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Validity and reliability of an instrument in Portuguese to assess bicycle use patterns in urban areas

Validade e fidedignidade de um instrumento em Português para avaliar o padrão de uso de bicicleta em áreas urbanas

Marilson Kienteka[1,2]
Rodrigo S. Reis[1,2,3]

Abstract – The aim of this study was to analyze the validity and reliability of an instrument to assess bicycle use patterns in urban areas through systematic observation. The instrument items were selected from a literature review. Content validity was established by consensus opinion of experts of the physical activity area. The temporal stability (reliability) was verified by percentage of agreement and intraclass correlation coefficient (ICC). Observations were conducted using an adapted protocol based on the System for Observing Play and Recreation in Communities (SOPARC), consisting of systematic scans for counting cyclists in an urban area through video images provided by the public transport control system of Curitiba (URBS). Observers A and B recorded a total of 383 and 378 cyclists. Most of the observed subjects were men (87%), adults (84%), cycling on the BRT lane (54%), coming from downtown (54%), rode the bicycle on the wrong side of the street (58.2%), were not wearing a helmet (76.8) and bicycled alone (64%). Agreement percentiles ranged from 89.2 to 99.5% and ICC values from 0.922 to 0.999. According to criteria adopted, reliability was considered high in all categories included in the instrument. The instrument showed validity and reliability to be used in studies aiming to evaluate bicycle use patterns in Brazilian urban areas.

Key words: Bicycling; Evaluation; Leisure activities; Observation; Pendular migration; Validity of tests.

Resumo – *O objetivo deste estudo foi analisar a validade e fidedignidade de um instrumento para avaliar o padrão de uso de bicicleta em áreas urbanas de forma observacional. Os itens componentes do instrumento foram selecionados a partir da revisão da literatura sobre o tema. A validade de conteúdo foi estabelecida pelo parecer consensual de especialistas da área de atividade física e saúde. A estabilidade temporal (fidedignidade) foi verificada por meio do percentual de concordância e pelo coeficiente de correlação intraclasse (CCI). As observações foram realizadas com um protocolo adaptado e baseado no System for Observing Play and Recreation in Communities (SOPARC), consistindo de varreduras sistemáticas e periódicas para a contagem de ciclistas em uma via urbana, a partir de filmagens cedidas pelo controle do transporte público de Curitiba (URBS). Ao todos foram realizadas 383 e 378 observações de ciclistas, respectivamente pelos avaliadores A e B. A maior parte dos sujeitos observados eram homens (87%), adultos (84%), pedalaram no BRT (54%), na direção centro/bairro (54%), conduziram a bicicleta na contramão (58,2%), sem capacete (76,8) e sozinhos (64%). Os percentis de concordância variaram entre 89,2 e 99,5% e os valores de CCI entre 0,922 e 0,999. Segundo os critério empregados, a fidedignidade foi classificada como elevada em todas as categorias de observação contidas no instrumento. O instrumento apresenta validade e fidedignidade para o emprego em pesquisas para avaliação do padrão de uso de bicicleta em contextos urbanos brasileiros.*

Palavras-chave: *Atividades de lazer; Avaliação; Ciclismo; Migração pendular; Observação; Validade de testes.*

1 Pontifical Catholic University of Parana. Research Group on Physical Activity and Quality of Life. Curitiba-PR. Brazil.

2 Federal University of Parana. Graduate Program in Physical Education. Curitiba-PR. Brazil.

3 Washington University in St Louis. Brown School. Prevention Research Center. St Louis- MO, USA.

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INTRODUCTION

The interest in bicycle use as a means of transport and leisure has increased in the last decade[1,2]. Such interest is motivated, among other aspects, by the potential positive impact of bicycle use on physical activity levels of individuals, with numerous health benefits[3]. In addition, such benefits outweigh the risks of bicycle use related to safety and injuries related to traffic[4]. However, this advantage has been observed in countries and cities with higher levels of bicycle use as modality of transport, in which it was observed that bicycle accident rates fall when use levels increase. In these places, the greater number of cyclists makes them more visible to drivers and pedestrians and increases the chance of drivers being bicycle users, thus increasing their awareness to the safety rights of cyclists on urban roads[5].

Therefore, increasing the presence of cyclists on public roads is an important aspect for the consolidation of the bicycle use in urban environments. To do so, investment in infrastructure for the use of bicycle[4] is considered a priority. However, an understanding of the effect of such changes on the presence and use of public bicycle lanes depends on reliable and accessible measures that provide information on the profile of public road users. In addition, there is still little evidence on the effect of changing urban structures on the bicycle use pattern. Most studies available in literature have cross-sectional design, limiting the understanding of causal relations. In this sense, researchers have indicated the need for more follow-up studies. However, follow-up surveys of urban interventions are operationally complex since they require comparisons before and after completion of environmental modifications that are not controlled by the researcher[6]. In addition, the evaluation of bicycle use patterns has high operational cost, since it relies on sophisticated equipment to record the use of bicycle on the lane, such as inductive detectors, tubular pneumatic counters[7] and web cameras[8]. In addition, although these devices allow establishing the traffic volume, they do not provide information about the profile of road users.

