

Cross-Cultural Adaptation of the Compendium of Physical Activity: Thai Translation and Content Validity

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Objective: To translate the compendium physical activity (compendium) proposed by Ainsworth to Thai and to validate the Thai translated version.

Material and Method: Five steps of cross-cultural adaptation were conducted as follows: (1) forward translation, (2) group review, (3) backward translation, (4) group review and final decision and (5) a pilot study. Eight hundred and twenty-one activities of the compendium were translated to Thai by two independent translators. Thai translated version was considered by 23 persons who have studied physical activity for at least five years. Backward translation was carried out by two bilingual translators. The research team completed the final Thai translation by comparing original and translated versions. For pilot study the Thai translated version was validated by 22 allied health persons. Data was analyzed by multi-rater agreement (Fleiss's kappa) and qualitative analysis.

Results: For translations and group review, recommendations included; a) changing to lay language with the same meaning, b) converting the US customary unit to the metric unit, and c) using consistent language. More than 80% of 22 persons accepted the Thai translation and the Kappa agreement ranged from 0.187 to 0.694. Some activities demonstrated poor multi-rater agreement and required additional definitions.

Conclusion: Thai translated compendium physical activity was constructed to reduce the language barrier and promote physical activity in Thailand. The poor to moderate agreement of each major heading of translation may partly be due to Western culture. Many activities in the compendium were assembled but they were not recognized by Thais. Hence, Thai compendium physical activity should to be developed in a future study.

Keywords: Physical activity, Compendium physical activity, Cross-cultural adaptation, Translation, Multi-rater agreement

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Physical activity (PA) improves health and reduces risk of noncommunicable diseases (NCD) and premature death^(1,2). According to the American College of Sports and Medicine (ACSM) guidelines, PA is defined as the bodily movement produced by the contraction of skeletal muscles that results in a substantial increase in caloric requirements over the resting energy expenditure⁽³⁾. Physical inactivity is one of top five risk factors that lead to more than 3 million deaths each year⁽⁴⁾. The World Health Organization (WHO) and ACSM recommend an adult aged 18 to 64 years should perform moderate intensity PA for at least

150 minutes or vigorous intensity PA at least 75 minutes a week^(3,5,6). Increased level of PA is related to increased cardiovascular fitness and longer life expectancy.

The level of PA has been classified according to energy expenditure termed, the metabolic equivalent (MET). The MET is defined as the ratio between the metabolic expenditure of activity performance and resting⁽⁷⁾. The resting metabolic rate (RER) is equal to 1 MET or 3.5 ml/kg/min of oxygen consumption (VO₂) while sitting quietly at rest. Five levels of PA are defined as inactivity (1.0-1.5 METs), mild intensity (1.6-2.9 METs), moderate intensity (3.0-5.9 METs), vigorous intensity (6.0-9.0 METs) and very vigorous (>9.0 METs).

Between 1993 and 2011 Ainsworth et al⁽⁸⁻¹⁰⁾ developed and modified, the compendium of PA (compendium) to promote PA. The compendium PA is used as a guideline for physical activity prescription worldwide. It comprises 21 major headings and 821 specific activities. Each activity has the METs value of

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the activity indicated ranging from 0.9 to 23.0 METs. The compendium has been translated into four languages: French, Italian, Japanese and Spanish to promote PA in each country.

To reduce the language barrier in applying the compendium, a Thai translated version needs to be developed. Therefore, the present study translated the compendium PA proposed by Ainsworth in 2011 to Thai and validated the translated version.

Material and Method

The present study was approved by the Mahidol University Institutional Review Board (MU-IRB COA. NO. 2014/069.2105). The authors received the copyright permission to translate the compendium of PA from Professor Dr. Stephen Herrmann, Healthy Lifestyles Research Center, School of Nutrition and Health Promotion, Arizona State University via e-mail (compendiumpa@gmail.com). The guideline to translate and validate is available on <https://sites.google.com/site/theipaq/cultural-adaptation>⁽¹¹⁾ and the details of each step are described in Souas et al⁽¹²⁾. In the present study, five steps of cross-cultural adaptation were conducted: (a) forward translation, (b) group review, (c) backward translation, (d) group review and (e) a pilot study.

Step 1: Forward translation

The compendium PA (compendium) proposed by Ainsworth et al in 2011⁽¹⁰⁾ was translated to Thai. To determine the concept of each activity and language equivalence, the translators had to translate the original English version to Thai by matching to Thai words with the same meaning. If they could not find a match they found another word that had a similar concept and was suitable for Thai culture. The compendium English version was translated by the research team and validated by two independent bilingual translators. The forward translated version was completed within two weeks.

