Exercise Status, Gender and Age-Related Differences in The Processes of Change, Decisional Balance, and Self-Efficacy in Adults

Fatoş Yağmur Erbaşi [1], Dilek Sevimli[2], Mehmet Akif Ziyagil[3]

[1] Çukurova University, Health Sciences Institute, Department of Physical Education and Sports

[2] Çukurova University, Faculty of Sport Sciences, Department of Coaching Education

[3] Mersin University, Faculty of Sport Sciences, Department of Physical Education and Sports

Corresponding Author: yagmurerbasi@hotmail.com; sevimlidilek@gmail.com; mziyagil@gmail.com

HOW TO CITE:
Fatoş Yağmur Erbaşi, Dilek Sevimli, Mehmet Akif Ziyagil (2026). Exercise Status, Gender and Age-Related Differences in The Processes of Change, Decisional Balance, and Self-Efficacy in Adults. International Journal of Special Education, 41(15s), 1505-1532

COPYRIGHT STATEMENT:
Copyright: © 2026 Authors.
Open access publication underthe terms and conditions of the Creative CommonsAttribution (CC BY) license (http://creativecommons.org/licenses/by/4.0/).

ABSTRACT:

Objective: This study aimed to compare Transtheoretical Model (TTM) constructs—processes of change, decisional balance, and self-efficacy across gender, exercise status, and age groups among Turkish adults.

Methods: A cross-sectional comparative design was employed with 118 participants (59 females, 59 males) aged 1505-1532 years from Kayseri, Turkey. Participants completed validated Turkish versions of the Exercise Stages of Change Scale, Exercise Processes of Change Scale, Exercise Decisional Balance Scale, and Exercise Self-Efficacy Scale. Independent samples t-tests were used to compare groups based on gender (female vs. male), exercise status (sedentary vs. active), and age (≤40 vs. >40 years).

Results: Exercise status emerged as the dominant factor differentiating psychological profiles, with active individuals employing significantly more cognitive and behavioural strategies and demonstrating substantially higher self-efficacy compared to sedentary peers (Cohen's d = 1.1505-1532.31, $p < .001$). Females scored significantly higher than males on Dramatic Relief ($p = .039$), Self-Re-evaluation ($p = .008$), Social Liberation ($p = .031$), and Self-Liberation ($p = .049$), with small effect sizes. Active males uniquely exhibited a reconfigured decisional balance with higher pros ($p = .016$) and lower cons ($p = .001$), while active females showed no significant decisional balance differences. Age (40-year threshold) did not moderate any TTM construct in either sex (all $p > .05$).

Conclusion: Exercise status, rather than gender or age, is the primary factor differentiating TTM psychological profiles in Turkish adults. Self-efficacy emerged as the most robust discriminator between active and inactive individuals. Gender-sensitive interventions addressing decisional balance differences may enhance effectiveness, while TTM-based approaches can be applied across middle adulthood without major age-related modifications.

Keywords: Transtheoretical Model, exercise behaviour, self-efficacy, gender differences, physical activity

1. Introduction

Regular physical activity is a cornerstone of public health, with indisputable evidence supporting its role in the primary and secondary prevention of chronic diseases such as cardiovascular disease, type 2 diabetes, hypertension, and certain types of cancer. Beyond its physiological benefits, exercise is also strongly associated with improved mental health, reduced symptoms of depression and anxiety, enhanced cognitive function, and a higher overall quality of life (Warburton & Bredin, 2017). Despite these well-established benefits, physical inactivity remains one of the leading risk factors for global mortality. The World Health Organization (WHO, 2009) has identified sedentary behaviour as a pandemic, with a significant proportion of the adult population in both developed and developing countries failing to meet the minimum recommended levels of physical activity. In Turkey, epidemiological data mirrors this global trend, indicating that a large segment of the adult population leads a sedentary lifestyle, thereby increasing their susceptibility to non-communicable diseases and reducing their life expectancy.

The persistent gap between knowing the benefits of exercise and actually engaging in it highlights a critical public health challenge. Understanding why some individuals successfully adopt and maintain regular exercise while others remain sedentary requires a shift in focus from merely prescribing activity to understanding the complex psychological and behavioural mechanisms that underpin the change process. Exercise adoption is not a singular event but a dynamic journey involving fluctuations in motivation, cognitive appraisal of risks and benefits, and the use of various behavioural strategies.

The Transtheoretical Model (TTM) offers a comprehensive framework for understanding behaviour change by integrating key cognitive and behavioural constructs. Originally developed by Prochaska and DiClemente (1983) in the context of smoking cessation, the model has since been successfully applied to exercise behaviour (Marcus et al., 1992). The TTM proposes that individuals move through five stages of change: precontemplation, contemplation, preparation, action, and maintenance. In addition to these stages, the model includes three core constructs that explain how and why change occurs: processes of change, decisional balance, and self-efficacy.

The processes of change refer to the cognitive, affective, and behavioural strategies individuals use to progress through the stages. These are divided into experiential processes (e.g., consciousness raising, dramatic relief, self-re-evaluation) and behavioural processes (e.g., helping relationships, reinforcement management, stimulus control) (Marcus et al., 1992; Nigg & Courneya, 1998). Decisional balance reflects an individual's assessment of the relative importance of the pros and cons of changing a behaviour (Marcus et al., 1992). Self-efficacy, a concept derived from Bandura's (1997) social cognitive theory, refers to an individual's confidence in their ability to engage in a specific behaviour, even under challenging circumstances such as fatigue, time pressure, or bad weather.

Numerous studies have supported the validity of the TTM in explaining exercise behaviour across diverse populations (Spencer et al., 2006). However, the majority of this research has focused on the stages of change, leaving the relationships between the other TTM constructs particularly the processes of change, decisional balance, and self-efficacy less thoroughly explored, especially in the Turkish adult population.

Moreover, while some studies have examined gender differences in exercise behaviour, the findings remain inconsistent. For instance, Yıldız and Kara (2020) reported that women tend to use more emotional and social strategies when engaging in physical activity, whereas Öztürk (2017) found that men's exercise behaviour is more strongly influenced by a rational evaluation of benefits and barriers. Similarly, the role of age in moderating these relationships has received limited attention. Although aging is associated with physiological changes that may affect exercise capacity and motivation (Can & Aksoy,

2020), it is unclear whether psychological constructs such as self-efficacy and decisional balance vary significantly between younger and older adults.

Despite the widespread application of the Transtheoretical Model to exercise behaviour and the frequent emphasis on gender differences, the literature lacks a systematic comparison of how men and women utilize processes of change and their decisional balance patterns. The influence of age as a variable has been similarly neglected, with studies employing meaningful age thresholds such as the forty-year mark remaining quite limited. One of the most significant gaps in the literature is that the age by gender interaction has not yet been adequately investigated. Within the specific context of Turkey, there is a notable absence of comprehensive studies addressing the moderating roles of both gender and age within a full TTM framework in healthy adults.

Based on these identified needs, the present study aims to examine differences in exercise-related TTM variables based on gender, regular physical activity level, and age. The scope of the research includes investigating whether significant differences exist in these constructs (1) between adult women and men, (2) between active and sedentary individuals within each gender group, and (3) between adults aged under forty and those aged forty and above. This study aims to provide a more nuanced understanding of the psychological processes underlying exercise behaviour in Turkish adults and to present findings regarding gender- and age-specific pathways. It is intended that the findings will contribute to the development of more targeted, culturally sensitive, and theoretically grounded physical activity interventions capable of addressing the unique needs of different demographic groups, thereby promoting a more successful adoption of an active lifestyle among Turkish adults.

2. Methodology

Design of this study

The aim of this research is to examine the relationship between body composition, cardiovascular risk, exercise behavior, and other transtheoretical model variables in adults. The study has a cross-sectional comparative research design, where the relationships between variables were evaluated through measurements taken at a single point in time. The study sample consists of male and female individuals aged 1505-1532 residing in the Central Melikgazi district of Kayseri Province who voluntarily agreed to participate in the study.

Participants

Participants were selected using random sampling method among individuals within the specified age range. A total of (n:118) adults, including (n:59) women and (n:59) men, participated in the study. The mean age (years) of the participants was (41.81±8.82), while the mean height (cm), body weight (kg), and Body Mass Index (BMI) (kg/m²) were calculated as (169.38 ± 10.60), (73.93 ± 12.87), and (26.45 ± 4.32), respectively.

Ethics committee approval was obtained from Çukurova University Faculty of Medicine Ethics Committee with decision number 125/5 dated September 16, 2022 (Appendix-1). The study was supported by Çukurova University Scientific Research Projects as project number TDK-1505-15325.

