

# Validation of Gujarati Version of International Physical Activity Questionnaire

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## ABSTRACT

**Background:** International Physical Activity Questionnaire (IPAQ) is a reliable and valid tool that helps to measure physical activity of an individual.

**Aim:** To validate the Gujarati version of IPAQ to be used in clinical research on Gujarati population.

**Settings and design:** Cross sectional study conducted at Government Physiotherapy College, Jamnagar, Gujarat, India.

**Materials and Method:** IPAQ was translated into Gujarati from English using forward-backward-forward method. For face & content validity of Gujarati version group consensus method was used. Each question was examined by group of experts in field of Medicine, Physiology and Cardiopulmonary Physiotherapy. Each question was analysed for content, meaning, wording, format, ease of administration & scoring. Each question was scored by expert group as either accepted, rejected or accepted with modification. Procedure was continued until 80% of consensus for all items. Concurrent validity was found by comparing the English version of IPAQ with Gujarati version of IPAQ.

**Statistical Analysis:** Spearman's correlation coefficients were used to assess the strength of association between the measures of both the versions.

**Results:** In validation process of Gujarati version of IPAQ total 21 questions were accepted; 6 questions were accepted with modification. High positive and significant correlations were also found for time spent in vigorous ( $\rho=0.83$ ), moderate ( $\rho=0.74$ ) and walking ( $\rho=0.93$ ) activities between the IPAQ Gujarati and the original English version of IPAQ. Total physical activity was significantly and highly correlated ( $\rho = 0.90$ ) between the IPAQ Gujarati and the original English version of IPAQ. The time spent in sitting was also significantly ( $\rho = 0.94$ ) and positively correlated between the IPAQ Gujarati and the original English version of IPAQ.

**Conclusion:** Gujarati version of International Physical Activity Questionnaire has a good validity to be used in Gujarati Population.

**Key words:** Physical Activity, Validity, International Physical Activity Questionnaire

## INTRODUCTION

Physical inactivity is an important public health issue. Sedentary lifestyles are associated with increased obesity, type 2 diabetes and cardiovascular disease and hence the promotion of active lifestyles is an important public health priority. There

are various tools to measure physical activity such as self reported questionnaires, physical activity diaries, accelerometers, motion sensors, heart rate monitors, etc. International physical activity questionnaire is one of such questionnaire. It is a reliable and valid tool that is used for measuring

physical activity. [1] It is available in self reported format as well as telephonic interview. The long and short forms of the questionnaire are available. [1] It consists of four domains i.e. work domain, active transportation domain, domestic work domain and leisure/recreation domain. The specific types of activity that are assessed are walking, moderate-intensity activities and vigorous-intensity activities. Computation of the total scores for the long form requires summation of the duration (in minutes) and frequency (days) for all the types of activities in all domains. Domain specific scores or activity specific subscores may be calculated. Domain specific scores require summation of the scores for walking, moderate-intensity and vigorous-intensity activities within the specific domain, whereas activity-specific scores require summation of the scores for the specific type of activity across domains. Data collected with International Physical Activity Questionnaire can be reported as a continuous measure. One measure of the volume of activity can be computed by weighting each type of activity by its energy requirements defined in MET (Metabolic Equivalent) to yield a score in MET–minutes. METs are multiples of the resting metabolic rate and a MET-minute is computed by multiplying the MET score of an activity by the minutes performed. The International Physical Activity Questionnaire sitting question is an additional indicator variable of time spent in sedentary activity and is not included as part of any summary score of physical activity. The long form of questionnaire were designed to be used by adults aged 15–59 yr.

Craig et al stated that the International Physical Activity Questionnaire instruments have acceptable measurement properties, at least as good as other established self-reports. Considering the diverse samples in this study, International Physical Activity Questionnaire has reasonable measurement properties for monitoring population levels

of physical activity among 18- to 65-yr-old adults in diverse settings. [1]

Validity is the degree to which it measures what it is supposed to measure. The content/face validity, which indicates whether the questionnaire makes sense to the patients and experts and whether all the important and relevant domains are included, was assessed by an expert panel. [2] Concurrent validity the degree to which the operationalization correlates with other measures of the same construct that are measured at the same time. [3]

Current study is part of a larger study to be done on finding relationship between physical activity and muscle strength which is being conducted at Jamnagar city of Gujarat state of India. Hence, the aim of the present study was to validate Gujarati version of International Physical Activity Questionnaire.