Step 2: Group reviews the forward translated version

Two forward translated versions were reviewed by the research team. They compared the two forward translated versions and built the final forward translated version. Twenty-three persons who studied PA at least 5 years reviewed this one forward translated version. This review discussion was held in a two-day meeting at the Faculty of Physical Therapy, Mahidol University. All comments and suggestions were recorded.

Step 3: Backward translation

Backward translation was carried out by two bilingual translators. They translated all items of the Thai translated version back to English. They were completely blind to the original English version and selected English words that had similar or the same meaning to match the Thai version. Two backward translated versions were completed within two weeks. All comments and suggestions were recorded.

Step 4: Group reviews the backward translated version and final decision

The research team considered the two forward and two backward translated versions to develop the final translated version. At a three-day meeting, the team compared the forward and backward translated versions and the original English version. They also considered all comments from the translation teams and the reviewing group. Finally the Thai translated compendium PA was completed.

Step 5: A pilot study

This step was undertaken to determine the acceptance and to validate the Thai translated version by the target population who comprised allied health persons that will use the Thai translated version. A questionnaire was developed to assess the acceptance of each activity and the overall translation. The questions were "Did you understand all the words? and Could you please rate the scale of acceptable meaning in each activity?". Five levels of acceptable meaning (Likert scale) ranged from unacceptable to acceptable meaning (scale 1 to 5). The final part of the questionnaire asked participants to rate the percent acceptable for overall translation.

Finally the research team reviewed and constructed the Thai translated version by considering the outcomes of steps 1 to 5 for a three-day meeting at the Faculty of Physical Therapy, Mahidol University.

Data analysis

The qualitative data and comments of cross-cultural adaptation steps 1 to 5 were summarized using content analysis⁽¹³⁾. For step 1, the agreement in each translation was demonstrated as a percentage of item agreement divided by total items. For the pilot study, a multi-rater agreement or Fleiss's Kappa agreement was used to determine the level of agreement in the final Thai translated version. The Kappa value was interpreted as follows: less than 0.40 for fair agreement, 0.41-0.60 for moderate agreement, 0.61-0.80 for

substantial agreement and 0.81-1.00 for perfect agreement⁽¹⁴⁾. The rating scale ≥ 3 was selected to define the neutral to acceptable meaning of each activity⁽¹³⁾. The acceptable meaning in each activity was calculated as a percentage of persons who rated acceptable meaning (scale ≥ 3) divided by total persons (n = 22).

Results

Eight hundred and twenty-one specific activities of the compendium of PA proposed by Ainsworth in 2011 were translated to the Thai. Five steps of cross-cultural adaptation and the details are described in Fig. 1. The results of the forward and backward translations and group reviews (step 1 to 5) are shown in Table 1. The multi-rater agreement and percentage of 22 subjects who rated scale of acceptable meaning (scale ≥ 3) are illustrated in Table 2.

Discussion

The method of translation and validation was conducted according to the cross-cultural adaptation guidelines. The Thai translated compendium PA comprises 21 major headings and 821 specific physical activities. The METs value in each activity was the same as the original version and was copied to the Thai translated version. The METs ranged from 0.9 METs for sleeping activities to 23.0 METs for running at 22.5 kilometer/hour.

Although the multi-rater agreement of 22 target persons in the pilot study demonstrated poor to moderate agreement (Kappa 0.187-0.694), the percentage of overall acceptable meaning of the Thai translated version was 77% (ranging from 50% to 98%). The acceptable meaning of each major heading ranged from 75.76% to 98.48%. Of 821, 601 activities were rated