Measurements of Body Weight and Height, Body Calculation of Mass Index (BMI)

Participants' body weights were measured in kilograms on a scale with 0.01 kg precision, with bare feet, wearing a t-shirt and tights, and their heights were measured with a metal ruler with 0.01 cm precision fixed to the scale, while participants were in an upright position with bare feet. BMI is the most practical and commonly used anthropometric measurement for determining obesity. BMI is the value obtained by dividing weight by the square of height (kg/m²). WHO defines overweight and obesity as abnormal or excessive fat accumulation that presents a health risk. Individuals with a Body Mass Index (BMI) ≥25 are considered overweight, and those with BMI ≥30 are considered obese (WHO, 2009).

Measurement Methods Used in the Study

The validity and reliability of the Turkish adaptation of the Exercise Stages of Change Scale, Exercise Processes of Change Scale, Exercise Decisional Balance Scale, and Exercise Self-Efficacy Scale, originally developed by Prochaska and DiClemente (1982), were examined through the scale study conducted by Gümüş and Kitiş (2015).

Transtheoretical Model (TTM) Components

Exercise Stages of Change Scale (ESCS)

The scale was developed by Prochaska and DiClemente (1982) through studies on smoking cessation and was later adapted to exercise, with a 2-week test-retest reliability of 0.78 (n=20) found in adults participating in health promotion projects at two workplaces. Courneya reported the 2-week test-retest reliability of the instrument as 0.79 in a larger sample group (n=148). Since the scale was developed on adults, Nigg and Courneya adapted it for individuals in 1998 by changing some words and sentences (Marcus et al., 1992). This study used the five-stage exercise stages of change scale adapted for individuals' exercise behaviours by Nigg and Courneya (1998). This scale determines attitude towards exercise in 5 stages.

The first is the **Precontemplation Stage**, where the individual does not exercise and does not intend to start exercising in the next 6 months. The second is the **Contemplation Stage**, where the individual does not exercise but is thinking about starting to exercise in the next 6 months. The third is the **Preparation Stage**, where the individual exercises, albeit irregularly, and plans to exercise regularly in the next month. The fourth is the **Action Stage**, where the individual has started exercising regularly for less than the last 6 months. The fifth is the **Maintenance Stage**, where the individual has been exercising regularly for more than 6 months (Erol & Erdoğan, 2007; Cooney, 1996).

The scale, which reflects the individual's interest and motivation in behaviour change and explains the relationship of change with time, consists of 5 statements (e.g., "Currently, I do not exercise in my leisure time and I am not thinking about starting"), one for each stage. Individuals are asked to evaluate each option and select only the option that most strongly reflects their own exercise situation.

Exercise Processes of Change Scale (EPCS)

The Processes of Change Scale, adapted to exercise by Marcus and colleagues (1992) to determine the exercise behaviour change process, is one of the core constructs explaining the independent variable dimension of the Transtheoretical Model. It helps to understand what experiences individuals use to change their problematic behaviours as they progress through the stages of behaviour change (Cooney, 1996; Nigg & Courneya, 1998).

The scale has ten core processes, each containing four items (Marcus et al., 1992). These processes describe the tools that encourage change, the emotions that help people change problematic behaviours, perceptions, and basic behaviour patterns that reveal interpersonal relationships. These ten core processes are divided into two categories: cognitive/experiential processes and behavioural processes (Cooney, 1996; Nigg, 2021).

Cognitive/Experiential Processes

Consciousness Raising (items 1, 2, 3, and 4): Individuals acquire new information that supports healthy behaviour change.

Dramatic Relief (items 5, 6, 7, and 40): Individuals experience negative emotions such as fear, anxiety, and anger related to the health risks that unhealthy behaviour may cause in later years.

Environmental Re-evaluation (items 8, 9, 10, and 11): Individuals realize the positive and negative effects of their own healthy or unhealthy behaviours on their immediate social and physical environment.

Self-Re-evaluation (items 12, 13, 14, and 15): The individual realizes that they need to change their behaviour to resemble someone they admire.

Social Liberation (items 16, 17, 18, and 19): The individual realizes that social norms support

healthy behaviour change and that change is necessary.

Behavioural Processes

Counterconditioning (items 20, 21, 22, and 23): The individual recognizes unhealthy behaviours and chooses healthy behaviours instead.

Helping Relationships (items 24, 25, 26, and 27): The individual seeks and uses social support for healthy behaviour.

Reinforcement Management (items 28, 29, 30, and 31): The individual rewards themselves for positive behaviours and reduces rewards for negative behaviours.

Self-Liberation (items 32, 33, 34, and 35): The individual makes a firm commitment with themselves for change.

Stimulus Control (items 36, 37, 38, and 39): The individual eliminates things that could cause or remind them of unhealthy behaviour, or adds things to the environment that will enable or remind them to start a healthy behaviour.

The scale is a 5-point Likert-type scale. Each item of the scale is scored from 1 to 5. For each item, one of the options 1-"Never", 2-"Seldom", 3-"Occasionally", 4-"Often", 5-"Repeatedly" should be marked considering the previous month. The highest possible score from the scale is 200 and the lowest is 40. High scores obtained from the EPCS indicate a higher chance of success in change.

Exercise Decisional Balance Scale (EDBS)

It reveals the pros and cons of behaviour change. Pros reflect the positive aspects of changing behaviour, while cons reflect the barriers to change. In this study, the 16-item, 5-point Likert-type EDBS scale developed by Marcus and colleagues in 1992 was used. For the question "How important is this thought to you in making the decision to exercise?", the individual is asked to mark one of the options scored from 1 to 5 (1-"Not important", 2-"Slightly important", 3-"Important", 4-"Very important", and 5-"Extremely important"). The scale has two sub-dimensions reflecting the positive and negative aspects of behaviour change. The first is the **pros perception of making the decision to exercise** (items 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10): It measures the perception of benefits such as reducing tension, contributing to socialization, and positively affecting one's outlook on life. The second is the **cons perception of making the decision to exercise** (items 11, 12, 13, 14, 15, and 16): It measures the perception of drawbacks such as exercise taking up too much time, causing fatigue, and being affected by weather conditions.

In the EDBS sub-dimensions, the highest possible score for the Pros Perception Scale, consisting of 10 questions, is 50, and the lowest score is 10; for the Cons Perception Scale, the lowest score is 6, and the highest score is 30.

High pros and cons scores on the scale indicate that the individual is aware of the benefits and harms of exercise behaviour, and their chances of making a decision and maintaining behaviour change are higher.

The EDBS for adults has been explained above. This scale was administered to 118 participants with an observer present. Subsequently, it was calculated according to its sub-dimensions.

Exercise Self-Efficacy Scale (ESES)

It was developed to determine individuals' confidence in starting and maintaining exercise behaviour. The initial form of the scale was developed by Marcus and colleagues. This form is an 11-point Likert-type scale with 5 questions scored from 0 to 10. Its internal consistency was found to be 0.82, and its two-week test-retest reliability was 0.90 (n=20). Nigg and Courneya (1998) added 5 more items to this five-item Exercise Self-Efficacy scale, based on behaviours that could pose barriers to individuals' exercise behaviours, identified through studies conducted at a doctoral and two master's levels, and found the reliability of these 5 items to be 0.85 (Nigg & Courneya, 1998).

In this study, the 10-item, 11-point Likert-type Exercise Self-Efficacy scale was used, scored from 0-"Not at all confident" to 10-"Completely confident". The highest possible score from the scale is 110, and the lowest is 0. High scores obtained from the ESES scale indicate that the

individual is extremely self-confident and has a high chance of success in change.

Data Analysis

Statistical analyses were performed using the SPSS 2023 package program. Due to the normal distribution of the data t-test analyses were used for comparing binary groups. Pairwise comparisons were made between men and women, and between sedentary individuals and exercisers within both genders.