## **MATERIALS AND METHODOLOGY**

This is a cross sectional study conducted at Government Physiotherapy College, Jamnagar, Gujarat, India. Ethical clearance was taken from M P Shah medical college, Institutional ethical committee, Jamnagar, Gujarat, India. International Physical Activity Questionnaire was translated into Gujarati from English using forward-backward-forward method using the instructions given in the International Physical Activity Questionnaire manual for reliability and validity. [4] Two independent bilinguals translated the questions into Gujarati, and subsequently the preliminary version was back translated into English following careful cultural adaptation. Then a third bilingual translator provided a final version. The translated version was approved by Head of Gujarati department, Maharaja Krushnakumarsinghji University, Bhavnagar. For face and content validity, participants are experts (n=5) in the field of Medicine, Physiology and Cardiopulmonary Physiotherapy. Consensus is defined as agreement with a question by at least 80% of participant. Characteristic of Group Consensus method is selection of expert

participants. Each professional was contacted personally by primary author separately for their expert opinion in first step of validation. [5,6] Each item was analysed by professionals for content, meaning, wording, format, ease of administration and scoring. Each item was scored as accepted, rejected or accepted with modification. Procedure was continued until 80% of consensus for all items. [6] For concurrent validity, both the versions (English and Gujarati) of International Physical Activity Questionnaire were given to 20 subjects. All the subjects had knowledge of both languages. A simple random technique (flip of coin) was used for determining the order of administration of both questionnaires. Subjects whose coin turned head first completed English version first and subjects whose coin turned tail first completed Gujarati version first. An interval of 1 hour was kept between administrations of two questionnaires. Concurrent validity of Gujarati version of International Physical Activity Questionnaire was assessed by comparing MET min/week of Walking, Moderate physical activity, Vigorous physical activity and the total physical activity score obtained by Gujarati version with the original English version.

**Statistical Analysis:** Domain specific scores for work, transportation, domestic and leisure time domain were calculated and analysed. MET min/week of Walking, Moderate physical activity, Vigorous physical activity and the Total physical activity scores of both versions were analysed with use of SPSS version 16 with level of significance kept at 5%. Spearman's correlation coefficients were used to assess the strength of association between the measures.

## RESULTS

**Table 1:** Represents the demographic details of study participants

	Age (Mean ± SD)	Body Mass Index (Mean ± SD)
Female (n=10)	20.2±0.7	21.12±1.8
Male(n=10)	20±0.8	21.46±4.9

**Face & content validity:** In validation process of Gujarati version of International Physical Activity Questionnaire discussion was done about translation and application of certain questions in questionnaire. Question number 8 and 9 are regarding travelling in the motor vehicle. Tram was not kept as an example, instead of it two wheeler vehicles was used. Question number 14 is regarding vigorous physical activities in garden or yard. Snow Shovelling was not kept as an example. Question number 24 is regarding moderate physical activities in leisure time. It was translated into Gujarati with the word "Double tennis" kept as it is as the translation of it was not meaningful. The word "Other sports" was also added in the same question. Question number 26 is regarding time spent while sitting on "Weekdays", 6 weekdays were considered. Question number 27 is regarding time spent while sitting on "Weekend", 1 day was considered.

**Concurrent validity:** For correlation of total physical activity score of Gujarati version with total physical activity score of English version Spearman's correlation test was used. Spearman correlation coefficients ranged from moderate ( $\rho=0.74$ ) to high ( $\rho=0.94$ ), indicating good concurrent validity for the International Physical Activity Questionnaire (IPAQ) Gujarati. Total physical activity (MET-min/ week) from the Gujarati version of IPAQ was significantly and highly correlated with the total physical activity (MET-min/week) from the original English IPAQ ( $\rho=0.90$ ). High positive and significant correlations were also found for time spent (MET min/week) in vigorous ( $\rho=0.83$ ), moderate ( $\rho=0.74$ ) and walking ( $\rho=0.93$ ) activities between the IPAQ Gujarati and the original English version of IPAQ. The time (MET min/week) spent in sitting from the IPAQ Gujarati was also significantly ( $\rho=0.94$ ) and positively correlated with the time spent in sitting from the original English version of IPAQ.

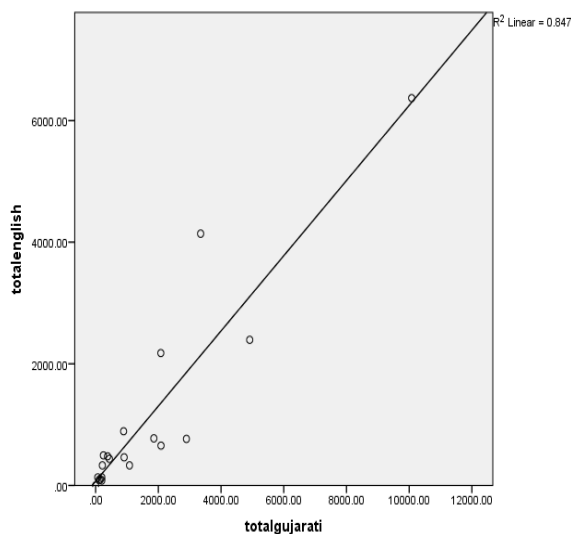
**Table 2: List of questions accepted with consensus >80% in phase 1**

