

# Validation and Standardization of the Weight Control Perceived Self-Efficacy Inventory in a Mexican College Population

## ABSTRACT

**Purpose:** The purpose of the study was to evaluate if the Weight Control Perceived Self-efficacy Inventory (WC-PSE) is reproducible in a Mexican college population. **Methods and materials:** This is an observational and protective process study. Sixty subjects from two geographical regions of Mexico were invited to answer the WC-PSE on two separate occasions. **Findings:** The Content Validity Index was 0.96. The mean difference in the test retest was  $<4$  in all domains; the intra-class correlation coefficient was  $>0.7$ ; Cronbach's coefficient was  $\alpha=.95$ . The inventory was sensitive to detecting differences according to gender and degrees of body mass index. **Conclusion:** The WC-PSE inventory is reproducible and sensitive for application to a Mexican college population.

## KEYWORDS

Self-efficacy, diet, physical activity, exercise, nursing. (Source: DeCS, Bireme).

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# Validación y estandarización del inventario auto-eficacia percibida para el control de peso en población mexicana universitaria

## RESUMEN

**Objetivo:** evaluar si el inventario auto-eficacia percibida para el control de peso (AP-CP) es reproducible en población universitaria. **Material y métodos:** estudio de proceso, observacional y prolectivo. Se invitó a 60 sujetos de dos regiones geográficas de México para responder el AP-CP en dos ocasiones por separado. **Resultados:** el Índice de Validez de Contenido fue de 0.96. En la prueba re-prueba, la diferencia promedio fue  $< 4$  en todos los dominios, coeficiente de correlación intra-clase  $> 0.7$ ; coeficiente  $\alpha=0.95$ . El inventario también fue sensible para detectar diferencias de acuerdo a género y grados de IMC. **Conclusión:** el inventario AP-CP es reproducible y sensible para aplicarse en población mexicana universitaria.

## PALABRAS CLAVE

Auto-eficacia, dieta, actividad física, ejercicio (Fuente: DeCS, Bireme).

# *Validação e padronização do inventário autoeficácia percebida para o controle de peso em população mexicana universitária*

## RESUMO

**Objetivo:** Avaliar se o inventário Autoeficácia Percebida para Controle de Peso (AP-CP) pode ser reproduzido em população universitária. **Material e métodos:** Estudo de processo, observacional e proleto. Sessenta sujeitos de duas regiões geográficas do México foram convidados para responder ao AP-CP em duas ocasiões separadamente. **Resultados:** O Índice de Validade de Conteúdo foi de 0,96%. Na prova re-prova, a diferença média foi de  $< 4$  em todos os domínios, coeficiente de correlação intraclassa  $> 0,7$ ; coeficiente  $\alpha=0,95$ . O inventário também foi sensível para detectar diferenças de acordo com o gênero e graus de IMC. **Conclusão:** O inventário AP-CP pode ser reproduzido e é sensível para ser aplicado na população mexicana universitária.

## PALAVRAS-CHAVE

Autoeficácia, dieta, atividade física, exercício (Fonte: DeCS, Bireme).

## Introduction

Obesity is a worldwide public health problem (1) and is considered a causal factor in the leading causes of death, such as cancer, diabetes and cardiovascular disease (2). The etiology of obesity is multifactorial, including mainly genetic and environmental factors related to weight gain. The environmental factors include overeating (impulsive and excessive consumption of large portions of foods rich in carbohydrates and saturated fat) and a sedentary lifestyle (with little or no physical exercise that is planned and performed with specific goals in mind, such as fitness and good health) (3). Evidence shows healthy nutrition and exercise are decisive to preventing and treating obesity (4). However, efforts to treat obesity commonly fail and, if weight is lost, it is regained in most cases (5, 6, 7).