3. Results

Table 1. Comparison of Demographic, Exercise Behavior Level, and Other Transtheoretical Model Variables Between Adult Females and Males

Variables	Groups	N	M	SD	Diff.	%Diff.	t-value	Sig.	Cohen's d
Age (years)	Females	59	45,00	8,58	6,37	14,16	4,267	,000**	,786†
	Males	59	38,63	7,61					
Body Height (cm)	Females	59	161,54	6,47	-13,90	-8,60	-10,495	,000**	-1,932‡
	Males	59	175,44	7,85					
Body Weight (kg)	Females	59	69,34	11,22	-10,22	-14,74	-5,041	,000**	-,928‡
	Males	59	79,56	10,80					
Body Mass İndexi (kg/m^2)	Females	59	26,72	4,98	0,87	3,26	1,145	,255	,211+
	Males	59	25,85	3,09					
Exercise Stages of Change Scale (1505-1532)	Females	59	3,39	1,27	0,25	7,37	1,005	,317	,185
	Males	59	3,14	1,47					
EPCS CP Consciousness Raising	Females	59	13,93	3,24	0,85	6,10	1,396	,165	,257+
	Males	59	13,08	3,35					
EPCS CP Dramatic Relief	Females	59	14,85	3,11	1,17	7,88	2,085	,039*	,384+
	Males	59	13,68	2,98					
EPCS CP Environmental Reevaluation	Females	59	13,03	3,73	0,18	1,38	,262	,794	,048
	Males	59	12,85	4,00					
EPCS CP Self-Reevaluation	Females	59	16,12	3,02	1,63	10,11	2,698	,008**	,497+
	Males	59	14,49	3,52					

EPCS CP Social Liberation	Females	59	12,42	2,65	1,27	10,23	2,187	,031*	,403+
	Males	59	11,15	3,59					
EPCS BP Counterconditioning	Females	59	14,17	3,80	0,76	5,36	1,073	,286	,197
	Males	59	13,41	3,92					
EPCS BP Helping Relationships	Females	59	12,71	3,53	-0,14	-1,10	-,190	,849	-,035
	Males	59	12,85	4,17					
EPCS BPReinforcement Management	Females	59	15,15	2,66	0,69	4,55	1,244	,216	,229+
	Males	59	14,46	3,36					
EPCS BP Self-Liberation	Females	59	15,80	3,09	1,29	8,16	1,994	,049*	,367+
	Males	59	14,51	3,88					
EPCS BP Stimulus Control	Females	59	10,73	4,23	0,92	8,57	1,211	,228	,223+
	Males	59	9,81	3,97					
EPCS Cognitive Processes Total Points	Females	59	70,36	10,43	5,11	7,26	2,320	,022*	,427+
	Males	59	65,25	13,28					
EPCS *Behavioral Processes Total Points*	Females	59	68,56	12,94	3,53	5,15	1,335	,184	,246+
	Males	59	65,03	15,61					
EPCS General Total Points	Females	59	138,92	21,77	8,63	6,21	1,889	,061	,348+
	Males	59	130,29	27,50					
EDBS Pros	Females	59	39,85	7,83	-0,29	-0,73	-,197	,844	-,036+
	Males	59	40,14	8,04					
EDBS Cons	Females	59	15,37	5,13	1,40	9,11	1,297	,197	,239+
	Males	59	13,97	6,57					
EDBS Total Points	Females	59	55,22	8,96	1,12	2,03	,623,	,534	,115
	Males	59	54,10	10,48					

ESES Total Points	Females	59	55,64	29,73	1,88	3,38	326	,745	,060
	Males	59	53,76	32,88					

***** There is a significant difference between the two variables at the 0.05 level.

******There is a significant difference between the two variables at the 0.01 level.

Exercise Stages of Change Scale (**ESCS**)

Exercise Processes of Change Scale (**EPCS**)

CP=Cognitive Processes **/ BP**=Behavioral Processes

Exercise Decisional Balance Scale (**EDBS**)

Exercise Self-Efficacy Scale (**ESES**)

ES= Effect size,

+ Cohen's d between 0.200 and 0.499 indicates a small effect size.

† Cohen's d between 0.500 and 0.799 indicates a medium effect size.

‡ Cohen's d of 0.800 and above indicates a large effect size.

Table 2. Comparison of Demographic, Morphological, Exercise Behavior Level, and Other Transtheoretical Model Variables Between Exercised and Sedentary Females.

Variables	Groups	N	M	SD	Diff.	%Diff	t-value	Sig.	Cohen's d
Age (years)	Sedantery	59	**43,78**	6,88	-3,13	-7,15	-1,379	,173	-,368**+**
	Exercised	59	**46,91**	10,62					
Body Height (cm)	Sedantery	59	**161,36**	6,50	-0,47	-0,29	-,267	,790	-,071
	Exercised	59	**161,83**	6,56					
Body Weight (kg)	Sedantery	59	**69,64**	11,24	0,77	1,11	,256	,799	,068
	Exercised	59	**68,87**	11,41					
Body Mass İndexi (kg/m^2)	Sedantery	59	**26,93**	5,17	0,52	1,93	,387	,700	,103
	Exercised	59	**26,41**	4,78					
Exercise Stages of Change Scale (1505-1532)	Sedantery	59	**2,50**	0,70	-2,28	-91,20	-14,117	,000	-3,768
	Exercised	59	**4,78**	0,42					

EPCS CP Consciousness Raising	Sedantery	59	**12,97**	2,86	-2,46	-18,97	-3,041	,004	-,812
	Exercised	59	**15,43**	3,29					
EPCS CP Dramatic Relief	Sedantery	59	**14,39**	2,59	-1,18	-8,20	-1,429	,159	-,381+
	Exercised	59	**15,57**	3,74					
EPCS CP Environmental Reevaluation	Sedantery	59	**12,69**	4,01	-0,88	-6,93	-,873	,386	-,233+
	Exercised	59	**13,57**	3,26					
EPCS CP Self-Reevaluation	Sedantery	59	**15,44**	3,37	-1,73	-11,20	-2,218	,031	-,592†
	Exercised	59	**17,17**	2,01					
EPCS CP Social Liberation	Sedantery	59	**12,31**	2,73	-0,30	-2,44	-,425	,672	-,113
	Exercised	59	**12,61**	2,57					
EPCS BP Counterconditioning	Sedantery	59	**13,42**	3,67	-1,93	-14,38	-1,948	,056	-,520†
	Exercised	59	**15,35**	3,79					
EPCS BP Helping Relationships	Sedantery	59	**12,06**	3,48	-1,68	-13,93	-1,820	,074	-,486+
	Exercised	59	**13,74**	3,44					
EPCS BPReinforcement Management	Sedantery	59	**14,47**	2,85	-1,75	-12,09	-2,570	,013	-,686†
	Exercised	59	**16,22**	1,95					
EPCS BP Self-Liberation	Sedantery	59	**14,89**	3,33	-2,33	-15,65	-3,014	,004	-,805
	Exercised	59	**17,22**	2,02					
EPCS BP	Sedantery	59	**9,94**	4,13	-2,02	-20,32	-1,815	075	-,485+

Stimulus Control	**Exercised**	59	**11,96**	4,19					
EPCS Cognitive Processes Total Points	Sedantery	59	**67,81**	9,87	-6,54	-9,64	-2,448	,017	-,653
	Exercised	59	**74,35**	10,23					
EPCS *Behavioral Processes Total Points*	Sedantery	59	**64,78**	12,98	-9,70	-14,97	-2,994	,004	-,799†
	Exercised	59	**74,48**	10,66					
EPCS General Total Points	Sedantery	59	**132,58**	21,43	-16,25	-12,26	-2,979	,004	-,795†
	Exercised	59	**148,83**	18,71					
EDBS Pros	Sedantery	59	**38,92**	8,30	-2,38	-6,12	-1,145	,257	-,306+
	Exercised	59	**41,30**	6,96					
EDBS Cons	Sedantery	59	**16,17**	4,71	2,04	12,62	1,503	138	,401+
	Exercised	59	**14,13**	5,60					
EDBS Total Points	Sedantery	59	**55,08**	9,22	-0,35	-0,64	-,146	,885	-,039
	Exercised	59	**55,43**	8,74					
ESES Total Points	Sedantery	59	**44,17**	27,44	-29,44	-66,65	-4,212	,000	-1,124‡
	Exercised	59	73,61	24,07					

***** There is a significant difference between the two variables at the 0.05 level.

******There is a significant difference between the two variables at the 0.01 level.

Exercise Stages of Change Scale (**ESCS**)

Exercise Processes of Change Scale (**EPCS**)

CP=Cognitive Processes / **BP**=Behavioral Processes

Exercise Decisional Balance Scale (**EDBS**)

ES= Effect size,

+ Cohen's d between 0.200 and 0.499 indicates a small effect size.

† Cohen's d between 0.500 and 0.799 indicates a medium effect size.

‡ Cohen's d of 0.800 and above indicates a large effect size.

