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# JOURNAL OF HEALTH, SPORTS, & KINESIOLOGY

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Research Critique

Open Access

# The Efficiency of Dynamic vs General Exercise for Posture Control Dealing with Low Back Pain

Michael Mendoza & MinHyuk Kwon

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## Abstract

Mechanical low back pain is brought on by associated factors, such as muscular imbalances, excess muscular stress, and improper posture. Proper posture is vital for treating low back pain because of its unloading effects on the spine. Thus, the purpose of this critiqued article is to explore which is an effective and functional exercise that can be done at any time for posture.

**Keywords:** exercise, posture, mechanical low back pain

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## Methods

Thirty adults (20-30 years old, 14 males and 16 females) with chronic as opposed to acute or surgery, mechanical low back pain were splitted into Dynamic Sitting Exercise (DSE) and Spinal Extension Exercise (SEE). DSE subject is unloading the spine using the arms while sitting in an upright position. SEE subject is laying prone in elbow position doing a press up with straight arms. Testing was conducted 3 days per week for 6 weeks. Back pain was measured by Visual Analogue Scale (VAS), lumbar mobility by Modified-Modified Schober Test (MMST), and quality of life through subject self-reporting using the (SF-36) health survey before and after the examination. Data were analyzed using paired t-test and Mann-Whitney U-test.

## Results

A greater improvement has been shown in pain (VAS;  $z = 3.81, p < .05$ ) with DSE in comparison to SEE. Greater lumbar mobility (MMST;  $z = 1.99, p < 0.05$ ) increase with DSE in comparison to SEE. A higher quality of life (SF-36;  $z = 4.16, p < 0.05$ ) with DSE in comparison to SEE was reported. Overall, the DSE proved more effective (see Table 1).

## Discussion

DSE works better because of its decompressing action unloading the disc in the spine without straining the lumbar muscles through excess abdominal activation compared to SEE. 6 weeks of DSE training is more efficient for adults with mechanical low back pain compared to SEE. DSE relieves more pressure off the mechanoreceptors leading

to greater reduction in pain while also increasing blood flow to the lumbar muscles.

Table 1. Mean and Standard Deviation of Pre- and post-Test Outcome Measures of Adults with Mechanical Low Back Pain in Between Groups. Adapted from Das, D., & Venkatesan, R. (2020, p. 85).

Sl. No	Outcome Measures	Pre-Test (n = 30)		Post-Test (n = 30)	
		Dynamic Sitting Exercise (DSE) (n = 15)	Spinal Extension Exercise (SEE) (n = 15)	Dynamic Sitting Exercise (DSE) (n = 15)	Spinal Extension Exercise (SEE) (n = 15)
		Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
1	<b>Pain (VAS)</b>	5.33 ± 1.04	5.47 ± .89	3.53 ± 1.06	4.67 ± .62
2	<b>Lumbar Mobility (MMST)</b>	17.93 ± 1.41	N/A	18.73 ± 1.43	N/A
3	<b>Quality of Life (SF-36)</b>	51.00 ± 5.90	51.76 ± 5.65	76.70 ± 7.85	62.56 ± 4.08
<b>Between Group Comparison</b>		VAS: z = 1.81, p > .05 MMST: z = 0.70, p > .05 SF-36: z = 0.25, p > .05		VAS: z = 3.81, p < .05 MMST: z = 1.99, p < .05 SF-36: z = 4.16, p < .05	

Note: Between group comparisons using paired t-test and Mann-Whitney U-test. N/A = Not Available.

### Critique

The study demonstrates the efficiency advantage of DSE in comparison to SEE with their improvements in pain, lumbar mobility, and quality of life. Defining comparisons were made between the two methods allowing us to understand DSE's decompression effect on intervertebral disc as opposed to SEE's strain on lumbar muscles. The results can be interpreted and used by anyone with mechanical low back pain so they may implement the DSE routine into their daily life. The only limitations include self-reporting quality of life with SF-36 survey and sample size. Adding a different means of measuring quality of life and larger sample size (100+) would improve experiment for a follow up study.

### Reference

Das, D., & Venkatesan, R. (2020). Dynamic sitting exercise versus spinal extension exercise on pain, lumbar mobility and quality of life in adults with mechanical low back pain. *Indian Journal of Physiotherapy & Occupational Therapy*, 14(1). Doi: 10.5958/0973-5674.2020.00015.5



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# The Effect of Hand-Held Technology on Thumb Biomechanics

Charisma Byrd & MinHyuk Kwon

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## Abstract

The rise of portable units calls attention to the impact of device design and its challenges to biomechanical capabilities of the thumb and increased musculoskeletal discomfort. The purpose of this critiqued article, therefore, is to understand the significance of thumb biomechanics on hand-held technology and upper extremity pain.

**Keywords:** user interface design, thumb swipe gestures, thumb posture

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## Methods

Healthy sixteen right-handed participants (21–40 years) performed a multitude of swiping gestures with the thumb of their right hand on 8" and 10" tablets (Samsung Galaxy III). The swiping gestures differed in swipe direction (outward v. inward), swipe orientation (horizontal v. vertical), swipe location (4 swipe zones), and swipe length (short v. long). Data was acquired using a custom Android application, thumb/wrist posture and forearm muscle activity was quantified using three-dimensional motion analysis and surface electromyograph, respectively. Data was analyzed using repeated measures of ANOVA. Self-reported perceived wrist and hand discomfort was measured using a visual analogue scale after each trial.

## Results

Swiping actions closest to the palm rendered less pain, decreased forearm muscle activity, neutral thumb biomechanics and wrist posture. The left zones had greatest metacarpal (16°) and carpometacarpal abduction (10°) and topmost wrist movement, ulnar deviation (18°) and extension (14°) (Table 1), compared to the right zones. Regarding tablet orientation, portrait mode of both devices amassed more muscle activity related to landscape mode.