Question no. of English Version	Description of question
1	Do you currently have a job or do any unpaid work outside your home?
2	How many days did you do vigorous physical activities like heavy lifting, digging, heavy construction, or climbing up stairs as part of your work? Activities that are done at least 10 minutes at a time.
3	How much time did you usually spend on one of those days doing vigorous physical activities as part of your work?
4	How many days did you do moderate physical activities like carrying light loads as part of your work? Activities that are done at least 10 minutes at a time.
5	How much time did you usually spend on one of those days doing moderate physical activities as part of your work?
6	How many days did you walk for at least 10 minutes at a time as part of your work?
7	How much time did you usually spend on one of those days walking as part of your work?
10	How many days did you bicycle for at least 10 minutes at a time to go from place to place?
11	How much time did you usually spend on one of those days to bicycle from place to place?
12	How many days did you walk for at least 10 minutes at a time to go from place to place?
13	How much time did you usually spend on one of those days walking from place to place?
15	How much time did you usually spend on one of those days doing vigorous physical activities in the garden or yard?
16	How many days did you do moderate activities like carrying light loads, sweeping, washing windows, and raking in the garden or yard? Activities that are done at least 10 minutes at a time.
17	How much time did you usually spend on one of those days doing moderate physical activities in the garden or yard?
18	How many days did you do moderate activities like carrying light loads, washing windows, scrubbing floors and sweeping inside your home? Activities that are done at least 10 minutes at a time.
19	How much time did you usually spend on one of those days doing moderate physical activities inside your home?
20	How many days did you walk for at least 10 minutes at a time in your leisure time?
21	How much time did you usually spend on one of those days walking in your leisure time?
22	How many days did you do vigorous physical activities like aerobics, running, fast bicycling, or fast swimming in your leisure time? Activities that are done at least 10 minutes at a time.
23	How much time did you usually spend on one of those days doing vigorous physical activities in your leisure time?
25	How much time did you usually spend on one of those days doing moderate physical activities in your leisure time?

**Table 3: List of questions went for phase 2 of validation**

Question no. of English Version	Description of question
8	How many days did you travel in a motor vehicle like a train, bus, car, or tram?
9	How much time did you usually spend on one of those days traveling in a train, bus, car, tram, or other kind of motor vehicle?
14	How many days did you do vigorous physical activities like heavy lifting, chopping wood, shoveling snow, or digging in the garden or yard? Activities that are done at least 10 minutes at a time.
24	How many days did you do moderate physical activities like bicycling at a regular pace, swimming at a regular pace, and doubles tennis in your leisure time? Activities that are done at least 10 minutes at a time.
26	How much time did you usually spend sitting on a weekday?
27	How much time did you usually spend sitting on a weekend day?

**Graph:** Correlation of English version of International Physical Activity Questionnaire with Gujarati version of International Physical Activity Questionnaire



**Table 4: Spearman's correlation coefficients between IPAQ English and IPAQ Gujarati version**

	Total (n=20) ρ
Walking (MET min/week)	0.93
Moderate Physical activities (MET min/week)	0.74
Vigorous Physical activities (MET min/week)	0.83
Total Physical activities (MET min/week)	0.90
Time spent while Sitting	0.94
Total Physical activity at Work	0.74
Total Physical activity for Transportation	0.65
Total Physical activity for Domestic	0.58
Total Physical activity for Leisure time	0.84

ρ=Spearman's correlation coefficient; MET=Metabolic Equivalent of task

## DISCUSSION

To our knowledge this is the first study to validate Gujarati version of International Physical Activity Questionnaire. The present study examined the face and content and concurrent validity of the Gujarati long, self-administered, last 7 days version of the International Physical Activity Questionnaire. The results of this

study indicate that the validity indices of Gujarati version of International Physical Activity Questionnaire are similar to English version of International Physical Activity Questionnaire. Gujarati version of International Physical Activity Questionnaire has acceptable properties for assessing Physical Activities in healthy adults.