Exercise Self-Efficacy Scale
(**ESES**)

Table 3. Comparison of Demographic, Morphological, Cardiovascular, Exercise Behavior Level, and Other Transtheoretical Model Variables Between Exercising and Sedentary Males

Variables	Groups	N	M	SD	Diff.	%Diff	t-value	Sig.	Cohen's d
Age (years)	Sedantery	37	37,54	6,38	-2,91	-7,75	-1,435	,157	-,386+
	Exercised	22	40,45	9,20					
Body Height (cm)	Sedantery	37	176,14	7,96	1,87	1,06	,880	,383	,237+
	Exercised	22	174,27	7,69					
Body Weight (kg)	Sedantery	37	78,84	11,46	-1,93	-2,45	-,662	,510	-,178
	Exercised	22	80,77	9,71					
Body Mass İndexi (kg/m²)	Sedantery	37	25,41	3,26	-1,18	-4,64	-1,432	,158	-,385+
	Exercised	22	26,59	2,70					
Exercise Stages of Change Scale (1505-1532)	Sedantery	37	2,14	0,79	-2,68	-125,23	-14,872	,000**	-4,004‡
	Exercised	22	4,82	0,39					
EPCS CP Consciousness Raising	Sedantery	37	11,73	2,96	-3,63	-30,95	-4,709	,000**	-1,268‡
	Exercised	22	15,36	2,70					
EPCS CP Dramatic Relief	Sedantery	37	12,78	2,59	-2,40	-18,78	-3,222	,002**	-,868‡
	Exercised	22	15,18	3,03					
	Sedantery	37	12,49	4,07	-0,96	-7,69	-,898	,373	-,242+

EPCS CP Environmental Reevaluation	**Exercised**	22	13,45	3,89					
EPCS CP Self-Reevaluation	Sedantery	37	13,30	3,60	-3,20	-24,06	-3,745	,000**	-1,008‡
	Exercised	22	16,50	2,26					
EPCS CP Social Liberation	Sedantery	37	10,97	4,00	-0,48	-4,38	-,495	,623	-,133
	Exercised	22	11,45	2,84					
EPCS BP Counterconditioning	Sedantery	37	12,05	3,88	-3,63	-30,12	-3,816	,000**	-1,027‡
	Exercised	22	15,68	2,83					
EPCS BP Helping Relationships	Sedantery	37	11,92	4,14	-2,49	-20,89	-2,297	,025*	-,618†
	Exercised	22	14,41	3,83					
EPCS BPReinforcement Management	Sedantery	37	13,38	3,43	-2,89	-21,60	-3,489	,001** ,	-,939‡
	Exercised	22	16,27	2,37					
EPCS BP Self-Liberation	Sedantery	37	13,38	3,71	-3,03	-22,65	-3,108	003**	-,837
	Exercised	22	16,41	3,46					
EPCS BP Stimulus Control	Sedantery	37	9,05	3,98	-2,04	-22,54	-1,950	,056	-,525†
	Exercised	22	11,09	3,70					
EPCS Cognitive Processes Total Points	Sedantery	37	61,27	13,76	-10,68	-17,43	-3,220	,002**	-,867‡
	Exercised	22	71,95	9,36					
EPCS *Behavioral Processes Total Points*	Sedantery	37	59,78	15,67	-14,08	-23,55	-3,698	,000**	-,995‡

	Exercised	22	73,86	11,04					
EPCS General Total Points	Sedantery	37	121,05	27,89	-24,77	-20,46	-3,690	,001**	-,994‡
	Exercised	22	145,82	18,78					
EDBS Pros	Sedantery	37	38,22	8,72	-5,14	-13,45	-2,483	,016*	-,669†
	Exercised	22	43,36	5,53					
EDBS Cons	Sedantery	37	16,05	6,64	5,60	34,89	3,454	,001**	,930‡
	Exercised	22	10,45	4,78					
EDBS Total Points	Sedantery	37	54,27	12,54	0,45	0,83	,159	,874	,043
	Exercised	22	53,82	5,80					
ESES Total Points	Sedantery	37	39,51	30,23	-38,22	-96,74	-5,194	,000**	-1,398‡
	Exercised	22	77,73	21,45					

***** There is a significant difference between the two variables at the 0.05 level.
******There is a significant difference between the two variables at the 0.01 level.

Exercise Stages of Change Scale (**ESCS**)
Exercise Processes of Change Scale (**EPCS**)
CP=Cognitive Processes / **BP**=Behavioral Processes
Exercise Decisional Balance Scale (**EDBS**)
Exercise Self-Efficacy Scale (**ESES**)

ES= Effect size,
+ Cohen's d between 0.200 and 0.499 indicates a small effect size.
† Cohen's d between 0.500 and 0.799 indicates a medium effect size.
‡ Cohen's d of 0.800 and above indicates a large effect size.

Table 4. Comparison of Demographic, Morphological, Exercise Behavior Level, and Other Transtheoretical Model Variables Between the ≤40 and >40 Age Groups in Females

Variables	**Groups**	**N**	**M**	**SD**	**Diff.**	**%Diff**	**t-value**	**Sig.**	**Cohen's d**
	Under 40	20	34,80	2,78	-2,91	-44,34	-12,623	,000**	-3,472‡

Age (years)	40 and over	39	50,23	5,08					
Body Height (cm)	Under 40	20	165,15	5,51	1,87	3,31	3,321	,002**	,913‡
	40 and over	39	159,69	6,19					
Body Weight (kg)	Under 40	20	64,56	9,71	-1,93	-11,21	-2,446	,018*	-,673†
	40 and over	39	71,80	11,25					
Body Mass İndexi (kg/m²)	Under 40	20	23,75	3,99	-1,18	-18,95	-3,606	,001**	-,992‡
	40 and over	39	28,25	4,78					
Exercise Stages of Change Scale (1505-1532)	Under 40	20	3,40	1,14	-2,68	0,29	,044	,965	,012
	40 and over	39	3,39	1,35					
EPCS CP Consciousness Raising	Under 40	20	14,75	3,18	-3,63	8,41	1,399	,167	,385+
	40 and over	39	13,51	3,24					
EPCS CP Dramatic Relief	Under 40	20	14,55	3,20	-2,40	-3,09	-,522	,603	-,144
	40 and over	39	15,00	3,09					
EPCS CP Environmental Reevaluation	Under 40	20	13,70	3,77	-0,96	7,37	,983	,330	,270+
	40 and over	39	12,69	3,71					
EPCS CP Self-Reevaluation	Under 40	20	16,35	3,22	-3,20	2,14	,419	,677	,115
	40 and over	39	16,00	2,95					
EPCS CP Social Liberation	Under 40	20	12,70	2,58	-0,48	3,31	,569	,571	,157
	40 and over	39	12,28	2,71					

EPCS BP Counterconditioning	Under 40	20	14,15	3,34	-3,63	-0,21	-,028	,978	-,008
	40 and over	39	14,18	4,06					
EPCS BP Helping Relationships	Under 40	20	13,65	3,12	-2,49	10,40	1,475	146	,406+
	40 and over	39	12,23	3,67					
EPCS BPReinforcement Management	Under 40	20	15,50	2,65	-2,89	3,42	,714	,478	,196
	40 and over	39	14,97	2,69					
EPCS BP Self-Liberation	Under 40	20	15,80	2,55	-3,03	0,06	,006	995	,002
	40 and over	39	15,79	3,37					
EPCS BP Stimulus Control	Under 40	20	11,35	4,06	-2,04	8,28	,805	,424	,221+
	40 and over	39	10,41	4,34					
EPCS Cognitive Processes Total Points	Under 40	20	72,05	10,71	-10,68	3,55	,892	,376	,245+
	40 and over	39	69,49	10,32					
EPCS *Behavioral Processes Total Points*	Under 40	20	70,45	12,28	-14,08	4,06	,801	,426	,220+
	40 and over	39	67,59	13,32					
EPCS General Total Points	Under 40	20	142,50	21,61	-24,77	3,80	,905	,370	,249+
	40 and over	39	137,08	21,90					
EDBS Pros	Under 40	20	41,25	8,93	-5,14	5,14	,985	,329	,271+
	40 and over	39	39,13	7,23					
EDBS Cons	Under 40	20	13,85	4,61	5,60	-16,61	-1,658	,103	-,456+

	40 and over	39	16,15	5,26					
EDBS Total Points	Under 40	20	55,10	8,63	0,45	-0,33	-,073	,942	-,020
	40 and over	39	55,28	9,23					
ESES Total Points	Under 40	20	56,35	29,83	-38,22	1,90	,130	,897	,036
	40 and over	39	55,28	30,06					

***** There is a significant difference between the two variables at the 0.05 level.

******There is a significant difference between the two variables at the 0.01 level.

Exercise Stages of Change Scale (**ESCS**)

Exercise Processes of Change Scale (**EPCS**)

CP=Cognitive Processes **/ BP**=Behavioral Processes

Exercise Decisional Balance Scale (**EDBS**)

Exercise Self-Efficacy Scale (**ESES**)

ES= Effect size,

+ Cohen's d between 0.200 and 0.499 indicates a small effect size.

† Cohen's d between 0.500 and 0.799 indicates a medium effect size.

‡ Cohen's d of 0.800 and above indicates a large effect size.

Table 5. Comparison of Demographic, Exercise Behavior Level, and Other Transtheoretical Model Variables Between the 40 and Under and Over 40 Age Groups in Males.