## Discussion

The limits of upper extremities and thumb biomechanics can be seen in specific swipe locations of hand-held technology. The p-values for wrist extension ( $p < 0.01$ ) and ulnar deviation ( $p < 0.03$ ) on tablet size and orientation

quantitatively illustrate the poor wrist posture commonly adopted by users under these conditions. Swipe zone results proved users had best performance and lower discomfort rates when gestures were performed near the palm. Carpometacarpal abduction data found high joint angles during trials on the left side of the tablet and no movement (0°) on the right side. This constant biomechanical exertion to swipe in out-of-reach areas may lead to musculoskeletal disorders or pain. The results suggest tablet hardware and user interface design to allow for neutral thumb and wrist posture while accounting for decreased muscle demands.

Table 1. Joint Angles (°) Measured Relative to Thumb and Wrist Posture of the Two-Handed Grip for 8" and 10" Tablets.

	Tablet Size		Tablet Orientation		Swipe Zone <sup>a</sup>						
	P-Value*	8"	10"	P-Value	Portrait	Landscape	P-Value	TL	TR	BL	BR
<b>Wrist</b>											
Extension (°)	<b>.01</b>	12	14	.55	12	12	< .001	14	11	13	11
Ulnar Deviation (°)	.09	15	16	<b>.03</b>	14	16	< .001	18	16	15	13
<b>Carpometacarpal</b>											
Abduction (°)	.32	3	4	.22	3	4	< .001	7	0	10	0
<b>Metacarpal</b>											
Abduction (°)	.65	14	14	.58	15	14	< .001	16	11	17	10

<sup>a</sup> TL= top left, TR=top right, BL=bottom left, BR=bottom right

\* Bold values indicate a significant effect (p < 0.05). Repeated Measures ANOVA with participant as random variable, Tablet Size (2 levels), Tablet Orientation (2 levels), Swipe Zone (4 levels) as fixed effect.

### Critique

The purpose of the study was to identify the effect of hand-held technology on thumb biomechanics, thumb/wrist posture, and forearm muscle activity. The findings demonstrated increased user performance and lower musculoskeletal pain while performing gestures closer to the palm. The authors' ability to pinpoint the specific location where users experienced greatest extension, abduction, pain, and forearm muscle activation (top left zone) was one of the articles supreme strengths. Nonetheless, the study should be considered within context of its limitations. A limitation within the experiment was the criteria to be a participant. The study did not inquire about the amount of time users usually spent on their device in a normal week, this may give evidence to the biomechanical loads their thumb and upper extremities are accustomed to. A suggestion for research design is to improve participant criterion. Users thumb strength can be quantified with the pinch test or examined through manual muscle tests to indicate a correlation between thumb strength and participant perception of fatigue post-trial(s).

### Reference

Coppola, S. M., Lin, M. Y. C., Schilkowsky, J., Arezes, P. M., & Dennerlein, J. T. (2018). Tablet form factors and swipe gesture designs affect thumb biomechanics and performance during two-handed use. *Applied Ergonomics*, 69, 40-46. doi:https://doi.org/10.1016/j.apergo.2017.12.015



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Research Abstract

Open Access

# Associations Between Adiposity and Muscular Strength in Healthy Adults

Ethan Clark, Dorin Drignei, & Elise Brown

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## Abstract

Excessive adipose tissue has deleterious effects on the physiology of humans, including consequences related to skeletal muscle performance. Since adiposity is assessed using various tools, the relationship between adiposity and muscular strength is not well understood. The purpose of this study was to examine the relationship between adiposity and normalized strength (NS) in healthy United States adults and determine if sex differences existed.

**Keywords:** adiposity, muscular strength, healthy adult

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## Methods

One hundred forty (140) healthy males and females aged 18-40 years participated in this study. Data were collected during two sessions separated by at least 48 hours. During session one, measurements performed included skinfold analysis (3-site test; Jackson Pollock nomogram was used to estimate body fat percentage), waist circumference (WC), height, and body mass. During session two, participants performed a one-repetition maximum (1RM) test in the barbell bench press exercise. Muscular strength was normalized by dividing 1RM values by body mass. Linear regression was used to explore the participant's NS values in relation to their body fat percentage (BF%), body mass index (BMI), WC, and waist-to-height ratio (WtHR) values.

## Results

Inverse associations were found between BF% and NS in both males ( $p < 0.0001$ , parameter estimate: -0.0354) and females ( $p = 0.0147$ , parameter estimate: -0.0084); positive associations were found between BMI and NS for both males ( $p = 0.0031$ , parameter estimate: 0.0509) and females ( $p = 0.0098$ , parameter estimate: 0.0211); an inverse association between WC and NS was exhibited only amongst females ( $p = 0.0370$ , parameter estimate: -0.0111), and no significant associations were observed between WtHR and NS for either sex.

## Discussion

Higher BF% is associated with lower NS in both sexes, and higher abdominal adiposity is associated with decreased NS only in females. These data highlight the importance of including measures of adiposity and abdominal adiposity in routine clinical practice and in fitness settings.



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Research Abstract

Open Access

# Effects of a 12-Week Lifestyle Intervention on Novel Biomarkers for Type 2 Diabetes (T2D) in Obese Latino Youth

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Gabriel Q. Shaibi<sup>2</sup>, & Joon Young Kim<sup>1</sup>

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## Abstract

In obese non-diabetic youth, glucose response curve (GRC) and 1-hr glucose concentration during an oral glucose tolerance test (OGTT) represent novel biomarkers for T2D risk. Obese youth with monophasic- vs. biphasic-GRC and 1-hr glucose concentration of  $\geq 155$  (Above155) vs.  $< 155$  mg/dL (Below155) are at increased risk for T2D. However, to date, it is unknown whether these OGTT-derived phenotypes can be improved in response to any interventions, thereby hindering their practical use as indicators of intervention effectiveness. The purpose of this was to investigate the effects of lifestyle intervention on OGTT-GRC and 1-hr glucose concentration in obese Latino youth at increased risk for T2D.

**Keywords:** Type 2 diabetes risk, glucose response curve, 1-hr glucose concentration, lifestyle intervention

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## Methods

Sixteen obese Latino youth (age  $15.6 \pm 0.9$  years; 7M/9F; body mass index %tile =  $98.3 \pm 1.2$ ) completed a 12-week lifestyle intervention that included weekly nutrition education and 180 minutes of moderate-vigorous exercise per week. All participants completed a 2-hr OGTT before and after the lifestyle intervention to assess changes in OGTT-GRC & 1-hr glucose as well as other pathophysiological risk factors including insulin sensitivity index, insulinogenic index, and oral disposition index (oDI). Chi-square and paired *t* test were used to compare changes in response to the intervention.

