media use [39]. When HBE is coupled with a must-take academic subject like physical education (PE), there is still an opportunity to remain physically active. As the remote learning of PE takes place, learners can take advantage of this, especially since it has learning tasks and assignments that the curriculum framers and teachers carefully design to keep them active while staying at home [40, 41]. These include using CE and HBE as part of learners' performance tasks. However, one can wonder if HBE and CE give the same or different fitness benefits when both are structured, conducted, and monitored carefully.

Purpose of the Study. This study examined the effectiveness of HBE and CE on adolescent learners' health-related fitness (HRF) and compared the effectiveness of the two exercises. The results of this undertaking can provide empirical support for PE learning resource decision-making and put HBE as one of the deliberate interventions in the teaching-learning process for PE subjects.

Materials and Methods

Participants.

The selected population sample underwent several screening procedures to ensure the health and safety of the study. The first screening was based on age (a minimum of 18 years old and a maximum of 19) to ensure that the exercise training program would be developmentally appropriate. The second screening dealt with health and comorbidity status, as those with health or medical-related concerns were excluded. The third screening involved assessing exercise readiness using the Physical Activity Readiness Questionnaire. 170 participants were initially screened, with 45 excluded based on the criteria and five declining their participation due to personal concerns. Overall, the screening procedures resulted in 120 fit and healthy participants in the study, and they were randomly assigned into two groups; the experimental group (HBE) (n=60: male = 30; female = 30) and the control group (CE) (n=60: male = 30; female = 30). The randomization was done at a 1:1 ratio using an online software research randomizer.

Research Design.

This parallel-group, randomized controlled trial examined the effectiveness of HBE and CE on adolescent learners' health-related fitness (HRF) and compared the effectiveness of the two exercises. The intervention began in January 2022 and ended in July 2022. The first two months were allocated for the approval of consent forms, the conduct of orientation, and the start of physical conditioning of the participants. The subsequent months were devoted to the conduct and monitoring of the study's intervention as well as the analysis of results. Accordingly, the study's exercise trainers, research assistants, and participants were blinded to the study's hypothesis. The participants in the HBE group conducted their exercises using housework activities. On the other hand, the participants in

the CE group did basic exercises like push-ups, pull-ups, squats, lunges, leaps and jumps, and planks. Participants in both groups work out for at least an hour each weekday for 12 weeks under the supervision of qualified fitness instructors.

Measurement and Implementation Procedures. The Department of Education's Revised Fitness Test Manual [42] was utilized to examine the participants' HRF. This document is a national guide for all Filipino teachers who give physical fitness tests to their students [43]. It instructs teachers on conducting, monitoring, and understanding the results of different fitness tests. The Department of Education has constantly been monitoring and reviewing the manual; hence, the results and interpretations are consistent with the national standard for physical fitness.

Monitoring Procedures for Exercise Program Adherence. At least two methods were used to monitor participants' adherence to the exercise programs: (1) requiring the participants to complete a daily training log detailing the completion and proper execution of the exercise; at the end of the log, both the participants and their parents or guardians were required to affix their signature to confirm the accuracy of the remarks made therein; and (2) participants were required to submit unedited and uncut video recordings of their exercise once a week for the monitoring of researchers and fitness instructors. All participants faithfully adhered to the monitoring mechanisms, as indicated by their regular and 100% submissions of their daily training log and video recordings. There was no incidence of injury reported in the study.

Statistical Analysis.

Microsoft Excel was used to encode, analyze, and store all the data. The significant difference between the pre-test and post-test mean scores of each training program was examined using the t-test for paired samples. The mean gain scores of the two training programs were also analyzed using the t-test for independent samples. Cohen's d was used to measure the t-test effect size with the following interpretation: .2 small, .5 medium, and .8 large [44, 45]. The threshold for statistical significance was set at $p < 0.01$.

Results

The baseline HRF components of the participants were examined, and no significant differences were found between the HBE and CE groups, regardless of gender (Table 1). Additionally, it can be inferred from the mean scores of the HBE and CE groups that the participants in both groups either have a normal, good, or average level of fitness in all HRF components [42].

On the other hand, the findings in Table 2 show the effects of the CE on the HRF of participants. The male and female groups significantly improved all HRF components, as can be gleaned from the increase in mean scores from pre-test to post-test, significant p-value scores, and large effect sizes.