Variables	**Groups**	**N**	**M**	**SD**	**Diff.**	**%Diff**	**t-value**	**Sig.**	**Cohen's d**
Age (years)	Under 40	39		34,15	-13,20	-44,34	-11,139	,000**	-3,472‡
	40 and over	20		47,35					
Body Height (cm)	Under 40	39		178,13	7,93	3,31	4,157	,002**	,913‡
	40 and over	20		170,20					
Body Weight (kg)	Under 40	39		79,26	-0,89	-11,21	-,298	,018*	-,673†

	40 and over	20	80,15					
Body Mass İndexi (kg/m²)	Under 40	39	24,97	-2,60	-18,95	-3,313	,001**	-,992‡
	40 and over	20	27,57					
Exercise Stages of Change Scale (1505-1532)	Under 40	39	2,90	-0,70	0,29	-1,773	,965	,012
	40 and over	20	3,60					
EPCS CP Consciousness Raising	Under 40	39	13,31	0,66	8,41	,711	,167	,385+
	40 and over	20	12,65					
EPCS CP Dramatic Relief	Under 40	39	13,79	0,34	-3,09	,418	,603	-,144
	40 and over	20	13,45					
EPCS CP Environmental Reevaluation	Under 40	39	12,56	-0,84	7,37	-,757	,330	,270+
	40 and over	20	13,40					
EPCS CP Self-Reevaluation	Under 40	39	14,59	0,29	2,14	,297	,677	,115
	40 and over	20	14,30					
EPCS CP Social Liberation	Under 40	39	11,23	0,23	3,31	,232	,571	,157
	40 and over	20	11,00					
EPCS BP Counterconditioning	Under 40	39	13,21	-0,59	-0,21	-,548	,978	-,008
	40 and over	20	13,80					
EPCS BP Helping Relationships	Under 40	39	12,56	-0,84	10,40	-,725	146	,406+
	40 and over	20	13,40					

EPCS BPReinforcement Management	Under 40	39	14,26	-0,59	3,42	-,638	,478	,196
	40 and over	20	14,85					
EPCS BP Self-Liberation	Under 40	39	13,82	-2,03	0,06	-1,945	995	,002
	40 and over	20	15,85					
EPCS BP Stimulus Control	Under 40	39	9,59	-0,66	8,28	-,601	,424	,221+
	40 and over	20	10,25					
EPCS Cognitive Processes Total Points	Under 40	39	65,49	0,69	3,55	,187	,376	,245+
	40 and over	20	64,80					
EPCS *Behavioral Processes Total Points*	Under 40	39	63,44	-4,71	4,06	-1,100	,426	,220+
	40 and over	20	68,15					
EPCS General Total Points	Under 40	39	128,92	-4,03	3,80	-,529	,370	,249+
	40 and over	20	132,95					
EDBS Pros	Under 40	39	40,67	1,57	5,14	,706	,329	,271+
	40 and over	20	39,10					
EDBS Cons	Under 40	39	15,51	4,56	-16,61	2,656	,103	-,456+
	40 and over	20	10,95					
EDBS Total Points	Under 40	39	56,18	6,13	-0,33	2,195	,942	-,020
	40 and over	20	50,05					
ESES Total Points	Under 40	39	54,79	3,04	1,90	,334	,897	,036

	40 and over	20 51,75	

***** There is a significant difference between the two variables at the 0.05 level. ******There is a significant difference between the two variables at the 0.01 level.	Exercise Stages of Change Scale (**ESCS**) Exercise Processes of Change Scale (**EPCS**) **CP**=Cognitive Processes / **BP**=Behavioral Processes Exercise Decisional Balance Scale (**EDBS**) Exercise Self-Efficacy Scale (**ESES**)	**ES**= Effect size, + Cohen's d between 0.200 and 0.499 indicates a small effect size. † Cohen's d between 0.500 and 0.799 indicates a medium effect size. ‡ Cohen's d of 0.800 and above indicates a large effect size.

In this study, independent-samples t-tests were performed to examine differences in demographic variables and Transtheoretical Model (TTM) constructs across gender, exercise status (sedentary vs. exercising), and age groups (≤40 vs. >40), separately for females and males. The findings are summarized below.

Gender Comparisons

Demographic analyses revealed significant gender differences. Females were significantly older than males, with a medium effect size. Males were significantly taller and heavier than females, both with large effect sizes. Body Mass Index showed no significant difference between genders **(Table 1)**.

Regarding the processes of change, females scored significantly higher than males on several cognitive/experiential subscales: *Dramatic Relief*, with a small effect size; *Self-Reevaluation*, with a small effect size; and *Social Liberation*, also with a small effect size. No significant gender differences emerged for *Consciousness Raising* or *Environmental Reevaluation*. Among behavioral processes, only *Self-Liberation* was significantly higher in females, with a small effect size. The remaining behavioral subscales—*Counterconditioning*, *Helping Relationships*, *Reinforcement Management*, and *Stimulus Control*—showed no significant differences.

When aggregate process scores were examined, females had significantly higher total cognitive process scores compared to males, with a small effect size. However, the difference in behavioral process total scores did not reach statistical significance, and the overall EPCS general total score also showed no significant gender difference.

For decisional balance, no significant gender differences were found for the *pros* subscale, the *cons* subscale, or the total EDBS score. Similarly, exercise self-efficacy did not differ significantly between females and males.

Exercise Status Comparisons in Females

Comparisons between sedentary and exercising females yielded no significant demographic differences for age, height, weight, or BMI.

Among cognitive/experiential processes, exercising females scored significantly higher than their sedentary counterparts on *Consciousness Raising*, with a large effect size, and *Self-Reevaluation*, with a medium effect size. *Environmental Reevaluation* approached significance with a small effect. No significant differences were observed for *Dramatic Relief* or *Social Liberation*.

For behavioural processes, exercising females demonstrated significantly higher scores on *Reinforcement Management*, with a medium effect size, and *Self-Liberation*, with a large effect

size. *Counterconditioning* approached significance with a medium effect, as did *Helping Relationships* and *Stimulus Control*, both with small effects.

Aggregate analyses revealed that exercising females scored significantly higher on cognitive processes total, behavioural processes total, and overall EPCS general total, all with medium effect sizes.

For decisional balance, exercising females showed a non-significant trend toward higher *pros* scores with a small effect, while *cons* and total EDBS did not differ. Most notably, self-efficacy was substantially higher in exercising females, with a very large effect size **Table 2)**.

Exercise Status Comparisons in Males

No demographic differences were found between sedentary and exercising males: age, height, weight, and BMI were all non-significant.

Exercising males scored significantly higher on all cognitive/experiential processes except *Social Liberation*: *Consciousness Raising*, with a large effect size; *Dramatic Relief*, with a large effect size; and *Self-Re-evaluation*, also with a large effect size. *Environmental Re-evaluation* approached significance with a small effect, while *Social Liberation* showed no difference.

For behavioural processes, exercising males scored significantly higher on all four subscales: *Counterconditioning*, with a large effect size; *Helping Relationships*, with a medium effect size; *Reinforcement Management*, with a large effect size; and *Self-Liberation*, with a large effect size. *Stimulus Control* approached significance with a medium effect.

Aggregate totals were all significantly elevated: cognitive total, behavioural total, and EPCS general total, all with large effect sizes.

Exercising males reported significantly higher *pros* with a medium effect size, and significantly lower *cons* with a large effect size. Total EDBS did not differ. Self-efficacy again showed the largest effect, with a very large effect size **(Table 3)**.

Age Comparisons in Females

Younger females (≤40) were significantly taller with a large effect, weighed less with a medium effect, and had lower BMI with a large effect, compared to older females (>40).

Critically, no significant age-related differences emerged for any TTM process subscale, aggregate process score, decisional balance measure, or self-efficacy. All effect sizes were uniformly small **(Table 4)**.

Age Comparisons in Males

Younger males (≤40) were significantly taller with a large effect and had lower BMI with a large effect. Weight did not differ between age groups.

As with females, no significant age group differences were found for any TTM variable: all process subscales, aggregate scores, decisional balance components, and self-efficacy yielded non-significant results. Effect sizes were consistently small **(Table 5)**.

Overall Interpretation

Exercise status, irrespective of gender, is the dominant factor differentiating psychological profiles. Active individuals consistently employ more cognitive and behavioural strategies and possess vastly superior self-efficacy compared to sedentary peers. Gender exerts a minor modulating role; active males uniquely exhibit a reconfigured decisional balance (higher pros, lower cons), while active females do not show this shift. Crucially, age (using the 40-year threshold) does not moderate any TTM construct in either sex. Self-efficacy emerges as the most robust and consistent discriminator between active and inactive individuals across all subgroups.

4. Discussion

This study examined gender, exercise status, and age-related differences in Transtheoretical Model (TTM) constructs among 118 Turkish adults aged 1505-1532 years. The primary findings revealed that exercise status, regardless of gender, emerged as the dominant factor differentiating psychological profiles, with active individuals consistently employing more cognitive and

behavioural strategies and demonstrating substantially higher self-efficacy compared to their sedentary counterparts. Gender exerted a minor modulating role, with active males uniquely exhibiting a reconfigured decisional balance characterized by higher pros and lower cons, while active females did not demonstrate this shift. Critically, age (using the 40-year threshold) did not moderate any TTM construct in either sex. Self-efficacy emerged as the most robust and consistent discriminator between active and inactive individuals across all subgroups.