## Results

At baseline, the prevalence of biphasic-GRC and Below155 was 12.5% and 43.8%, respectively. After the 12-week intervention, OGTT-derived phenotypes were improved, exhibiting significant increases in the prevalence of biphasic-GRC (37.5%,  $P=0.05$ ) and Below155 (75%,  $P=0.042$ ). Together with improvement on GRC and 1-hr glucose, oDI was enhanced (Pre:  $7.36 \pm 6.20$  vs. Post:  $8.16 \pm 5.13$ ,  $P<0.05$ ), despite no improvement in insulin sensitivity index and insulinogenic index.

## Discussion

A 12-week lifestyle intervention is efficacious in improving glucose response curve and 1-hr glucose concentration during an OGTT in conjunction with  $\beta$ -cell improvement in obese Latino youth. Our data further suggest that these emerging T2D risk biomarkers have prospective utility in terms of assessing change following interventions/therapeutic trials.



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# The Effect of Stride Frequency on Running Economy and Running Distance During High Intensity Treadmill Running

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## Abstract

Running economy (RE; ml·kg<sup>-1</sup>·km<sup>-1</sup>) considers as a valid predictor of endurance running performance. Theoretically, improving RE allows runners to cover more distance at constant speed or run faster at a given distance. Stride frequency (SF) is one of the important parameters that affects running performance. The purpose of this study was to investigate the effect of SF on RE and distance while running on the treadmill at the speed of VO<sub>2</sub>max (sVO<sub>2</sub>max) until volitional fatigue. The second purpose was to determine a relationship between RE and running distance during high intensity running. We hypothesized that both RE and running distance would affect significantly by SF variations and there is a positive relationship between RE and running distance.

**Keywords:** running economy, stride frequency, high intensity running performance

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## Methods

Ten male recreational runners (age: 25.8 ± 5.0 yrs, height: 171.4 ± 6.2 cm, mass: 71.9 ± 7.5 kg) completed total seven experimental sessions including graded exercise test and running session for determining VO<sub>2</sub>max (55.4 ± 5.9 ml·kg<sup>-1</sup>·min<sup>-1</sup>) and preferred SF (PSF; 88.0 ± 3.9 strides/min), respectively. Running speed was calculated based on VO<sub>2</sub>max using the metabolic equation; VO<sub>2</sub> (ml·kg<sup>-1</sup>·min<sup>-1</sup>) = [0.2 × Speed(m/min)] + 3.5(ml·kg<sup>-1</sup>·min<sup>-1</sup>). Participants performed five separate running sessions (PSF, ±5%, ±10%) on the treadmill at the sVO<sub>2</sub>max with 0% gradient until volitional fatigue. A computer-based metronome was played in order to help maintain a target SF while running.

## Results

The running distance was significantly different among SF variations (p < 0.01) and all participants ran the greater distance at 105% PSF. However, RE was not statistically significant (p = 0.19) across the SF conditions. There was a low correlation between RE and running distance (r = 0.214, p = 0.14).

## Discussion

SF variations have a significant influence on running distance, but not RE during high intensity running. Recreational runners may use 105% PSF during high intensity running to train both aerobic and anaerobic capacity.



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## Research Critique

## Open Access

# Potential Mechanisms of Overtraining

**Jeremy Park, Lorin E. Donovan, & Joon Young Kim**

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## Abstract

Frequent/intense training increases the risk of overtraining in athletes. When overtrained, despite high effort in training, performance stagnates and/or deteriorates (Cadegiani & Kater, 2018). A growing body of literature has attempted to decipher the pathophysiology of overtraining. However, the majority of these literatures focus on the metabolic, biochemical, hormonal, and immunological aspects of overtraining. Few studies have analyzed more applicable biomarkers of overtraining such as eating and sleeping patterns, body composition, mood, and libido with conclusive results. A previous study entitled "Endocrine and Metabolic Responses on Overtraining Syndrome (EROS)" has attracted researchers' attention as they measured relevant/applicable biomarkers for overtraining. The purpose of the study by Cadegiani and Kater (2018) is to elaborate the EROS study and understand the mechanisms of overtraining more comprehensively.

**Keywords:** Type 2 diabetes risk, glucose response curve, 1-hr glucose concentration, lifestyle intervention

**Article History**

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## Methods

Male volunteers (age 18-50 years) were screened based on health history, drug use, exercise patterns, and overtraining symptoms (i.e., unexplained performance decreases). After prescreening, selected participants (n=51) were further tested on their sleeping, eating, and social patterns (self-reported), and psychological state by the POMS (Profile of Mood States) questionnaire. Based on these answers, participants were divided into three groups: healthy athletes (ATL), overtrained athletes (OTS), and non-physically active controls (NCS). Using bioimpedance and air-displacement, body hydration and composition were measured. Daily caloric/macronutrient intake, POMS, time spent studying/working (hours/day), libido on a scale 1-10, and basal metabolic rate (BMR) by indirect calorimetry were also measured for analysis.

## Results

Compared to ATL, OTS reported reduced relative calorie intake (26.4 kcal/kg/day in OTS vs. 52.7 kcal/kg/day in ATL), worse sleep quality on a scale 1-10 (6.5 vs. 8.0), worse mood (POMS scores of 15.0 vs. 5.0 on anger, 5.0 vs. 2.0 on confusion, 7.5 vs. 0.0 on depression, 20.0 vs. 2.0 on fatigue, 16.5 vs. 6.0 on tension, and 9.5 vs. 26.0 vigor), lower measured-to-predicted BMR (100.5% vs. 109.0%), higher body fat (15.3% vs. 10.3%), and diminished libido on a scale

1-10 (7.0 vs. 8.0) and hydration (60.8% vs. 64.9% body water) (all  $P < 0.05$ ). OTS had greater musculature than NCS (40.2 kg vs. 33.7 kg) and spent more time studying/working than ATL (8 vs. 7 hours/day) (all  $P < 0.05$ ).