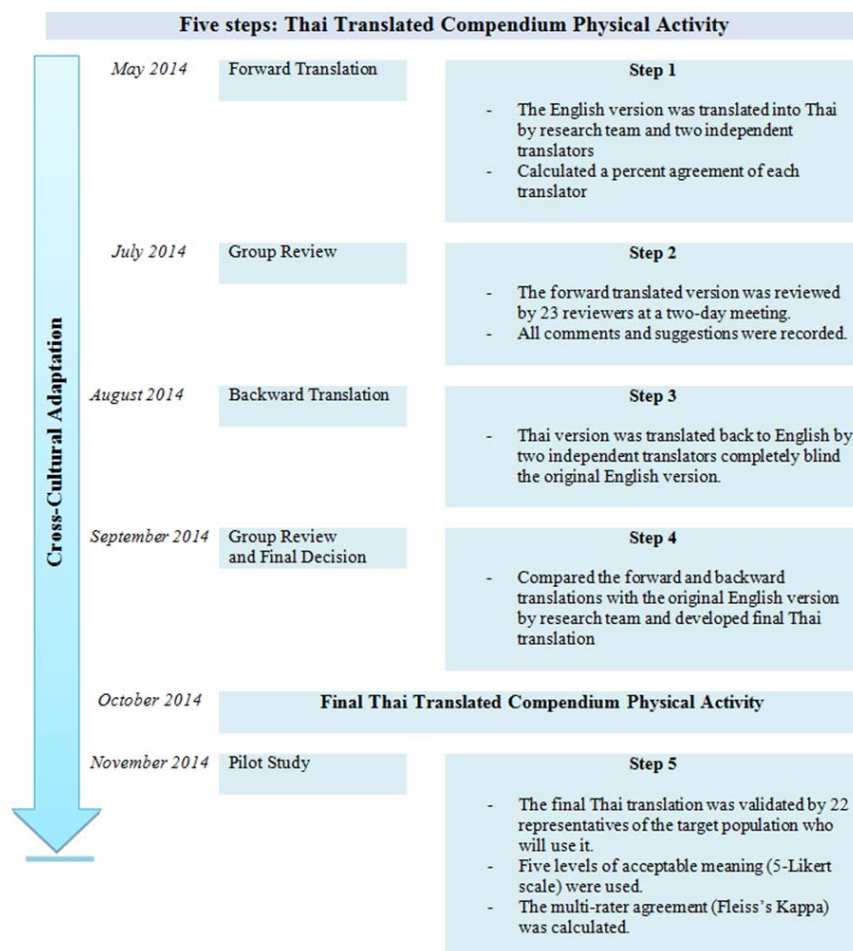


Fig. 1 Five steps of cross-cultural adaptation.

Table 1. Conclusions of translation processes and group reviewing

Cross-cultural adaption	Results
1. Forward translation	<p>821 activities of the original English compendium were translated to Thai by research team and evaluated by two independent bilingual translators. Following demonstrated the % agreement</p> <p><i>1st independent bilingual translator:</i> Of 821,749 activities were accepted (91.23%). Seventy-two activities were edited.</p> <p><i>2nd independent bilingual translator:</i> Of 821, 676 activities were accepted (82.33%). One hundred and forty-five activities were edited.</p>
2. Group review	<p><i>Research team review:</i> Two forward translated versions were reviewed by research team. Many words were accepted for the same meanings and some words were changed according to their recommendations. The forward translated version was developed.</p> <p><i>Group review:</i> Twenty-three persons were physicians, physiologists, nutritionists, physical and occupational therapists. They reviewed the forward translated version and commented as follows:(a) changing to lay languages with the same meaning or using transliterated words, (b) converting the U.S. customary unit (pound and miles/hours) to the metric units (kilogram and meter/minute) and (c) using consistent translated languages for the same words such as light, moderate and vigorous efforts.The final forward translated (FFT) version was developed.</p>
3. Backward translation	<p>The FFT version was translated from Thai to English by two independent bilingual translators.</p> <p><i>Two independent bilingual translators:</i> Of 821, many activities used exactly the same words such as sitting, standing, walking, running and the metric units of load, distance and speed. They used the words with similar meanings such as heavy force for vigorous force, fast pace for brisk pace, pets for animals, sweeping for raking and lay back for reclining. There were a few activities which had not similar words to the English words particular to sport activity and occupation.</p>
4. Group review and Final decision	<p><i>Group review:</i> The research team (n=10) reviewed all documents including two forward translated, comments of group reviewing and two backward translated and compared with the original English version. They substituted lay language for technical terminology and converted the U.S. customary unit to the metric unit, i.e., kilometer/hour, kilograms and meter/minute). To reduce verbosity in the translated version, a consistent word for the same meaning was used. Finally, Thai translated version of compendium PA was developed.</p>
5. Pilot study	<p>Twenty-two target populations comprised nurses, sport scientists, physical and occupational therapists and undergrad students. They rated the acceptable meaning of each item and overall translation as shown in Table 2.</p>

as 3 to 5 meaning that more than 70% of activities in the Thai translated version were acceptable. The comments and suggestions were mostly about unfamiliarity with the specific activities. Some sports or winter activities

are particular to Western culture and traditions. The target persons complained that they could not estimate the level of effort, i.e., mild, moderate and vigorous effort and needed more explanation of these activities.