Another notable finding is reported in Table 3,

Table 1. Significant difference of the Pre-test scores of participants (male vs. male, female vs. female) in the HBE and CE groups

HRF components	Groups	HBE		CE		t	P	Remarks
		Mean	SD	Mean	SD			
Body Mass Index (BMI)	Male	22.46	0.85	22.39	0.74	0.34	0.74	Not sig
	Female	22.46	0.75	22.88	0.72	-2.16	0.03	Not sig
Cardiovascular Endurance	Male	85.23	1.70	84.47	2.10	1.56	0.12	Not sig
	Female	85.90	1.03	85.97	0.85	-0.27	0.79	Not sig
Flexibility of the Left Arm	Male	2.26	0.20	2.18	0.17	1.67	0.10	Not sig
	Female	2.23	0.16	2.14	0.18	2.04	0.05	Not sig
Flexibility of the Right Arm	Male	2.28	0.24	2.20	0.15	1.41	0.16	Not sig
	Female	2.23	0.25	2.25	0.30	-0.23	0.82	Not sig
Flexibility of the Left Leg	Male	32.20	1.06	31.57	1.50	1.89	0.06	Not sig
	Female	32.40	1.57	32.97	1.40	-1.48	0.15	Not sig
Flexibility of the Right Leg	Male	33.37	1.67	32.50	2.08	1.78	0.08	Not sig
	Female	32.80	2.09	33.47	1.41	-1.45	0.15	Not sig
Muscle Strength and Endurance of the Arms	Male	18.30	0.84	18.13	0.63	0.87	0.39	Not sig
	Female	17.97	0.72	17.90	0.71	0.36	0.72	Not sig
Muscle Strength and Endurance of the Core	Male	32.50	1.38	31.83	0.65	2.46	0.02	Not sig
	Female	31.70	1.06	32.03	0.93	-1.30	0.20	Not sig

α=0.01

Table 2. Significant difference of the Pre- test and post-test scores of participants (male vs. male, female vs. female) in the CE group

HRF Components	Pre-test		Post-test		Paired t test			
	Mean	SD	Mean	SD	t	P	Cohen's d	Remarks
Males (N = 30)								
BMI	22.39	0.74	21.51	1.03	4.27	<.01	0.98	Sig
Cardiovascular Endurance	84.47	2.10	81.50	1.11	7.32	<.01	1.77	Sig
Flexibility of the Left Arm	2.18	0.17	2.83	0.26	-11.21	<.01	2.96	Sig
Flexibility of the Right Arm	2.20	0.15	2.87	0.29	-13.34	<.01	2.91	Sig
Flexibility of the Left Leg	31.57	1.50	37.30	2.78	-14.10	<.01	2.53	Sig
Flexibility of the Right Leg	32.50	2.08	37.70	2.78	-10.72	<.01	2.10	Sig
Muscle Strength and Endurance of the Arms	18.13	0.63	23.43	3.95	-7.00	<.01	1.86	Sig
Muscle Strength and Endurance of the Core	31.83	0.65	36.80	3.52	-7.28	<.01	1.93	Sig
Females (N = 30)								
BMI	22.88	0.72	21.30	0.80	9.72	<.01	2.08	Sig
Cardiovascular Endurance	85.97	0.85	82.10	1.90	10.10	<.01	2.63	Sig
Flexibility of the Left Arm	2.14	0.18	2.79	0.32	-9.09	<.01	2.50	Sig
Flexibility of the Right Arm	2.25	0.30	2.80	0.30	-8.45	<.01	1.83	Sig
Flexibility of the Left Leg	32.97	1.40	37.07	2.53	-6.69	<.01	2.01	Sig
Flexibility of the Right Leg	33.47	1.41	37.67	3.79	-4.88	<.01	1.47	Sig
Muscle Strength and Endurance of the Arms	17.90	0.71	24.60	2.85	-13.38	<.01	3.23	Sig
Muscle Strength and Endurance of the Core	32.03	0.93	36.70	3.64	-6.74	<.01	1.76	Sig

α=0.01

which shows the effects of the HBE on the HRF of participants. The most significant improvements in male HRF components are: flexibility of the left arm (from M = 2.26, SD = 0.20 to M = 2.48, SD = 0.17) with significant p-value and large effect size (p = <.01, Cohen's d =1.19); flexibility of the right arm (from M = 2.28, SD = 0.24 to M = 2.46, SD = 0.21) with significant p-value and large effect size (p = <.01, Cohen's d =0.80); muscle strength and endurance of the arms (from M = 18.30, SD = 0.84 to M = 20.77, SD = 2.94) with significant p-value and large effect size (p = <.01, Cohen's d =1.14); and muscle strength and endurance of the core (from M = 32.50, SD =1.38 to M = 33.27, SD = 1.72) with significant p-value and medium effect size (p = <.01, Cohen's d =0.5). The rest of the components have improved, albeit not significantly, as can be gleaned from the increase in mean scores from pre-test to post-test.