## Discussion

Declining performance observed in OTS may originate from inadequate sleep, which prevents optimal reparative processes. Disproportionally high body fat may have caused reduced BMR in OTS. Excessive working/studying may impair physical performance as cognition requires energy. Critical risk factors for overtraining are likely inadequate sleep, excessive cognition, and insufficient caloric intake (Figure 1).

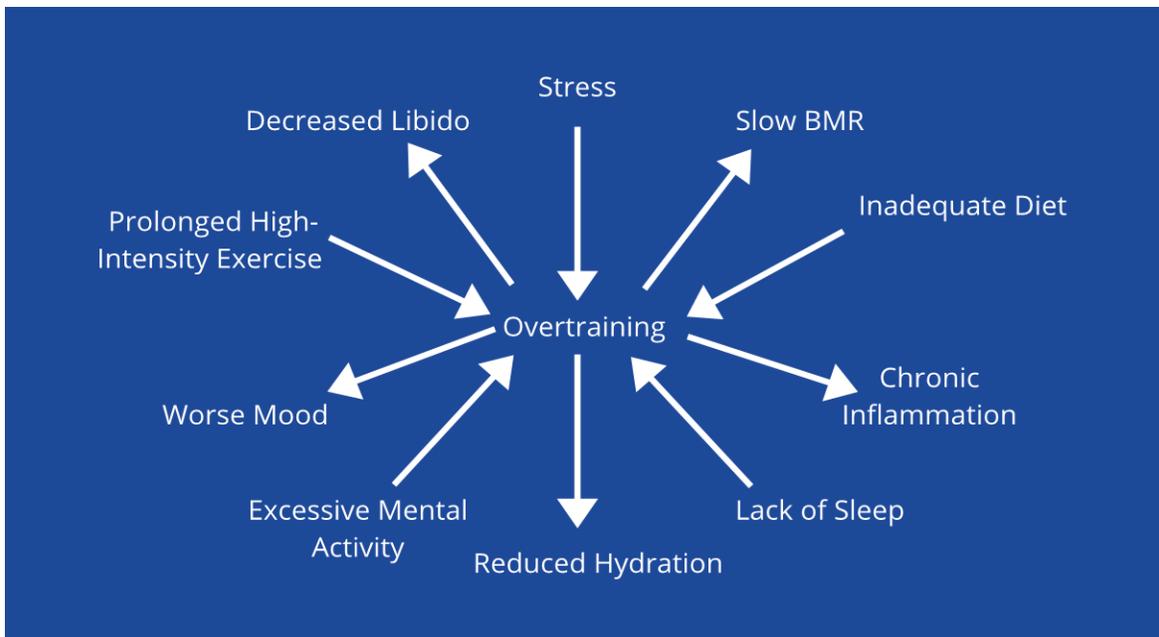


Figure 1. A comprehensive overview on the general causes and effects of overtraining. The figure was created based on the Cadejani and Kater (2018) study.

## Critique

The recruitment method likely involved self-selection bias and limits the validity of the findings. Furthermore, this study disregards metabolic adaptations. OTS consumed less calories than ATL, despite both groups being athletes. It is well-established that metabolism can change depending on diet/lifestyle, thus a slower metabolism observed in OTS may have been caused by previous under-eating rather than from overtraining (Heilbronn et al., 2006). Future overtraining studies should record previous patterns of eating prior to participation in an effort to account for potential metabolic adaptations. Lastly, a rigorous recruitment criterion (i.e., randomized controlled setting) should be utilized to minimize potential participation bias.

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Research Critique

Open Access

# Assessing How Exercise is Medicine – On Campus (EIM-OC) Movement is Operationalized at Campuses

Bryson Long & Young Sub Kwon

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## Abstract

Researchers reported that about 40% to 50% of college students are physically inactive (Keating et al., 2005), and physical inactivity among college students has been a prevalent issue. Exercise Is Medicine On Campus (EIM-OC) has been developed to combat this growing trend. Implementation of this program may be vital to its success in improving physical activity levels. However, there has been very little research into assessing how EIM-OC operates on various university campuses throughout the world. Therefore Wilson et al., (2018) developed a survey to evaluate EIM-OC implementation and outcomes at various institutions.

**Keywords:** physical inactivity, college students, Exercise is Medicine (EIM)

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## Methods

159 representatives were sent a cross-sectional mixed-method survey online that collected data from universities currently participating in EIM-OC. The data collected was based on one or more characteristics of their EIM-OC programs. These characteristics include the size of the university, background information on their EIM-OC programs (Date they began EIM-OC, program home, program focus, if they had an EIM-OC ambassador, and selection of student leaders and level of student involvement) and current challenges that programs face.

## Results

41 responses were used with student wellness making up the majority of programs (n=61.98%) followed by faculty/staff wellness (n=22.43%) with community wellness rounding it out (n=15.59%). Students' involvement played a critical role in many program's successes. Student roles varied from promotion, leadership/organization/planning, education, program implementation, and data collection (Table 1).

Table 1. Number of Students Roles in Exercise Is Medicine On Campus (EIM-OC).

Student Involvement	Number of Roles
Program Promotion	20
Student Leadership/Organization/Planning	18
Student Education	16
Program Implementation	14
Data Collection	10

Note: Taken from Table 2 from Wilson et al. (2018).

## Discussion

Student involvement is the key to the success of EIM-OC programs on university campuses; therefore, most of the universities had a majority of their effort focused on student wellness. Having well-defined roles for students to participate in led to the majority of successes in many programs across multiple campuses. However, it was noted that many programs could not meet the demand for improving student's physical activity level due to several shortcomings among the programs and the sheer number of students involved.