On the other hand, cognitive aspects also exert an influence on the success or failure of weight control. The concept of self-efficacy (SE), rooted in Bandura's social cognitive theory (8, 9), is defined as a person's confidence or conviction about being able to succeed in performing a particular task or behaving in a particular way. SE serves as an important mediator in the intention to pursue healthy behavior (10). Bandura recommends the use of specific SE concepts when studying particular behavior such as physical activity or diet, especially when the research interest is on weight control. According to Bandura, SE includes four principles: a) performance accomplishments, defined by an individual's success or failure in personal experiences; b) vicarious experience, meaning the influence of other people's behavior or achievements on one's personal experiences (social comparison); the more an individual resembles the leading model, the stronger the expectations of self-efficacy; c) oral persuasion, which is a suggestion from someone other than the person to generate a positive change in beliefs; and d) emotional activation, which is the intensity or type of emotional experience that informs the person of his or her competence.

Scientific evidence shows there is an association between a high perception of SE, healthy eating, and adherence to exercise (11, 12, 13). Several instruments to measure SE in the Anglo-Saxon population have been developed and applied to college students (14, 15), adolescents (16), adults (17), and senior citizens (18). Other populations that have been studied are patients with chronic degenerative diseases, including obesity (19, 20, 21, 22, 23, 24, 25).

Spanish speaking groups such as Ruiz et al (26, 27), have validated the Eating Self-Efficacy Scale (ESES) (28) and the Weight Efficacy Life Style Questionnaire (WEL) (29) in the Spanish population. However, instruments developed for the Latin American population are scarce. The conclusions of these same authors point to the need for more research targeted to obtaining new tools to evaluate SE for weight control (24).

Roman et al (30) structured an inventory known as Perceived Self-Efficacy for Weight Control (WC-PSE). It assesses SE in three domains: diet (overeating), exercise (planned physical activity), and physical activity (everyday activity or that performed with no physical fitness goals in mind). Reports on this tool reveal validity and reliability when applied in Venezuela.

Considering these results, it would be interesting to apply the WC-PSE inventory in a culturally different context, such as that of Mexico. Since the WC-PSE inventory has yet to be used in clinical studies and there are no reports of its application to an adult Mexican population, it is important to apply the WC-PSE and validate it in different geographical areas of Latin America. Therefore, the objective of this study was to determine if the WC-PSE questionnaire is reliable for use in a Mexican college population. Content validity was established through a panel of experts, leading to adaptations that are culturally appropriate to the Mexican context. Internal consistency was determined using Student's paired t test between the test and re-test means and sensitivity by detecting differences among groups, based on gender and BMI.

## Materials and Methods

**Study design and sample.** We designed an observational and protective process study (31). A conveniently-sized sample size of 30 participants was planned to obtain 80% statistical power and less than 5% type I error. However, it was decided to increase data variability to enhance external validity; accordingly, two geographical areas were used, thus doubling the number of participants analyzed and increasing the statistical power ( $n=60$ ).

College student subgroups were merged for the statistical analysis, as they showed no differences in gender frequency and BMI figures.

## WC-PSE Inventory

The WC-PSE inventory is comprised of 37 items distributed into three domains: diet with 20 assertions, exercise with nine, and physical activity with eight. All 37 items were designed to be answered on a Likert-type format, ranging from 1= "incapable of doing so" to 4= "certain to do so". The maximum score possible is 148 points and the minimum is 37 points. In all three domains, the greater the values, the greater the perceived SE. Cronbach's  $\alpha$  coefficient was 0.88, 0.91 and 0.88 for diet, exercise, and physical-activity domains, in that order. Factor analysis showed the diet, exercise and physical-activity domains explained 17.2%, 14.5% and 12.2% of the variance, respectively. To verify these results and validation of the original inventory, please refer to Román et al., (30) since some of the items were adapted for our study.

*Procedures.* Content validation, item adaptation, application of the inventory and test re-test were included in our investigation.

*Content validation.* The original (30) inventory was sent to a panel of five experts (with Ph.D degree) to ensure each item corresponded to the concept of SE and to the domain of either diet, exercise or physical activity, and to ensure language clarity according to the social context of the studied population. Each expert judged each item according to a Likert -type scale ranging from zero (definitely not related) to four (extremely related). The following indexes were calculated:

Validity Index by Item ( $IVE = \sum \text{total items} < 3 / \text{total judges}$ )  
Validity Criterion ( $CV = IVE / \text{total items}$ ).