Table 2. The multi-rater agreement of Thai translated version for pilot study

Thai translated compendium physical activity			Percentage of 22 persons who scored $\geq 3^a$		Kappa's agreement	
Code	Major headings	Number of activity	%	Min-max (%)	K	Min-max
01	Bicycling	18	86.36	68.18-100	0.187	0.053-0.670
02	Conditioning exercise	54	86.62	68.18-100	0.263	0.026-0.846
03	Dancing	18	89.90	63.64-100	0.304	0.091-0.578
04	Fishing and hunting	32	91.32	72.73-100	0.269	0.037-0.497
05	Home activities	75	90.99	77.27-100	0.462	0.102-0.946
06	Home repair	37	93.10	80.95-100	0.579	0.115-0.751
07	Inactivity	16	95.18	86.36-100	0.594	0.280-0.838
08	Lawn and garden	53	87.80	77.27-100	0.302	0.091-0.740
09	Miscellaneous	27	89.77	81.82-100	0.383	0.107-0.751
10	Music playing	20	95.45	77.27-100	0.515	0.188-0.654
11	Occupation	122	92.90	63.64-100	0.473	0.042-0.946
12	Running	25	95.17	68.18-100	0.614	0.118-1.000
13	Self-care	11	96.69	81.82-100	0.395	0.297-0.513
14	Sexual activity	3	75.76	68.18-81.82	0.131	0.075-0.172
15	Sports	121	98.48	40.91-100	0.654	0.021-0.838
16	Transportation	9	95.45	95.45-100	0.560	0.481-0.946
17	Walking	56	93.94	86.36-100	0.399	0.221-0.946
18	Water sports	52	98.48	72.73-100	0.446	0.145-0.843
19	Winter activities	30	81.82	68.18-100	0.233	0.042-0.643
20	Religious activities	23	86.36	77.27-100	0.361	0.221-0.843
21	Volunteer activities	19	95.45	86.36-100	0.358	0.302-0.735

^a For 5-Likert scale = 1 for unacceptable; 2 for slightly unacceptable; 3 for neutral; 4 for slightly acceptable and 5 for acceptable

The outline of the Thai translated version was compared with the other translated versions⁽¹⁵⁾. Among the four translated versions (French, Italian, Spanish and Japanese) only the Japanese version provided the original English language underneath each translated word. The Japanese version classified physical activity in four levels: inactivity, mild, moderate and vigorous intensities and highlighted each item with different colors. The specific names of some activities were transliterated to Japanese. The metric unit of load, distance and speed was substituted for the U.S. customary unit. The authors used ideas from the Japanese version to improve the content validity of our Thai translated version. First, for each activity the original English was placed underneath Thai. Second, the outline of the Thai translated version was highlighted with different colors that represented different level of physical activity; inactivity (white), mild (yellow), moderate (blue) and vigorous (pink). Third, the transliterated language was used to clarify meaning. Although some activities are uncommon in

Thailand, these sports and other activities were written using the corresponding Thai alphabet. Lastly, clear and simple Thai words were substituted to improve the content validity in the Thai translated version.

To apply this Thai translated version to promote physical activity, the caloric expenditure was calculated. The method was modified from the ACSM guidelines⁽⁷⁾. The METs value of activity performance was multiplied by the frequency and duration of performance and body weight. For example; a man completes bicycling with moderate effort (8 METs) for 30 minutes (0.5 hour), 3 days per week. His weight is 60 kg and the calorie expenditure equaled 720 kcal/kg/hour. The prescription of physical activity should motivate him to add 30 minutes more for bicycling in each session, so then the calorie expenditure could reach 1,440 kcal/kg/hour and achieve the WHO's recommendation^(3,4).

Limitation and future study

The present study had some limitations. The

pilot study (step 5) could not include all allied health professions who comprise the target population for validating the Thai translated compendium PA. The findings demonstrated poor to moderate agreement and many activities were identified that were uncommon in Thailand. Although the Thai translated compendium PA can be applied to promote physical activity in Thailand, some problems could happen. Many activities are not carried out in Thailand and some Thai activities are not included. Further study is needed to complete the Thai PA Guidelines that include physical activities appropriate to the Thai population.