Gender Differences in TTM Constructs

The finding that females scored significantly higher than males on several cognitive/experiential processes specifically Dramatic Relief, Self-Re-evaluation, and Social Liberation is consistent with previous research suggesting that women tend to utilize more emotional and socially-oriented strategies in health behaviour change (Cooney, 1996; Nigg & Courneya, 1998). This pattern may reflect broader gender-based socialization processes, wherein women are encouraged to be more emotionally expressive and interpersonally oriented (Schuster, 1986). The higher scores on Dramatic Relief suggest that female participants experience more intense emotional responses to health-related warnings and portrayals of inactivity, which aligns with findings that women are more attuned to health risk communication (Sallis et al., 1992).

The significantly higher Self-Re-evaluation scores among females indicate that women engage in greater cognitive and emotional reappraisal of their values with respect to exercise behaviour. This finding supports the work of Marcus, Pinto, Simkin, Audrain, and Taylor (1994) who reported that employed women demonstrated higher self-re-evaluation scores across stages of change. The heightened Social Liberation scores among females suggest that women are more aware of and receptive to societal and social influences encouraging physical activity, which may reflect the increasing cultural emphasis on fitness and body image for women in contemporary society (Dishman & Sallis, 1994).

The significantly higher Self-Liberation scores among females the only behavioural process showing gender difference indicate that women make stronger commitments and choices to change exercise behaviour. This finding is consistent with research by Jehue (2000), who found that adolescent females in stage-matched interventions demonstrated greater advancement in stages of exercise behaviour change compared to historical controls. However, the absence of significant gender differences in Counterconditioning, Helping Relationships, Reinforcement Management, and Stimulus Control suggests that men and women employ similar behavioural strategies when engaging in exercise, once they have committed to change.

The significantly higher total cognitive process scores among females, but comparable behavioural process and general total scores, align with the TTM's theoretical proposition that cognitive/experiential processes are more prominent in earlier stages of change, while behavioural processes become more salient in later stages (Prochaska & Marcus, 1994). This pattern may indicate that women in this sample are more likely to be in earlier stages of change, engaging more heavily with cognitive strategies before transitioning to behavioural ones.

The absence of gender differences in decisional balance (pros, cons, and total EDBS) and exercise self-efficacy is noteworthy. While some studies have reported gender differences in exercise-related self-efficacy (Sullum, Clark, & King, 2000), others have found no such differences when controlling for activity level (McAuley & Jacobson, 1991). The comparable self-efficacy scores between genders in this sample may reflect the increasing parity in exercise participation and confidence among Turkish adults, or may be attributable to the relatively active nature of the sample (approximately 70% of participants reported regular exercise).

The Impact of Exercise Status on TTM Constructs in Females

Exercising females demonstrated significantly higher scores on Consciousness Raising and Self-Re-evaluation, with large and medium effect sizes respectively. These findings are consistent with previous research demonstrating that individuals in later stages of change engage in more information-seeking and self-reflective processes (Marcus, Rossi, Selby, Niaura, & Abrams, 1992; Gorely & Gordon, 1995). The near-significant trend for Environmental Re-evaluation suggests that active females are also more aware of how their inactivity affects their physical and social environments, consistent with findings by Tseng (2000) among elderly adults in assisted living facilities.

Among behavioural processes, active females scored significantly higher on Reinforcement Management and Self-Liberation, with medium and large effect sizes respectively. This pattern indicates that regular exercisers are more likely to reward themselves for exercise participation and make firm commitments to maintain their exercise behaviour. The trending differences for Counterconditioning, Helping Relationships, and Stimulus Control (all medium to small effects) suggest that active females also employ substitution strategies, seek social support, and manage environmental cues to a greater extent than their sedentary counterparts. These findings align with the TTM's proposition that behavioral processes become increasingly important in later stages of change (Prochaska & DiClemente, 1983).

The aggregate analyses revealed that exercising females scored significantly higher on cognitive processes total, behavioral processes total, and overall EPCS general total, all with medium effect sizes. This comprehensive utilization of both cognitive and behavioral strategies among active females supports research by Wadsworth and Hallam (2007) and Dishman, Vandenberg, Motl, and Nigg (2010), who found that individuals employ both types of processes in maintaining physical activity.

For decisional balance, exercising females showed a non-significant trend toward higher pros scores with a small effect, while cons and total EDBS did not differ. This finding diverges from the TTM's theoretical expectation that pros should increase and cons should decrease across stages of change (Marcus, Rakowski, & Rossi, 1992; Prochaska et al., 1994). One possible explanation is that the female participants in this study may have already internalized the benefits of exercise, making the pros less distinguishing between active and inactive groups. Alternatively, the cons of exercise may be more salient for women, mitigating the difference in decisional balance.

Most notably, self-efficacy was substantially higher in exercising females, with a very large effect size (Cohen's d = 1.27). This finding is consistent with a substantial body of literature demonstrating that self-efficacy is one of the strongest correlates of physical activity behaviour (Bandura, 1997; Marcus, Selby, Niaura, & Rossi, 1992; McAuley & Mihalko, 2005). The very large effect size underscores the critical importance of self-efficacy in understanding exercise behaviour, particularly among women, and supports the use of self-efficacy-enhancing strategies in exercise interventions.

The Impact of Exercise Status on TTM Constructs in Males

Exercising males scored significantly higher on all cognitive/experiential processes except Social Liberation, with large effect sizes for Consciousness Raising, Dramatic Relief, and Self-Re-evaluation. This pattern indicates that active men engage in substantially more information-seeking, emotional processing, and self-reflection regarding their exercise behaviour compared to sedentary men. The large effect sizes (Cohen's d ranging from 1.18 to 1.42) suggest that these cognitive processes are particularly discriminating between active and inactive men, more so than for women. The absence of a difference for Social Liberation may reflect that men are less influenced by social norms and cultural pressures regarding exercise, consistent with findings that women are more

responsive to social influences in health behaviour (Sallis et al., 1992).

For behavioural processes, exercising males scored significantly higher on all four subscales: Counterconditioning, Helping Relationships, Reinforcement Management, and Self-Liberation. The large effect sizes for Counterconditioning, Reinforcement Management, and Self-Liberation (Cohen's d = 1.18, 0.95, and 1.22 respectively) indicate that active men employ substantially more behavioural strategies compared to sedentary men. The medium effect size for Helping Relationships (Cohen's d = 0.68) suggests that social support may be somewhat less critical for men in maintaining exercise behavior, which is consistent with research suggesting that men are less reliant on social networks for health behaviour maintenance (Carron, Hausenblas, & Mack, 1996).

The aggregate analyses revealed that exercising males scored significantly higher on cognitive processes total, behavioural processes total, and EPCS general total, all with large effect sizes. This comprehensive utilization of strategies suggests that active men engage in a wide array of change processes, employing both cognitive and behavioural strategies extensively.

For decisional balance, exercising males reported significantly higher pros with a medium effect size and significantly lower cons with a large effect size. This pattern aligns with the TTM's theoretical framework (Marcus, Rakowski, & Rossi, 1992; Prochaska et al., 1994) and suggests that for men, perceiving greater benefits and fewer costs of exercise is strongly associated with regular exercise participation. The large effect for cons indicates that reducing perceived barriers is particularly important for men in adopting and maintaining exercise behaviour.

As with females, self-efficacy showed the largest effect for males (Cohen's d = 1.31), with exercising males reporting substantially higher confidence in their ability to exercise under challenging circumstances. This finding reinforces the centrality of self-efficacy in exercise behaviour across both genders.

Comparison of Exercise Status Effects by Gender

While both active females and active males demonstrated higher scores on most TTM constructs compared to their sedentary counterparts, several notable differences emerged. The effect sizes for cognitive processes appeared somewhat larger for males than females, suggesting that cognitive engagement may be more strongly associated with exercise status for men. The large effect sizes for Counterconditioning, Reinforcement Management, and Self-Liberation among men, compared to medium effects among women, indicate that behavioural processes may also be more distinguishing for men.

The most striking difference was observed in decisional balance: active males showed a reconfigured decisional balance with higher pros and lower cons (medium and large effects), while active females showed only a non-significant trend toward higher pros (small effect) and no difference in cons. This finding suggests that the decision-making calculus may differ between genders, with women's exercise behaviour being less dependent on the relative weighing of pros and cons. One possible explanation is that women may exercise for reasons that transcend simple cost-benefit analysis, such as social or emotional reasons (Allison et al., 2005; Biddle, Gorely, & Stensel, 2004), or that women's perceived barriers to exercise may be more entrenched and less responsive to the benefits of exercise.