Content Validity Index ( $IVC = \sum \text{total items} \geq 3 / \text{total items reviewed by all judges}$ ). IVC values near 1.0 are considered acceptable.

Additionally, each expert reported the items he or she considered confusing. It was decided beforehand that if three or more judges considered an item to be confusing, it would be modified.

*Inventory application.* Participants were selected on a convenience basis from two Mexican universities (México City = subgroup 1 and Monterrey = subgroup 2). They gave their consent in writing. One of the researchers explained the instructions on how to answer the inventory to all participants. The participants completed the inventory in their classrooms, in the presence of

their professor and one of the researchers. Since perceived SE is a changing cognitive state, brief time intervals between evaluations (<2 weeks) are recommended (33). A second application or retest of the inventory was conducted with subgroup one (S1) two hours after the first application and without any notification. An academic activity unrelated to the inventory was conducted during the interval between the first and second applications. The retest for subgroup two (S2) was also applied without any notification, but 24 hours after the test. Both subgroups were free to ask questions and to offer suggestions on how to enhance any of the items, if they felt they were confusing.

*Statistical analysis.* SPSS software, version 19, was used to analyze the data. The data from the groups were considered as one group when analyzing reproducibility and sensitivity of the perceived SE inventory in the diet, physical activity and exercise domains. Therefore, the sample size was 60 participants.

Cronbach's alpha coefficients were calculated for each domain and for the SE inventory overall. Reproducibility was evaluated using Student's paired t test between the test and re-test means. It was decided beforehand that, if the difference was more than four points, the instrument would be considered non-reproducible. This was based on the maximum value (32) of the domain with fewer items (physical activity), where 4 points represent 12.5% variability.

Test re-test concordance was calculated with the inter-class correlation coefficient, and complemented with a Bland-Altman graph (34). If the interclass correlation coefficient was greater than 0.7, the questionnaire would be reproducible and concordant, as previously decided.

*Ethical considerations.* The study was conducted according to the General Health Law on research matters (35). Approval was obtained from the Ethics Committee of the Universidad Autónoma de Nuevo León School of Nursing, under registration number FAEN-D-648.

## Results

*Sample description.* The data were combined into one group, as no significant differences were found between the two groups of college students in terms of gender, age and BMI ( $p = 0.11$ , 0.53 and 0.64, respectively). Women accounted for 71.7% of the

total sample ( $n=43$ ). The mean age was  $22\pm 5.1$  years (in a range of 18-49 years) and BMI was  $23.9\pm 4.5$  (in a range 18-40).

The Content validity index (IVC) obtained in the study was 0.96, which was considered acceptable. The results are presented in Spanish, so this version can be considered for groups of Mexican immigrants residing in Anglo Saxon contexts. The expert validation yielded modifications in five items in the diet domain: “*Evitar comer alimentos chatarra (perros calientes, hamburguesas, granjero, etc.)*” instead of “*Evitar comer alimentos chatarra (hot dogs, hamburguesas, fritos, etc.)*.” “*Estar en una panadería y comprar un yogurt en vez de una pizza.*” instead of “*Estar en una tiendita y comprar un yogurt en vez de un Gansito®.*” “*Pensar que realizando las tres comidas diarias bajas en grasa contribuyes a controlar tu peso,*” instead of “*Realizar tres comidas diarias bajas en grasa contribuye a controlar tu peso.*” “*Creer que respetando los horarios de comida contribuyes a controlar tu peso.*” instead of “*Respetar horarios de comida contribuye a controlar tu peso.*” “*Evitar dejar de cenar si te sientes bajo presión.*” instead of “*Cenar aunque estés bajo presión.*” There were no modifications in the physical activity and exercise domains.

**Internal consistency.** Cronbach’s alpha coefficients for the diet, exercise, and physical-activity domains were calculated in the test and the respective results were 0.92, 0.96 and 0.93. The scale, in general, was  $\alpha = 0.95$  with 95% IC (Interval= $0.932 - 0.967$ ).