For females, all seven HRF components have improved (cardiovascular endurance, flexibility of the left arm, flexibility of the right arm, flexibility of the left leg, flexibility of the right leg, muscle strength and endurance of the arms, and muscle strength and endurance of the core) as can be gleaned from the mean scores from pre-test to post-test, as well as the p-value and effect size scores. The BMI score has improved from (M = 22.46, SD = 0.75) to (M = 22.35, SD = 0.80); albeit insignificant (p = 0.05, Cohen's d = 0.14).

Finally, Table 4 shows participants' significant mean gain differences (male vs. male, female vs. female) in the HBE and CE groups.

The CE program outperformed the HBE program, as observed in its higher mean gain scores in all HRF components. In particular, the males in CE showed the following positive improvements: cardiovascular endurance (M = -2.97, SD = 2.22) than HBE (M= -0.23, SD=0.73) with significant p-value and large effect size (p = <.01, Cohen's d =1.66); flexibility of the left arm (M = 0.65, SD = 0.32) than HBE (M =0.22, SD=0.25) with significant p-value and large effect size (p = <.01, Cohen's d =1.50); flexibility of the right arm (M=0.66, SD=0.27) than HBE (M=0.18, SD=0.26) with significant p-value and large effect size (p = <.01, Cohen's d =1.81); flexibility of the left leg (M=5.73, SD=2.23) than HBE (M=1.10, SD=2.37) with significant p-value and large effect size (p = <.01, Cohen's d =2.01); flexibility of the right leg (M=5.20, SD=2.66) than HBE (M=1.50, SD=3.08) with significant p-value and large effect size (p = <.01, Cohen's d =2.01); muscle strength and endurance of the arms (M=5.30, SD=4.15) than HBE (M=2.47,

Table 3. Significant difference of the Pre- test and post-test scores of participants (male vs. male, female vs. female) in the HBE group

HRF Components	Pre-test		Post-test		Paired t test			
	Mean	SD	Mean	SD	t	p	Cohen's d	Remarks
Males (N = 30)								
BMI	22.46	0.85	22.05	0.80	1.99	0.06	0.50	Not sig
Cardiovascular Endurance	85.23	1.70	85.00	1.53	1.76	0.09	0.14	Not sig
Flexibility of the Left Arm	2.26	0.20	2.48	0.17	-4.86	<.01	1.19	Sig
Flexibility of the Right Arm	2.28	0.24	2.46	0.21	-3.86	<.01	0.80	Sig
Flexibility of the Left Leg	32.20	1.06	33.30	2.37	-2.54	0.02	0.60	Not sig
Flexibility of the Right Leg	33.37	1.67	34.87	2.67	-2.67	>.01	0.67	Not sig
Muscle Strength and Endurance of the Arms	18.30	0.84	20.77	2.94	-4.37	<.01	1.14	Sig
Muscle Strength and Endurance of the Core	32.50	1.38	33.27	1.72	-2.89	<.01	0.50	Sig
Females (N = 30)								
BMI	22.46	0.75	22.35	0.80	2.06	0.05	0.14	Not sig
Cardiovascular Endurance	85.90	1.03	84.50	1.46	3.63	<.01	1.11	Sig
Flexibility of the Left Arm	2.23	0.16	2.37	0.23	-3.97	<.01	0.71	Sig
Flexibility of the Right Arm	2.23	0.25	2.41	0.19	-3.95	<.01	0.81	Sig
Flexibility of the Left Leg	32.40	1.57	33.27	2.10	-2.98	<.01	0.47	Sig
Flexibility of the Right Leg	32.80	2.09	34.97	2.33	-4.04	<.01	0.98	Sig
Muscle Strength and Endurance of the Arms	17.97	0.72	21.40	3.20	-5.26	<.01	1.48	Sig
Muscle Strength and Endurance of the Core	31.70	1.06	33.60	1.79	-4.69	<.01	1.29	Sig

α=0.01

SD=3.09) with significant p-value and medium effect size (p = <.01, Cohen's d =0.77); and muscle strength and endurance of the core (M=4.97, SD=3.74) than HBE (M=0.77, SD=1.45) with significant p-value and large effect size (p = <.01, Cohen's d =1.48). For the BMI component, although the findings indicated no significant difference in the two exercise programs with small effect size (p = 0.12, Cohen's d = 0.41), the mean gain scores showed that CE (M =-0.89, HBE = 1.14) has more improvement than HBE (M =-0.42, SD = 1.15).