## Critique

Assessing this survey journal article, we found that most campuses' EIM-OC programs did only awareness programs but did not practice exercise as medicine. The Humboldt State University EIM-OC team decided to do things differently compared to other universities, so we have provided an awareness program as well as the 12-week Daily 5 km program for students, faculty, and staff during the academic year. The Daily 5 KM is a simple and free program that gets students and faculty out of the classroom and school staff out of the office for 25 to 30 minutes every day to run or jog, at their own pace, with their classmates and peers making them fitter and healthier. Some of the health benefits The Daily 5 KM program provides student and faculty is increased cardiovascular health, stamina, energy levels. It will also help in maintaining a healthy weight level and is also great stress and anxiety reducer. Therefore, we recommended the Daily 5 KM should be used in current and future programs as one of the EIM-OC movement practices.

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Research Abstract

Open Access

# The Association Between Balance and Muscular Strength in Healthy Young Adults

Mariah Gleeson, Mathew Mallet, & Elise Brown

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## Abstract

With aging, there are natural physiological declines, such as decreased neuromuscular function, muscular strength, and balance, often preceding a fall, which is indicated as a public health issue. Nevertheless, young adults do not experience such natural declines as rapidly yet encounter falls that may lead to musculoskeletal injuries. Therefore, the objective of this study was to evaluate the relationship between postural sway and muscular strength in healthy young adults using gold-standard measurements.

**Keywords:** falls, balance, strength

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## Methods

The study consisted of thirty-nine healthy adults (mean age  $20.8 \pm 2.8$  years, mean body mass  $78.4 \pm 17.3$  kg.), with no known muscular or bone deficits, uncontrolled medical conditions, high blood pressure, or contraindications to exercise. Static balance was assessed using force plates, measuring vision, vestibular, and proprioception contributions toward balance. Grip strength was assessed using a handgrip dynamometer. After 48 hours, upper and lower body strengths were assessed using a one-repetition maximum bench press and leg press, respectively. To control for effects of body mass on strength, strength measurements were normalized, then transformed into z-scores. The average of the z-scores was computed to form a muscular strength index. Pearson correlation coefficients ( $r$ ) were used to determine the relationship between balance and strength, while controlling for age and sex. The  $p$ -value was set at  $< 0.05$ .

## Results

A negative moderate correlation was found between the proprioceptive contribution toward balance and normalized handgrip strength ( $r = -0.434$ ,  $p < 0.05$ ). There were no other significant relationships between postural sway and strength measurements.

## Conclusions

Our findings indicate that who possess higher handgrip strength may have better balance, however longitudinal studies are needed to determine a causal effect. The lack of association between postural sway and other strength measures suggests that these parameters are independent of each other and may require a separate training form.



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Research Critique

Open Access

# Sustainable Mobility Promotion During COVID-19

Hyunzu Kim & Kwang Wook Koh

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## Abstract

With the recent COVID-19 pandemic in the Republic of Korea, surveys have reported rising issues with physical inactivity and obesity, social isolation, and economic depression. We analyzed the implications of active mobility and attuned it towards Korean society, exploring the possible scenarios, cases, and policies. Our research recommended active mobility to be an effective solution.

**Keywords:** active mobility, COVID-19, sustainable transport

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## Methods

Originally, the keywords used in Google Scholar were COVID-19, active mobility, and physical activity. To add more depth, active transport and active travel were inserted later on. The physical activity guideline, socioeconomic and environmental mechanisms were explored by scouring through documents published by various institutions and local authorities. Other cases about active mobility were summarized, while policy interventions, such as utilizing active travel to school were suggested.

## Results

Sustainable Transport strives for the development of efficient methods of personal mobility on three major fronts: economic growth, environmental preservation (13 SDGs), and social development. Since the emergence of COVID-19, cases of sustainable active mobility have increased; countries utilizing WHO's Health Impact Assessment (HIA) to find ways to improve health and well-being. Based on the recent development of Information and Communication Technology (ICT), infrastructure, and the legal system in Korea, the country needs to implement safe methods for active mobility to develop further.

## Discussion

Sustainable mobility could positively address the problems that arose with the emergence of COVID-19. Using good cases with a careful application to Korean society is necessary. Some policy interventions including active travel to school could be applicable with careful preparation and participation. Prudent advocacy from the government is also needed to promote new regulations.

Table 1. Existing Sustainable Mobility Measures on Most Populated Italian Cities.

City	Sustainable Urban Mobility Plans	Bike Plans	Mobility Sharing Programs	Tactical Urbanism Actions	Municipal Bike Agency
<b>Rome</b>	Approved	Approved	Active	Presents	Not presents
<b>Milan</b>	Approved	Not approved	Active	Presents	Not presents
<b>Naples</b>	In progress	Not approved	Active	Presents	Present
<b>Turin</b>	Approved	Approved	Active	Presents	Present
<b>Palermo</b>	In progress	Not approved	Active	Not presents	Present
<b>Genoa</b>	Approved	In progress	Active	Not presents	Not presents
<b>Bologna</b>	Approved	Approved	Active	Not presents	Present
<b>Florence</b>	Approved	Not approved	Active	Presents	Not presents
<b>Bari</b>	Approved	Approved	Under construction	Not presents	Not presents
<b>Catania</b>	Not approved	Not approved	Not active	Not presents	Not presents

Note: Cities were able to create a homogenous and environmentally aware community and most have been able to embrace sustainable mobility strategies, like cycling and walking.

### Critique

When we read about COVID-19 rapidly spreading across Europe, especially Italy, both researchers were alarmed at the news. As time passed, we were intrigued by the quick reaction of the governments to guide their cities from electric vehicles to sustainable transport. Through this paper, we were able to learn more in-depth details about Italy's big cities and how they achieved homogeneous awareness regarding sustainable mobility (Table 1). Was COVID-19 the trigger? However, due to the different socioeconomic aspects between Italy and South Korea, the root cause was difficult to discern. We would recommend that future research addresses more comprehensive aspects for foreigners to learn from the study.