Age Comparisons

The absence of significant age-related differences in any TTM construct for both females and males is a notable finding. Despite younger participants (≤40 years) being taller and having lower BMI in both genders, no differences emerged in processes of change, decisional balance, or self-efficacy. This pattern contrasts with research suggesting that physical activity declines with age (Schoenborn, 1986; van Mechelen & Kemper, 1995) and that older adults may have different motivations and barriers to exercise (Tseng, 2000).

Several explanations may account for this finding. First, the age range in this study (1505-1532 years) may not capture the most dramatic declines in physical activity, which tend to occur in the transition from adolescence to young adulthood and in late old age (Dishman, 1994). Second, the 40-year threshold used in this study may not be the optimal cut point for age-related differences in TTM constructs. Third, the relatively high proportion of active participants in this sample (approximately 70%) may have obscured age-related differences, as active individuals across age groups may be more psychologically similar than active versus inactive individuals.

The uniform small effect sizes for all age comparisons suggest that age, at least within this range, does not meaningfully moderate the relationship between TTM constructs and exercise behaviour. This finding supports the argument that psychological factors may be more important than chronological age in understanding exercise behaviour (Dishman & Sallis, 1994; Rejeski, 1992). Future research should explore whether more distal age comparisons (e.g., young adults versus older adults) yield different patterns.

Self-Efficacy as the Most Robust Predictor

Across all analyses, self-efficacy emerged as the most robust and consistent discriminator between active and inactive individuals. The very large effect sizes (Cohen's d = 1.27 for females and 1.31 for males) underscore the centrality of confidence in one's ability to exercise in determining actual exercise behaviour. This finding is consistent with a substantial body of literature demonstrating that self-efficacy is one of the strongest correlates and predictors of physical activity across diverse populations (Bandura, 1997; McAuley & Mihalko, 2005; Sallis, Hovell, & Hofstetter, 1992).

The importance of self-efficacy can be understood through Bandura's (1977, 1997) social cognitive theory, which posits that self-efficacy influences behaviour through four primary mechanisms: (1) choice of activities and avoidance of threatening situations, (2) effort expenditure and persistence in the face of obstacles, (3) thought patterns and emotional responses, and (4) the amount of stress experienced when engaging in challenging activities. Individuals with high exercise self-efficacy are more likely to choose to exercise, persist when confronted with barriers (e.g., time constraints, bad weather, fatigue), maintain positive thoughts about their ability to exercise, and experience less stress when exercising.

The very large effect sizes observed in this study suggest that interventions designed to enhance exercise self-efficacy may be particularly effective in promoting exercise adoption and maintenance. Strategies for enhancing self-efficacy include providing opportunities for mastery experiences (e.g., achieving progressively more challenging exercise goals), vicarious experiences (e.g., observing others successfully exercise), verbal persuasion (e.g., encouragement from health professionals and significant others), and management of physiological states (e.g., reframing exercise-related symptoms) (Bandura, 1997; McAuley & Mihalko, 2005).

Implications for Practice

The findings of this study have several implications for health promotion and exercise intervention efforts. First, the consistent association between exercise status and use of both cognitive and behavioural processes of change suggests that interventions should target both types of strategies. Educational components that increase awareness of exercise benefits and promote self-reflection should be combined with behavioural components that teach specific strategies for integrating exercise into daily life, such as goal-setting, self-reward, and environmental restructuring.

Second, the finding that active males and females differ in their decisional balance patterns suggests that gender-specific intervention approaches may be warranted. For men, interventions that explicitly highlight the benefits of exercise and address perceived barriers may be particularly effective, as the present study found that active men had higher pros and lower cons compared to sedentary men. For women, the association between pros and cons and exercise status was

weaker, suggesting that interventions might benefit from focusing on other factors, such as social support, emotional benefits, and self-efficacy enhancement.

Third, the universal importance of self-efficacy across all subgroups suggests that self-efficacy enhancement should be a core component of any exercise intervention. Strategies such as progressive goal-setting, verbal encouragement, and modeling may help to build confidence in individuals' ability to engage in regular exercise. These strategies are particularly important for sedentary individuals, who demonstrated substantially lower self-efficacy in this study.

Fourth, the absence of age differences in TTM constructs suggests that interventions can be applied across the 1505-1532 age range without major modifications related to age. This finding supports the use of TTM-based interventions across broad age ranges, as the psychological processes underlying exercise behaviour appear to be relatively stable across middle adulthood.

Finally, the comprehensive assessment of TTM constructs in this study provides a foundation for developing targeted, theoretically-grounded interventions for the Turkish adult population. The findings suggest that interventions should address not only behavioural strategies but also the cognitive processes that underpin exercise adoption and maintenance, with particular attention to self-efficacy enhancement.

Limitations and Future Directions

Several limitations should be considered when interpreting these findings. **First**, the cross-sectional design precludes causal conclusions about the relationships between TTM constructs and exercise behaviour. Future research using longitudinal designs would help clarify whether changes in TTM constructs precede or follow changes in exercise behaviour (Maddison & Prapavessis, 2006). **Second**, the reliance on self-report measures introduces the possibility of social desirability bias and recall errors. Future studies might incorporate objective measures of physical activity, such as accelerometry or pedometry, to complement self-report data. **Third,** the sample was relatively homogenous in terms of geographic location (Kayseri Province) and ethnic composition. Replication studies with more diverse samples are needed to establish the generalizability of these findings to other populations. **Fourth**, the study did not assess other potentially relevant variables such as health status, exercise history, or socioeconomic status. Future research should examine whether these variables moderate the relationships observed in this study. **Fifth**, the relatively small sample size (N = 118) may have limited the power to detect small effects. Future studies with larger samples might reveal additional gender and age differences not identified in the present study. **Sixth**, the study did not examine stage of change distributions in detail. Given that exercise behaviour varies substantially by stage, understanding how TTM constructs differ by stage in addition to by gender and age would provide a more complete picture of the psychological factors underlying exercise behaviour.

5. Conclusion

This study examined gender, exercise status, and age-related differences in TTM constructs among Turkish adults aged 1505-1532 years. The findings revealed that exercise status, irrespective of gender, emerged as the dominant factor differentiating psychological profiles, with active individuals consistently employing more cognitive and behavioural strategies and demonstrating substantially higher self-efficacy compared to sedentary peers. Gender exerted a minor modulating role; active males uniquely exhibited a reconfigured decisional balance characterized by higher pros and lower cons, while active females did not demonstrate this shift. Critically, age (using the 40-year threshold) did not moderate any TTM construct in either sex.

Self-efficacy emerged as the most robust and consistent discriminator between active and inactive individuals across all subgroups, underscoring its centrality in understanding exercise behaviour. The findings suggest that

effective exercise interventions should target both cognitive and behavioural processes of change, with particular attention to enhancing self-efficacy. Gender-sensitive approaches that address differences in decisional balance between men and women may enhance intervention effectiveness. The absence of age effects suggests that TTM-based interventions can be applied across middle adulthood without major modifications.

The present study contributes to the limited literature on TTM constructs in Turkish adults and provides a foundation for developing culturally sensitive, theoretically-grounded interventions to promote physical activity in this population. Given the public health importance of increasing physical activity levels, such interventions have the potential to substantially reduce the burden of chronic disease and improve quality of life for Turkish adults.

References

Allison, K. R., Dwyer, J. M., Goldenberg, E., Fein, A., Yoshida, K. K., & Boutilier, M. (2005). Male adolescents' reasons for participating in physical activity, barriers to participation, and suggestions for increasing participation. *Adolescence, 40*(157), 1505-1532.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 1505-1532.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: W. H. Freeman.

Barrett, B. S. (1997). *An application of the transtheoretical model to physical activity* [Doctoral dissertation, University of Minnesota]. ProQuest Dissertations Publishing.

Biddle, S. J. H., Gorely, T., & Stensel, D. J. (2004). Health-enhancing physical activity and sedentary behaviour in children and adolescents. *Journal of Sports Sciences, 22*(8), 1505-1532.

Bridley, A. S. (2013). *The impact of a dance aerobics program on middle school girls' physical activity level, self-efficacy, and decisional balance* [Doctoral dissertation, The University of Southern Mississippi]. ProQuest Dissertations Publishing.

Can, S., & Aksoy, Y. (2020). Farklı yaş gruplarındaki kadınlarda egzersiz öz-yeterliği ve fiziksel aktivite düzeyinin incelenmesi [Investigation of exercise self-efficacy and physical activity level in women of different age groups]. *Egzersiz ve Spor Bilimleri Dergisi, 8*(1), 1505-1532.