**Reproducibility.** The mean time to fill out the WC-PSE questionnaire was  $9\pm 4$  minutes. Table 1 shows the averages for the difference (Delta  $\Delta$ ) between the test and re-test ranged from zero to four; these dimensions were established previously (see the statistical analysis). Regarding concordance, the interclass correlation coefficient was 0.93 (CI= $0.885-0.959$ ,  $p < .001$ ) for the average of the measures by pairs, which was greater than the previously established 0.7. This indicates the WC-PSE has temporal stability. Bland-Altman’s correlation graphs corroborate this finding (Graphs 1 and 2).

**Sensitivity.** The statistical analysis was able to detect differences between gender (feminine vs. masculine) in the SE overall ( $114.6\pm 1.2$  vs.  $125.1\pm 9.7$ ,  $t = -2.7$ ,  $p = .007$ ) and in the exercise domain ( $26.1\pm 5.8$  vs.  $31.4\pm 4.4$ ,  $t = -1.3$ ,  $p = .001$ ). For physical activity, it was at the limit ( $26.8\pm 4$  vs.  $29\pm 3$ ,  $t = -1.9$ ,  $p = .053$ ), and no differences were observed as to the diet domain ( $61.5\pm 7.9$

vs.  $64.5\pm 7.5$ ,  $t = -1.3$ ,  $p = .183$ ). Finally, we analyzed the sensitivity of the inventory associated with the BMI spectrum (Graph 3), noting that the larger the BMI, the smaller the SE score.

## Discussion

In this study, we determined the WC-PSE questionnaire possibly is reliable for application to the Mexican college population. The results of the study support this, at least in the selected sample. Content validity and adaptation were done by a panel of SE experts. The inventory also showed some sensitivity in detecting the difference between male-female and according to body mass index.

The content validity performed by experts suggested five items in the original inventory that needed to be modified to adapt them into the Mexican cultural context. With the modifications, we obtained an adequate internal consistency with Cronbach’s alphas coefficients greater than 0.9 in each inventory domain, similar to those obtained in the original validation (30). However, the SE results overall must be viewed with caution, since coefficients above 0.95 suggest redundancy in the items in the inventory.

On the other hand, the WC-PSE is reproducible and concordant in the test re-test for all domains, as well as for SE overall. The degree of concordance obtained shows the inventory has temporal stability. This also is supported with the Bland-Altman method, which represents the differences between two measurements compared to their means.

The inventory is sensitive in detecting differences in SE overall and in the exercise domain, according to gender and BMI. These differences could help to conduct future projects where SE is crucial to adherence to weight reduction treatment, as suggested by the work of Nies (11), Olivari (12) and Sánchez (13). Despite SE perception being a cognitive aspect that does not necessarily represent action or performance of a particular behavior, it could be a crucial element as a predictor, and the WC-PSE inventory could be used in experimental designs to measure the response of specific population groups to treatment or intervention aimed at changing habits in the interest of weight control. One of the most important aspects in the WC-PSE inventory is precisely the fact that it includes the dimensions of diet, exercise, and physical activity, which are undoubtedly aspects related to weight control, according to systematic reviews (4).

The main limitations of the study are the following; a) It was conducted in a college population, so the results cannot necessarily be generalized to other populations in Mexico; b) A convenience sample is adequate to analyze the instrument, but cannot be used to make inferences for a general population, even a college one.

The results of this study contribute to having a reliable instrument for the Mexican adult population, since there are no reports of the WC-PSE questionnaire being applied in the Latin-American population outside of its original design. Use of the inventory could contribute further to its validation in different groups and perhaps its generalizability. In future work, the inventory might be applied to overweight or obese subjects to identify the way SE expectations influence modifying dietary habits and physical ac-

tivity patterns through time. From an experimental point of view, groups of obese persons could be compared to different types of exercise or diet, and SE could be used as a result variable and to show if scores after and before the intervention increase for the experimental group.

We conclude this study shows the WC-PSE inventory is reproducible and concordant for the Mexican college population in question. Its internal consistency is acceptable and it is sensitive to differences between gender and BMI.

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