On the other hand, the females in CE have significantly higher mean gain scores than the females in HBE in seven HRF components, and only the flexibility of the right leg component has no significant difference with the p = value of (0.05) with a medium effect size of (Cohen's d = 0.52); albeit still having a higher mean score than HBE (CE: M = 4.20, SD = 4.72 > HBE: M = 2.17, SD = 2.94).

Discussion

This study gives an in-depth look at how HBE and CE affect the HRF components of adolescent learners and how these effects compare to each other. Before the implementation of the HBE and CE, as shown in Table 1, it was made sure that there was no significant difference between the participants in terms of their level of fitness in BMI, cardiovascular endurance, flexibility, muscular endurance, and strength. This is to ensure that biases among the participants of each training program are eliminated and to allow better comparison between the two training programs. This, coupled with thorough and regular monitoring and validation mechanisms, enhances the study's robustness, reliability, and validity in the context of an exercise program.

Then, after 12 weeks of intervention, one notable finding of the study confirms that CE offers positive effects on various HRF components (Table 2), corroborating prior related studies [19, 20, 21, 22, 23]. It is widely known that closing public parks and fitness facilities has pushed individuals to stay at home, which has impeded their participation in physical activity, particularly among adolescents. Although adolescents have become less active during the pandemic due to several factors, such as excessive Internet gaming [38] and social media use [39], it is still possible to maintain a healthy fitness level with the aid of PE teachers who constantly provide their learners with opportunities to exercise. Hence, implementing and adapting CE remains one of the most important ways to help maintain and

Table 4. Significant mean gain difference of participants (male vs. male, female vs female) in the HBE and CE groups.

HRF Components	HBE		CE		Independent t test			
	Mean	SD	Mean	SD	t	p	Cohen's d	Remarks
Males								
BMI	-0.42	1.15	-0.89	1.14	1.58	0.12	0.41	Not sig
Cardiovascular Endurance	-0.23	0.73	-2.97	2.22	6.41	<.01	1.66	Sig
Flexibility of the Left Arm	0.22	0.25	0.65	0.32	-5.80	<.01	1.50	Sig
Flexibility of the Right Arm	0.18	0.26	0.66	0.27	-6.98	<.01	1.81	Sig
Flexibility of the Left Leg	1.10	2.37	5.73	2.23	-7.81	<.01	2.01	Sig
Flexibility of the Right Leg	1.50	3.08	5.20	2.66	-4.98	<.01	1.29	Sig
Muscle Strength and Endurance of the Arms	2.47	3.09	5.30	4.15	-3.05	<.01	0.77	Sig
Muscle Strength and Endurance of the Core	0.77	1.45	4.97	3.74	-5.74	<.01	1.48	Sig
Females								
BMI	-0.11	0.30	-1.58	0.89	8.53	<.01	2.21	Sig
Cardiovascular Endurance	-1.40	2.11	-3.87	2.10	4.54	<.01	1.17	Sig
Flexibility of the Left Arm	0.14	0.20	0.65	0.39	-6.34	<.01	1.65	Sig
Flexibility of the Right Arm	0.18	0.25	0.55	0.36	-4.68	<.01	1.19	Sig
Flexibility of the Left Leg	0.87	1.59	4.10	3.36	-4.77	<.01	1.23	Sig
Flexibility of the Right Leg	2.17	2.94	4.20	4.72	-2.00	0.05	0.52	Not sig
Muscle Strength and Endurance of the Arms	3.43	3.58	6.70	2.74	-3.97	<.01	1.03	Sig
Muscle Strength and Endurance of the Core	1.90	2.22	4.67	3.79	-3.45	<.01	0.89	Sig

α=0.01

enhance students' fitness in school or at home.