Conclusion

The Thai translated compendium of PA was developed according to the cross-cultural adaptation guidelines. The Thai translated compendium PA was evaluated by persons who studied PA more than five years and allied health persons. The Thai version reduces the language barrier; thereby, it would be more appropriate to promote physical activity in the Thai population.

What is already known on this topic?

The compendium PA proposed by Ainsworth was translated to four different languages (French, Italian, Japanese and Spanish versions) and posted on the website: <https://sites.google.com/site/compendiumofphysicalactivities/compendia>.

What this study adds?

This study developed the Thai translated compendium of PA that will be useful for PA promotion in Thailand.

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Potential conflicts of interest

None.

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การปรับข้ามทางวัฒนธรรมของหัวข้อกิจกรรมทางกาย: แปลภาษาไทยและความตรงตามเนื้อหา

ชุตินา ชลาชนเดชะ, วรธนะ ชลาชนเดชะ, รุ่งทิวา วัจฉลະฉิตติ, สุนีย์ บวรสุนทรชัย, ประเสริฐ สกฤศรีประเสริฐ, เวทสินี เชื้อองศิริกุล, ทิพวดี บรรพระจันทร์, รุจิเรศ เอื้อพิริยะสกุล

วัตถุประสงค์: เพื่อแปลและหาความเที่ยงของหัวข้อกิจกรรมทางกายที่นำเสนอโดย Ainsworth และหาความเที่ยงของฉบับภาษาไทยที่แปลแล้ว

วัสดุและวิธีการ: การปรับข้ามทางวัฒนธรรมของหัวข้อกิจกรรมทางกาย 5 ขั้นตอนถูกดำเนินการได้แก่ 1) การแปลไปข้างหน้า 2) การทบทวนแบบกลุ่ม 3) การแปลย้อนกลับ 4) การทบทวนแบบกลุ่มและการตัดสินใจขั้นสุดท้ายและ 5) การศึกษานำร่อง หัวข้อกิจกรรมทางกายจำนวน 821 กิจกรรมถูกแปลเป็นภาษาไทย โดยผู้แปลสองคน ฉบับที่แปลได้รับการพิจารณาจากผู้ศึกษาเกี่ยวกับกิจกรรมทางกายมากกว่า 5 ปี จำนวน 23 คน การแปลย้อนกลับถูกทำโดยผู้แปล สองภาษา 2 คน ทีมผู้วิจัยทำฉบับแปลสุดท้ายเสร็จสมบูรณ์ด้วยการพิจารณาเปรียบเทียบฉบับแปลกับต้นฉบับสำหรับการศึกษานำร่องหัวข้อกิจกรรม ทางกายฉบับแปลภาษาไทยจะได้รับการทดสอบความเที่ยงจากกลุ่มเป้าหมายผู้ใช้ 22 คน ข้อมูลถูกวิเคราะห์ด้วยความสอดคล้องระหว่างผู้ประเมิน (Fleiss's kappa) และการวิเคราะห์เชิงคุณภาพ

ผลการศึกษา: สำหรับการแปลและการทบทวนกลุ่ม มีข้อแนะนำดังนี้ 1) เปลี่ยนเป็นภาษาชาวบ้านที่มีความหมายเหมือนเดิม 2) แปลงหน่วยวัดมาตรงตามนิยามของสหรัฐเป็นระบบเมตริกและ 3) ใช้ภาษาคงที่ มากกว่า 80% ของ 22 คนยอมรับฉบับภาษาไทยและค่าความสอดคล้อง Kappa มีค่าจากช่วง 0.187-0.694 หลายกิจกรรมแสดงค่าความสอดคล้องระหว่างผู้ประเมินต่ำและต้องการคำอธิบายเพิ่มเติม

สรุป: หัวข้อกิจกรรมทางกายฉบับภาษาไทยถูกสร้างขึ้นเพื่อลดอุปสรรคทางภาษาและส่งเสริมกิจกรรมทางกายในประเทศไทย ค่าความสอดคล้องต่ำถึงปานกลางของแต่ละหัวข้อกิจกรรมทางกายอาจเกิดจากพื้นฐานทางวัฒนธรรมตะวันตก หลายกิจกรรมในหัวข้อกิจกรรมทางกายถูกรวบรวมแต่กิจกรรมเหล่านั้นไม่ได้เป็นที่รู้จักในประชาชนคนไทย ดังนั้นหัวข้อกิจกรรมทางกายของไทย ควรได้รับการพัฒนาเป็นการศึกษาในอนาคต