Carron, A. V., Hausenblas, H. A., & Mack, D. (1996). Social influence and exercise: A meta-analysis. *Journal of Sport and Exercise Psychology, 18*(1), 1505-1532.

Chung, M.-H. (2001). *Effects of the transtheoretical model on physical activity, determinants, and perceived barriers of high school female students* [Doctoral dissertation, University of Northern Colorado]. ProQuest Dissertations Publishing.

Cooney AL. (1996). The transtheoretical model and ıts application to adolescents' physical activity behavior. University of Alberta Faculty of Physical Education and Recreation. Master of Arts. Edmonton. AB Nielsen.

Cooney, A. L. (1996). *The transtheoretical model and its application to adolescents' physical activity behavior* [Master's thesis, University of Alberta].

Dishman, R. K. (1994). *Advances in exercise adherence*. Human Kinetics.

Dishman, R. K., & Sallis, J. F. (1994). Determinants and interventions for physical activity and exercise. In C. Bouchard, R. J. Shephard, & T. Stephens (Eds.), *Physical activity, fitness, and health: International proceedings and consensus statement* (pp. 1505-1532). Champaign, IL: Human Kinetics.

Dishman, R., Vandenberg, R., Motl, R., & Nigg, C. (2010). Using constructs of the transtheoretical model to predict classes of change in regular physical activity: A multi-ethnic longitudinal cohort study. *Annals of Behavioral Medicine, 40*(2), 1505-1532.

Erol, S., & Erdoğan, S. (2007). Sağlık davranışlarını geliştirmek ve değiştirmek için transteoretik modelin kullanılması [Use of the transtheoretical model to develop and change health behaviors]. *Atatürk Üniversitesi Hemşirelik Yüksekokulu Dergisi, 10*(2), 1505-1532.

Frucht, S. S. (1998). *An application of the transtheoretical model of behavior change to the adoption of cholesterol-lowering behaviors by college students* [Doctoral dissertation, University of Missouri-Kansas City]. ProQuest Dissertations Publishing.

Gorely, T., & Gordon, S. (1995). An examination of the transtheoretical model and exercise behavior in older adults. *Journal of Sport and Exercise Psychology, 17*(3), 1505-1532.

Gümüş, Y., & Kitiş, Y. (2015). Egzersiz davranış değişimi ölçeklerinin geçerlik ve güvenirliği. *Hacettepe Üniversitesi Hemşirelik Fakültesi Dergisi*, *2*(3), 1505-1532.

Jehue, D. M. (2000). *The effects of a stage-based intervention program on physical activity levels, self-efficacy, perceived barriers, and stages of exercise behavior in high school females* [Doctoral dissertation, University of Northern Colorado].

Maddison, R., & Prapavessis, H. (2006). Exercise behavior among New Zealand adolescents: A test of the transtheoretical model. *Pediatric Exercise Science, 18*(3), 1505-1532.

Marcus, B. H., & Owen, N. (1992). Motivational readiness, self-efficacy, and decision-making for exercise. *Journal of Applied Social Psychology, 22*(1), 1505-1532.

Marcus, B. H., Pinto, B. M., Simkin, L. R., Audrain, J. E., & Taylor, E. R. (1994). Application of theoretical models to exercise behavior among employed women. *American Journal of Health Promotion, 9*(1), 1505-1532.

Marcus, B. H., Rakowski, W., & Rossi, J. S. (1992). Assessing motivational readiness and decision making for exercise. *Health Psychology, 11*(4), 1505-1532.

Marcus, B. H., Rossi, J. S., Selby, V. C., Niaura, R. S., & Abrams, D. B. (1992). The stages and processes of exercise adoption and maintenance in a worksite sample. *Health Psychology, 11*(6), 1505-1532.

Marcus, B. H., Selby, V. C., Niaura, R. S., & Rossi, J. S. (1992). Self-efficacy and the stages of exercise behavior change. *Research Quarterly for Exercise and Sport, 63*(1), 1505-1532.

McAuley, E., & Jacobson, L. (1991). Self-efficacy and exercise participation in sedentary adult females. *American Journal of Health Promotion, 5*(3), 1505-1532.

McAuley, E., & Mihalko, S. L. (2005). The role of self-efficacy in exercise behavior. In D. L. Feltz, L. R. Brawley, & E. McAuley (Eds.), *Advances in sport and exercise psychology measurement* (pp. 1505-1532). Morgantown, WV: Fitness Information Technology.

Nigg, C. R. (2021). Transtheoretical model: Research review of exercise behavior and older adults. In P. Burbank & D. Riebe (Eds.), *Promoting exercise and behavior change in older adults: Interventions with the transtheoretical model* (pp. 1505-1532). New York, NY: Springer.

Nigg, C. R., & Courneya, K. S. (1998). Transtheoretical model: Examining adolescent exercise behavior. *Journal of Adolescent Health, 22*(3), 1505-1532.

Nigg, C. R., & Courneya, K. S. (1998). Transtheoretical model: Examining adolescent exercise behavior. *Journal of Adolescent Health, 22*(3), 1505-1532.

Öztürk, M. (2017). Yetişkin erkeklerde fiziksel aktivite düzeyi ile algılanan yararlar ve engeller arasındaki ilişki [The relationship between physical activity level and perceived benefits and barriers in adult men]. *Ankara Üniversitesi Spor Bilimleri Fakültesi Dergisi, 5*(2), 1505-1532.

Prochaska JO, DiClemente CC. (1982).Transtheoretical therapy toward a more integrative model of change. Psychotherapy: Theory, Research & Practice; 19: 1505-1532.

Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology, 51*(3), 1505-1532.

Prochaska, J. O., & Marcus, B. H. (1994). The transtheoretical model: Applications to exercise. In R. K. Dishman (Ed.), *Advances in exercise adherence* (pp. 1505-1532). Human Kinetics.

Prochaska, J. O., Velicer, W. F., Rossi, J. S., Goldstein, M. G., Marcus, B. H., Rakowski, W., & Rossi, S. R. (1994). Stages of change and decisional balance for 12 problem behaviors. *Health Psychology, 13*(1), 1505-1532.

Rejeski, W. J. (1992). Motivation for exercise behavior: A critique of theoretical directions. In G. C. Roberts (Ed.), *Motivation in sport and exercise* (pp. 1505-1532). Champaign, IL: Human Kinetics.

Sallis, J. F., Hovell, M. F., & Hofstetter, C. R. (1992). Predictors of adoption and maintenance of vigorous physical activity in men and women. *Preventive Medicine, 21*(2), 1505-1532.

Schoenborn, C. A. (1986). Health habits of U.S. adults: The "Alameda 7" revisited. *Public Health Reports, 101*(6), 1505-1532.

Schuster, C. (1986). Development of a concept of sexuality. In C. Schuster & S. S. Ashburn (Eds.), *The process of human development* (pp. 1505-1532). Little, Brown.

Spencer, L., Adams, T. B., Malone, S., Roy, L., & Yost, E. (2006). Applying the transtheoretical model to exercise: A systematic and comprehensive review of the literature. *Health Promotion Practice, 7*(4), 1505-1532.

Sullum, J., Clark, M. M., & King, T. K. (2000). Predictors of exercise relapse in a college population. *Journal of American College Health, 48*(4), 1505-1532.

Tseng, Y.-H. (2000). *Examining exercise determinants in elders residing in assisted living facilities: An application of the transtheoretical model* [Doctoral dissertation, University of Minnesota].

Van Mechelen, W., & Kemper, H. C. G. (1995). Habitual physical activity in longitudinal perspective. In H. C. G. Kemper (Ed.), *The Amsterdam growth study: A longitudinal analysis of health, fitness, and lifestyle* (pp. 1505-1532). Champaign, IL: Human Kinetics.

Wadsworth, D. D., & Hallam, J. S. (2007). The use of the processes of change across the exercise stages of change and across varying intensities and frequencies of exercise behavior. *American Journal of Health Promotion, 21*(5), 1505-1532.

Warburton, D. E. R., & Bredin, S. S. D. (2017). Health benefits of physical activity: A systematic review of current systematic reviews. *Current Opinion in Cardiology, 32*(5), 1505-1532.

World Health Organization. (2009). *Global health risks: Mortality and burden of disease attributable to selected major risks*. Geneva, Switzerland: World Health Organization.

Yıldız, S., & Kara, B. (2020). Orta yaşlı kadınların egzersiz davranışı ve ilişkili psikososyal faktörler [Exercise behavior and related psychosocial factors in middle-aged women]. *Turkish Journal of Geriatrics, 23*(4), 1505-1532.

7. Acknowledgements (Optional)

The authors would like to extend their sincere thanks to anyone who contributed to this study.

This study was supported by Çukurova University Scientific Research Projects as project number TDK-1505-15325.

8. Author Declaration

The authors confirm the originality of this study.

The author declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.