### Reference

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Research Critique

Open Access

# Escalating Risk of Metabolic Syndrome Imparted by Salivary Biomarker in Obese Children

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Syracuse University, New York, USA

## Abstract

Type 2 diabetes (T2D) is a chronic metabolic disorder characterized by a progressive loss of  $\beta$ -cell function relative to insulin resistance. Once thought to be an adult disease, T2D has emerged as an increasingly prevalent health concern in obese youth, suggesting that early identification of those who are at high-risk for T2D is critical. Traditionally, either fasting glucose and/or 2-hr glucose concentrations during an oral glucose tolerance test has been used to identify prediabetes (i.e., intermediate stage of T2D). However, the fact that multiple blood collections are required during the test hinders necessary screening of high-risk youth with obesity and metabolic syndrome, primarily due to the invasive methods (i.e., fear of needles). For this reason, there is increasing interest in salivary biomarkers that can identify metabolic abnormalities. Goodson et al. provided critical evidence for future use of salivary samples for T2D risk detection as investigating saliva-based inflammatory biomarkers in an at-risk population of children.

**Keywords:** Type 2 diabetes, salivary biomarkers, inflammation, Children

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## Methods

A total of 744 children (mean age 11 years) were divided into 4 groups based on their weight status using the age- and sex-standardized BMI z-score: underweight, normal healthy weight, overweight, and obese (n=186 for each group). Fasting saliva samples were collected from all participants to examine 20 biomarkers and the biomarkers were analyzed on a Luminex 200 platform (Luminex Corporation, Austin, TX, USA).

## Results

Of the 20 biomarkers tested, 16 showed no significant differences between obese and normal weight subjects. However, 4 biomarkers did show significant differences between obese and normal weight subjects. Salivary C-reactive protein (CRP), a pro-inflammatory biomarker, was 6 times higher in obese youth compared with their normal weight peers (median 435 pg/ml vs. 76 pg/ml,  $P < 0.0001$ ) (Table 1). Salivary insulin and leptin showed a 3-fold increase in obese children compared with their normal weight counterparts. Salivary adiponectin (anti-

inflammatory biomarker and indicator of insulin sensitivity) concentration was 30% lower in overweight (median 2,981 pg/mL) and obese (2,798 pg/mL) youth compared with normal weight (4,083 pg/ml, P<0.0001) (Table 1).

Table 1. Concentration of Insulin, C-reactive protein (CRP), Adiponectin and Leptin in the Saliva Supernatant of 744 Children by Body Weight Category and Sex.

	Probe Parameter Unit	Insulin		CRP		Apiponectin		Leptin	
		Median/Intraquartile pg/ml Saliva							
<b>Underweight</b> (n=186)	M (64)	39.17	48.63	56.64	92.32	4,421	6,424	0.01	5.31
	F (122)	34.30	38.02	61.99	182.74	5,060	4,573	0.01	3.22
<b>Normal</b> (n=186)	M (93)	39.39	45.38	73.01	153.75	4,220	5,303	1.06	4.77
	F (93)	44.70	54.38	77.15	186.95	3,994	5,052	0.63	4.61
<b>Overweight</b> (n=186)	M (93)	80.39	88.74	177.46	311.93	2,402	3,785	1.06	3.26
	F (93)	76.25	87.13	281.39	516.54	3,322	3,639	2.41	5.03
<b>Obese</b> (n=186)	M (93)	112.98	125.24	429.44	668.52	2,548	2,779	3.16	6.40
	F (93)	143.50	150.24	443.13	1,033.29	3,062	3,752	3.70	6.41
	<b>Age</b>	0.107		0.083		0.373		1.000	
<b>Wilcoxon</b>	<b>Sex</b>	0.337		0.028		0.471		1.000	
<b>Regression</b>	<b>Overweight</b>	< 0.0001		< .0001		0.001		0.408	
<b>P-value</b>	<b>Obese</b>	< 0.0001		< 0.0001		< 0.0001		< 0.0001	
	<b>Underweight</b>	0.157		0.266		0.142		1.000	

Note. Regenerated the Table 2 from Goodson et al. (1). Summary statistics are median, interquartile range (N subjects). Probability levels for age, sex, overweight, obese, and underweight were computed by Wilcoxon regression relative to normal healthy weight children.

## Discussion

Biomarkers provide essential information for understanding the etiology of diseases, treatment, and early intervention. Saliva sampling has been introduced into research as a potential indicator of T2D risk and correlations between serum and saliva samples have been identified. In this study, 4 biomarkers were identified that exhibit significant change with increasing body weight in a pediatric population (Goodson et al., 2014). This suggests that saliva could be a useful blood replacement for the study of metabolic complications of obesity in children.

## Critique

In the face of COVID-19, this study is especially important in bringing awareness to the possible use of salivary biomarkers in determining potential risk for T2D and metabolic syndrome. With the limited in-person human research available currently, a new non-invasive, cost-effective, time-saving method is of the utmost importance in addition to the fact that at-home saliva collection is feasible for the research purpose (<https://salimetrics.com/how-do-i-collect-saliva/>). Although Goodson et al. proved the utility of the saliva analysis for T2D risk, a lack of validation data against blood samples is considered significant obstacle for a solid conclusion from this study. The saliva samples need to be compared to their respective blood samples in order to validate its reliability as novel biomarker. Furthermore, it would be germane to see if salivary biomarkers can be used for testing effectiveness of any prevention and treatment of metabolic syndrome and T2D in youth populations.

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Research Abstract

Open Access

# A Meta-Analysis of the Effect of Physical Activity on Depressive Symptoms: Influence of the COVID-19 Pandemic

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## Abstract

Due to the COVID-19 pandemic, a significant number of people experienced higher levels of depression. Concerning the unprecedented impact of depression on physical health, it is important to combat this situation. Physical activity (PA) has been found to have a positive effect on reducing depression (Schuch et al., 2018). However, there is a lack of a systematic review of the association between PA and depression during these unique times of the COVID-19 pandemic. This study was designed to serve as a meta-analysis of the overall effects of PA on depression in studies conducted before and during the COVID-19 pandemic.

**Keywords:** physical activity, depression, meta-analysis

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## Methods

Empirical studies on the link between PA and depression were searched from academic databases including PubMed and EBSCO. A total of 15 studies (total participants were 170,195) qualified for inclusion in the meta-analysis. Comprehensive Meta-Analysis version 3 was used to compute weighted average effect size and random-effects analyses were conducted.