Another notable finding of this study shows that HBE has favorable effects on various HRF components (Table 3). This finding adds to earlier research that found a link between physical housework and fitness [29, 31, 32]. Also, it backs up the results of a study [28] that said active lifestyle activities (like climbing stairs) might have the same effect on various health outcomes as aerobic exercise. It also supports the study's results [46] that said housework might have the same effects as aerobic exercise because both activities raise the body's core temperature. Further, performing housework and caregiving activities are opportunities for increasing overall physical activity levels, especially for those with low financial and time resources [47]. Therefore, adapting housework into an exercise program is a beneficial starting point to improve one's fitness levels. Likewise, instilling in people the benefits of performing daily routines in their homes, particularly amid remote work and learning, is crucial to maintaining and enhancing fitness.

Furthermore, it is essential to remember that HBE should focus on the person's situation to get the best results. Since every person had a different scenario from the others, careful planning for each participant's household activities as a form of exercise is necessary. If there are no stairs in the home, comparable housework is offered, such as scrubbing the floor, with the time and intensity of exercise adjusted accordingly. Also, setting up regular monitoring and validation systems is vital because exercising at home is prone to inconsistent adherence to guidelines due to several factors that may come in the way, including the lack of an outside professional who can physically monitor and validate the exercise.

Another notable finding in Table 3 shows that the BMI levels of the male and female groups did not significantly improve, demonstrating that HBE does not affect body composition. This finding further supports prior studies that reported domestic-related activities do not have an association or have a negative association with BMI or leanness [26, 32, 48, 49]. One reason is that housework often requires isometric contractions and uses fewer muscle groups. This type of movement uses less energy and may not change BMI. In addition, the study participants before the intervention were in a normal range of BMI for both male and female groups. So, it is safe to say that CE has kept the participants' BMI scores in the normal range.

Table 3 also shows that the cardiorespiratory fitness scores of men and women are different, with women more likely to yield improvement than men. This difference in scores between men and women probably comes from the notion that women traditionally do more housework than men. Hence, they may have engaged the HBE more pedantically and intensely than men. This assumption has also been made in previous studies [26, 50]. Furthermore, the findings indicate that HBE may be more appropriate for females because it involves household-related tasks that they traditionally perform.

Finally, Table 4 shows that CE has higher positive effects than the HBE for both the male and female groups, as demonstrated by its higher mean gain scores in every HRF component. Such findings are consistent with previous research indicating that housework, career, and transportation activities have only marginal health benefits compared to CE [29, 30]. One explanation might be the structure of training activities in CE, which has a reputation for giving careful attention to each training component—frequency, intensity, duration, and type. Contrary to the HBE, which places generic emphasis on enhancing HRF components during tasks like mopping the floor, cleaning the windows, and washing the laundry, CE training exercises address specific HRF components. For instance, Pilates aims to increase flexibility, whereas plank exercises and crunches primarily work on the strength and endurance of the core muscles. Additionally, CE often has high-intensity movements of large muscle groups performed for brief intervals with at least 60% of maximal oxygen uptake. This movement improves heart rate, blood pressure, breathing, and energy expenditure. This, coupled with planned rest intervals and enough recovery, will improve long-term peripheral and metabolic activities, resulting in better health advantages and an improved fitness level [19, 20, 21, 22, 23, 51].

On the other hand, there were no significant differences in the post-test scores between HBE and CE for components like the BMI for males and the flexibility of the right leg for females. This finding shows that even though neither of the exercise programs led to significant changes, they successfully kept the participants' normal fitness levels in BMI and flexibility. Overall, this study adds to the evidence of previous studies, explaining that exercise, whether it is traditional or not, is a crucial way to stay fit and healthy while in quarantine [34, 35]. This concept is critical for adolescents who, due to various factors, including excessive Internet gaming and social media use, become less active during the pandemic [38, 39].

Conclusions

When planned, implemented, and monitored carefully as an exercise program, doing housework is just as good as doing traditional exercise for keeping or improving adolescent learners' fitness. However, CE produces more positive and significant fitness effects. Thus, teachers can use HBE in the remote exercise activities of their learners along with CE.

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Conflict of interest

There is no conflict of interest in the conduct of the research.

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Information about the authors:

Jem Cloyd M. Tanucan; (Corresponding Author); https://orcid.org/0000-0002-9697-2618; tanucanj@cnu.edu.ph; College of Teacher Education, Cebu Normal University; Cebu City, Philippines.

Marino A. Garcia; https://orcid.org/0000-0001-9651-8979; garciam@cnu.edu.ph; College of Arts and Sciences, Cebu Normal University; Cebu City, Philippines.

Marlon T. Bojos; https://orcid.org/0000-0003-1699-0240; bojosm@cnu.edu.ph; College of Teacher Education, Cebu Normal University; Cebu City, Philippines.

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