For face and content validity, none of the questions were rejected by the panel of experts. Total 21 questions were accepted with translation into Gujarati. Only 6 questions required discussion among experts and were accepted with modification. Question number 8 and 9, instead of Tram, two wheeler vehicles was used. As two wheeler vehicles are common mode of transportation in Gujarat rather than tram. Question number 14 snow shoveling was not kept as an example as it is not possible as per location of Gujarat. Question number 24 the word "Other sports" was added, as there are many other sports which are more commonly played in Gujarat rather than double tennis. As per Gujarati set up weekdays are 6 i.e. Monday to Saturday so 6 weekdays were considered in question number 26. Even only 1 day i.e. Sunday was considered for weekend in question number 27.

Craig et al has studied on reliability and validity of IPAQ among 12 countries they found IPAQ questionnaires produced repeatable data Spearman's clustered around 0.8, with comparable data from short and long forms. Criterion validity had a median of about 0.30, which was comparable to most other self-report validation studies. The "usual week" and "last 7 d" reference periods performed similarly, and the reliability of telephone administration was similar to the self-administered mode. [1] Result of the present study is consistent with Craig et al.

The present study states that there is high correlation for walking between the two versions with  $\rho=0.93$ . Helou K et al had found in their study similar results with  $\rho=0.98$ . [7] Correlation for moderate physical

activities was moderate ( $\rho=0.74$ ) in the present study whereas Hagströmer M et al had found the correlation between IPAQ and activity monitor to be  $\rho=0.12$  for moderate physical activities. [8] It has been argued that it is difficult to obtain a good measure of moderate Physical activity using self-administered questionnaires, [9-11] because these activities are being accumulated throughout the day and the number and diversity of these activities is enormous, resulting in a poor recall. In contrast, high-intensity Physical activity such as different types of exercise are much more structured and stable over time and are much easier to recall. The stronger correlations found in the present study for vigorous-intensity physical activity ( $\rho=0.83$ ) compared with moderate-intensity Physical activity illustrate this point and agree with previous findings. [9] Our findings even supports the findings of Shweta et al who studied on validation of short form of international physical activity questionnaire, found vigorous physical activity ( $\rho=1.00$ ) had higher correlations compared to moderate physical activities ( $\rho=0.9$ ). [12]

Correlation coefficient for vigorous physical activities was  $\rho=0.83$  in the present study which is consistent with the result of Hagströmer M et al where they found it to be  $\rho=0.63$ . [8] The total physical activity correlation coefficient was  $\rho=0.90$  in the present study whereas Hagströmer M et al had found the correlation between IPAQ and activity monitor to be  $\rho=0.55$  for total physical activities. [8]

Correlation coefficient for total time spent in sitting was found  $\rho=0.94$  in the present study which is consistent with the finding of Helou K et al ( $\rho=0.98$ ). [7] In the present study moderate to high correlation was observed between answers of IPAQ English and those of IPAQ Gujarati, with Spearman's correlation coefficients ranging from 0.64 to 1.00. This is consistent with the results of Helou K et al who found high correlation with Spearman's correlation coefficients ranging from 0.91 to 1.00 ( $p < 0.05$ ). [7]



We have found Spearman's Correlation coefficient of Physical Activity at work (MET-min/ week) to be  $\rho=0.74$ , Physical Activity during transport (MET-min/week)  $\rho=0.65$ , Physical Activity at home or in garden (MET-min/week)  $\rho=0.58$ , Leisure-time Physical Activity (MET- min/week)  $\rho=0.84$ , Time spent sitting  $\rho=0.94$ . The results of the present study are higher than those found by Hagstromer et al. for concurrent validity they compared IPAQ with physical activity log book. [8] They measured physical activity in MET hours/day. Whereas in our study we compared English version of International Physical Activity Questionnaire with Gujarati version of International Physical Activity Questionnaire.

The IPAQ Turkish version was found to be nearly identical to the original English version in terms of test-retest reliability and reasonably good concurrent validity. [1] The Persian version of the long form, interview-administered IPAQ had an acceptable reliability and validity for assessing total PA in our Iranian sample of individuals. [13] Hagstromer had found the long, self-administered IPAQ questionnaire (Swedish) has acceptable validity when assessing levels and patterns of PA in healthy adults. [8] The IPAQ-M demonstrated good reliability and validity for the evaluation of physical activity among this Malay population. [14] Consistent with the above studies our study also had a good concurrent validity for Gujarati version of International Physical Activity Questionnaire.

The present study is subject to the following limitations. First, as is the case with any questionnaire, the respondents could have suffered from recall bias as well as social desirability bias. Second, the data of this study may not be representative of the general population which may have inflated our estimates.

Future recommendations criterion validity can be done by comparing with any gold standard instruments for measuring

physical activities. It can be carried out on larger population with various age groups.

## CONCLUSION

Gujarati version of International Physical Activity Questionnaire has a good validity to be used in Gujarati Population.

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