## Results

The average effect size (odds ratio) across all 15 studies was 0.722 (95% CI = 0.651, 0.800,  $Z = -6.229$ ,  $p < .001$ ), demonstrating that study participants with high levels of PA had lower incidence of depression, compared to those with low PA levels. For the subgroup analysis, significant effects of high PA were found in the 11 studies conducting before the COVID 19 as well as in the four studies that assessed the influence of the COVID-19 (odds ratio = .734,  $p < .001$ ; odds ratio = .683,  $p < .001$  respectively). The Q-value ( $Q = 41.061$ ,  $p < .001$ ) and I-squared value (65.904) demonstrated that the studies were heterogeneous.

## Conclusion

The main finding of this study supported the evidence that PA can play an important role in reducing depression, especially during the COVID-19 pandemic. Public health professionals should incorporate the significance of improving PE levels into social distancing guidelines (CDC, 2020).



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Research Abstract

Open Access

# Re-Establishment of Health for Professionals in Higher Education During the COVID-19 Pandemic: Using Professors in an HIS as an Example

Pierre Lu

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## Abstract

The purpose of this study is to investigate faculty health and well-being (H&W; SDG#3) in a Hispanic Serving Institution (HSI) and how these professionals seek to re-establish their health during the COVID-19 pandemic. Recent research has shown that H&W concerns from COVID-19 are much higher among Hispanics than Whites (Pew Research Center, 2020), and COVID-19 is affecting Hispanics at an alarming rate (CNN, 2020). Understanding how COVID-19 is affecting Hispanic faculty's H&W is paramount as literature has shown that faculty H&W are important to the success of their students, their profession, and their institutions of higher education. However, few studies have explored H&W for faculty in an HSI. The study explores how these professionals re-establish their H&W during the pandemic.

**Keywords:** Hispanic serving institution (HSI), covid-19, health and well-being

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## Methods

The study takes place in an HSI in South Texas. Survey method with convenience sampling ( $n = 50$ ), followed by one-on-one in-depth interviews with purposive sampling ( $n = 5$ ) are conducted. Based on the Hetler's H&W model and referenced to the Travis' and Ardell's models, all aspects of H&W are inquired (physical, emotional, social, spiritual, vocational, and intellectual health). Quantitative data are analyzed using statistical methods.

## Results & Conclusion

86% of participants reveal that this pandemic has decreased their H&W. 75% of participants indicate they thought about building or re-establishing their H&W. However, only 30% of participants reveal they actually implement their H&W plans. Qualitative data are analyzed using thematic analysis methods. Several themes emerge: (1) H&W challenges faculty face, such as increased stress from work, family, and children at home; (2) their awareness and attempts of re-establishment of H&W, such as needs to be more organized, eat better, and exercise more; (3)

recommendations from faculty that echo UN's H&W tips, such as of staying home more, keeping social distancing, enjoying things in life, sleeping, exercising, having balanced diet, and a positive mental attitude.



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Research Abstract

Open Access

# The Effects of 2-Week 16:8-Hour Intermittent Fasting on Body Composition: Case Study

Pietro Weaver, Alexander Zeizinger, Peter Vu,  
Hayden West, & Soon-Mi Choi

Midwestern State University, Texas, USA

## Abstract

Intermittent fasting is a form of nutrition dieting in which an individual is allotted an amount of time to consume food throughout the day. Intermittent fasting has been shown to acutely change an individual's body composition as an effective intervention. The purpose of this research was to determine the effects of 2-week 16:8-hour intermittent fasting on body composition.

**Keywords:** intermittent fasting, body composition, weight loss

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## Methods

Participants ages ranged from 21-24 years, with a total of four (males: 3, female: 1), all college aged students. All participants were involved in regular exercise but had no previous experience of intermittent fasting. Each participant consumed their normal dietary intake till day of pre-intervention testing but were told to be in a fasted state before undergoing baseline testing. A glucometer was used to evaluate fasted blood glucose. Blood pressure was determined by using a manual cuff. A stadiometer was used to measure participants height and weight. A flexible tape measure was used to determine the waist and hip circumferences, which were used to determine the waist to hip ratio. Bioelectrical Impedance Analysis and Skinfold Calipers were used to determine body composition. Participants maintained normal physical activity levels, and logged volume and intensities in the MyFitnessPal application. Participants followed an isocaloric intake. Participants followed a 16:8 ratio, with a 16 hour fast and 8 hours allotted to consume food. Participants followed the intermittent fasting diet for a total of two weeks. Post-intervention was reevaluated at the two-week mark following intervention start. Data was presented as mean  $\pm$  standard deviation and determined by descriptive analysis. Statistical significance was set at  $p < .05$ .

## Results

There was no significant difference in body composition and fasting blood glucose. Significant difference was noted in both body mass and blood pressure.

## Conclusion

The results may indicate that intermittent fasting with a 16:8 ratio can decrease body mass and resting blood pressure in young individuals. Due to COVID-19, limitations were placed allotting only 2 weeks for intervention and for smaller sample size. For future research, study would be increased to 8 weeks with an increased sample size up.



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# Non-Physical Education Major Collegiate Students' Experiences and Changes in Sport Education Model

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## Abstract

The purpose of this study was to be exploring the 79 collegiate students' empirically experiences and receptivity and how they changed the perception of Sport Education (SE) model (Siedentop, Hastie, & van der Mars, 2020) in volleyball Physical Activity (PA) class.

**Keywords:** Sport Education Model (SEM), higher education, physical activity

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## Methods

A total of seventy-nine non-Physical Education (PE) major (24 female students and 55 male students) collegiate students participated in volleyball PA class for 15 weeks that focused on implementing SE model. Qualitative data were collected through class observations and formal-informal interviews to assess students' experiences and perceptions of the SE model as well as students' volleyball skill progress. Researcher used inductive analysis, and trustworthiness (Lincoln & Guba, 1985; Patton, 1990) was supported through member checks and triangulation of various data sources.

## Results

The SE model helped the students expand their knowledge and improve sport skills. Among all stages, all the students worked together, participated actively, demonstrated strong teamwork and recognized more benefits from SE model, such as increased communication and collaboration amongst team members, engagement and leadership opportunities; but they criticized the SE model for being time-consuming and requiring extensive preparation.

## Conclusion

Researcher concluded that the benefit of the SE model in higher education PA course was that every student became more involved and worked closely as a team and created an environment that facilitated student learning and enjoyment through the model.



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# The Impact of PE Teachers' Leadership on Middle School Students

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## Abstract

Physical education (PE) teachers' leadership plays a critical role in enhancing students' learning. Each PE teacher leadership style implies a critical meaning of how a class reaches its goals and objectives effectively. Transformational leadership initially was proposed by Burns (1978). Daft (2008) defined transformational leadership as "characterized by the ability to bring about significant change in followers and the organization" (p. 356). The expectancy value theory focuses on two critical aspects: an expectation of being successful in a current or distant task and the value placed on having a value for doing the task. The purpose of this study was to examine the effect of PE teachers' transformational leadership on middle school students' expectancy-value.

**Keywords:** leadership, PE Teacher, middle school students

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## Methods

Transformational teaching questionnaire (Beauchamp et al., 2010) and expectancy-value questionnaire (Duncan & Tammen, 1989) were employed for this study; a total of 16 items were used. The participants included 295 middle school students from three private middle schools located in the southwestern area in the USA and 262 questionnaires were used for the data analyses. Collected data were analyzed by descriptive, exploratory factor analysis and regression using the SPSS 25.

## Results

According to single regression, transformational leadership had a positive impact on students' expectancy-value. Based on multiple regression, intellectual stimulation was a common factor that affected students' expectancy-value positively.

## Conclusion

The results of the study support the importance of transformational leadership which used a means of enhancing middle school students' expectancy-value in PE. Moreover, this study indicated that transformational leadership facilitates teaching and students' learning in PE. Thus, it is recommended that PE teachers be able to understand and display appropriate leadership, in particular transformational leadership.



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Research Abstract

Open Access

# Factors Influencing Intern Performance and Employability in Sport Management: A Voice from Internship Site Supervisors

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## Abstract

Recent literature refers to internships as one of the most impactful aspects of an academic degree program and a catalyst for developing necessary employability skills (Narayanan, Olk, & Fukami, 2010; Shoenfelt, Stone, & Kottke, 2013). The purpose of this study was to utilize internship site supervisor evaluations to assess interns' skills, knowledge, and ability as a means of gaining a greater understanding of employability in the sport industry.

**Keywords:** internships, employability, sport management

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## Methods & Results

A total of 420 usable, final supervisor evaluations were gathered from the academic years 2012-2013 through 2018-2019. Interns' quality of work ( $\beta = .49, p < .001$ ) was the most important predictor in explaining their performance as an intern, followed by their attitude ( $\beta = .20, p < .001$ ), dependability ( $\beta = .12, p = .002$ ), quality of oral communication ( $\beta = .10, p < .001$ ) and maturity ( $\beta = .07, p = .015$ ). Similarly, interns' quality of work ( $\beta = .37, p < .001$ ) was the most important predictor for their employability, followed by attitude ( $\beta = .24, p < .001$ ), quality of oral communication ( $\beta = .15, p < .001$ ) and quality of writing ( $\beta = .09, p = .020$ ).

## Conclusion

Students, higher education institutions and industry practitioners are in a constant flux between what is offered within the sport management curriculum and what is required by the sport industry (Emery et al., 2012). Other scholars (e.g., de Schepper et al., 2020) also found this as a challenging balance between developing well-rounded graduates and providing appropriate sport management job opportunities.



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Research Abstract

Open Access

# Comparative Study on the Characteristics of Sporting Goods Consumption Behavior of Chinese College Students

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## Abstract

College students are the main group of sports consumption in the future. Therefore, it is very important to understand the motivation of college students' sporting goods consumption and evaluate the importance and satisfaction of college students' purchase behavior of sporting goods. Currently, there are mainly three evaluation methods based on satisfaction, such as SERVQUAL model (service quality) proposed by Parasuraman A in 1985, the SERVPERF model (service performance) proposed by Cronin and Taylor in 1992, and the IPA (Important Performance Analysis) proposed by Martilla and James (1977).

**Keywords:** sporting goods, consumption, important performance analysis (IPA), Chinese college students

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## Methods

The IPA method used matrix coordinates to identify the important factors considered by consumers and the degree of consumer satisfaction with these factors, forming four quadrants of superiority, maintenance, improvement, and disadvantaged areas, thereby judging the elements that should be concentrated and prioritized for improvement. IPA analysis is widely used in many fields such as in tourism (Duke & Persia, 1996; Deng, 2007; Hudson et al., 2004; Oh, 2001; Wade & Eagles, 2003), in education (Alberty & Mihalik, 1989; Orfinau et al., 1989), in sports services (Kwon & Chung, 2018; Antonio Rial et al., 2008; Erjuan & Bingshu, 2016; Meng, 2018). Therefore, this article used the IPA analysis method to study 386 Chinese college students who participated in the consumption of sporting goods. The data were analyzed by frequency analysis, exploratory factor analysis, reliability analysis and Importance-Performance Analysis using SPSS.

## Results

The results of this study were as follows. *First*, the motivation of college students' sports goods consumption is divided into three dimensions such as conspicuousness, practicality, and individuality. Among them, the conspicuous factor is related to student age, grade, monthly allowance, and brand awareness. *Second*, the pre-consumption importance and post-consumption satisfaction are divided into six dimensions such as environment, function, price, after-sales, design, and brand. Among the important dimensions considered before consumption, female believe

that the consumption environment and product functions are more important than male. Compared with non-sports students, sports majors think brand is more important than normal brand. In terms of domestic and foreign brand recognition, LiNing and Nike are considered the most wanted brands. In the post-consumption satisfaction dimension, students are more satisfied with the environment, function, and brand. *Third*, pre-consumption importance and post-consumption satisfaction are statistically significant difference ( $p = 0.000$ ).

## Conclusion

The IPA analysis showed that marketers should continue to maintain their product design advantages and focus on improving the convenience of after-sales service and consumer environmental sanitation conditions to better meet the needs of different college students.



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