This limitation can be mitigated by using direct observation. Direct observation has been used in studies on human behaviors in specific contexts and scenarios[9], as in physical activities performed in public spaces such as parks and squares[10], in school space[11], and also during games and leisure activities[12]. Direct observation Involves sampling techniques in which systematic and periodic scans are performed of people and contextual factors within target areas in predetermined community environments[9]. During a scan, activities and characteristics of each individual are coded according to the study objectives using specialized counters[13]. Therefore, its use can help identifying individual characteristics, behaviors and environmental aspects simultaneously. This set of characteristics, coupled with low cost, makes this method a potentially adequate and accessible tool for analyzing bicycle use patterns on public roads. Thus, the aim of this study was to develop a recording tool based on the direct observation of public roads in order to obtain information on the bicycle use pattern in urban areas.

METHODOLOGICAL PROCEDURES

The process of development, validity and reliability of the instrument was composed of sequential steps following recommendations and criteria for the development of instruments in the health area[14]. These steps included: a) construction of the instrument from the identification of items in literature and a conceptual framework; b) content validity, established by the clarity and adequacy of items analyzed by specialists in the area of physical activity and quality of life; and c) reliability, obtained by the analysis of the agreement among evaluators.

Construction of the instrument

Initially, a standardization of the term "pattern" was adopted, once the proposed instrument seeks to establish patterns of use of a public road related to bicycle use[15]. In the dictionary of the Portuguese language, the word "pattern" presents, among others, two definitions pertinent to the subject: 1) official model of weights and measures and 2) what is the basis or standard for evaluation; measure[16]. Based on these conceptual definitions, the operational definition for the present study was established, the term "bicycle use pattern" being the most repeated model regarding the use of bicycles on public roads objectively measured.

Once the operational definition was established, it was sought to identify the components of the instrument to analyze the bicycle use pattern on public roads. For this, individual and environmental factors associated with bicycle use, published in the peer-reviewed literature and synthesized in a systematic review on theme[17], were used. The literature search and the organization of identified factors also considered an ecological model of correlates and determinants of physical activity, which considers that the interaction between the different, individual, social and environmental levels can explain the level of physical activity of a person[18].

Then, the factors identified in the literature review were organized in a theoretical framework that would allow the subsequent identification of component items of the research instrument (Table 1)[19]. These items were listed and classified according to their characteristics, namely:

a) Characteristics of the physical environment
    - Functionality: a) traffic routes for cyclist, the route that the cyclist chooses to travel, such as street, sidewalk or bicycle paths / bicycle lanes[1,20]; b) route direction, which seeks to identify the cyclist's direction flow;
    - Safety: a) use the bicycle against the traffic flow of motor vehicles, where cyclists may find situations of conflict with pedestrians on the sidewalks and adverse situations with motor vehicles on the streets[2];
    - Climate: a) climate and temperature, pointed in literature as an important factor in the decision to use a bicycle[21];

b) Social environment

- Social support: positive encouragement is an important factor in the decision to use a bicycle for transportation or leisure[22,23]. Pedaling accompanied by another cyclist is considered an approximation of the social support to use a bicycle.

c) Individual characteristics
- Sex: most studies indicate greater use of bicycles among men, which is certainly a target for the implementation of actions towards women as an incentive for bicycle use[24,25];
- Age group: the use of the bicycle negatively related to younger individuals and older adults, and therefore age group is an important aspect to be considered when promoting safe facilities for urban cycling[26];
- Helmet use: Head injuries related to bicycle accidents are common and can be serious. They can be avoided or reduced in terms of severity with the use of the helmet; however, its use is still neglected[27]. Understanding this relationship is vital for a set of safety awareness actions for cyclists.

Based on factors identified in the conceptual model (Figure 1), a registration form was developed with the respective categories and codes used during direct observation of behaviors at the study site. The form presents the possibility of the following records: 1) date of collection, 2) study phase, 3) hourly period fraction and 4) time spent in each observation fraction. For the climate factor, there are three options for recording: 1) presence of sun or sun among clouds; 2) cloudy and 3) predominance of drizzle or rainfall, also the recording of the maximum and minimum temperature of the observation period. For recording the pattern in which the cyclist uses the bicycle in the traffic: a) Location identification: (1) street, (2) bus corridor, (3) sidewalk and (4) bicycle path or bicycle lane; b) Route: (1) direction; neighborhood to downtown and 2) downtown to neighborhood, being able to be adapted for use according to the cardinal points;

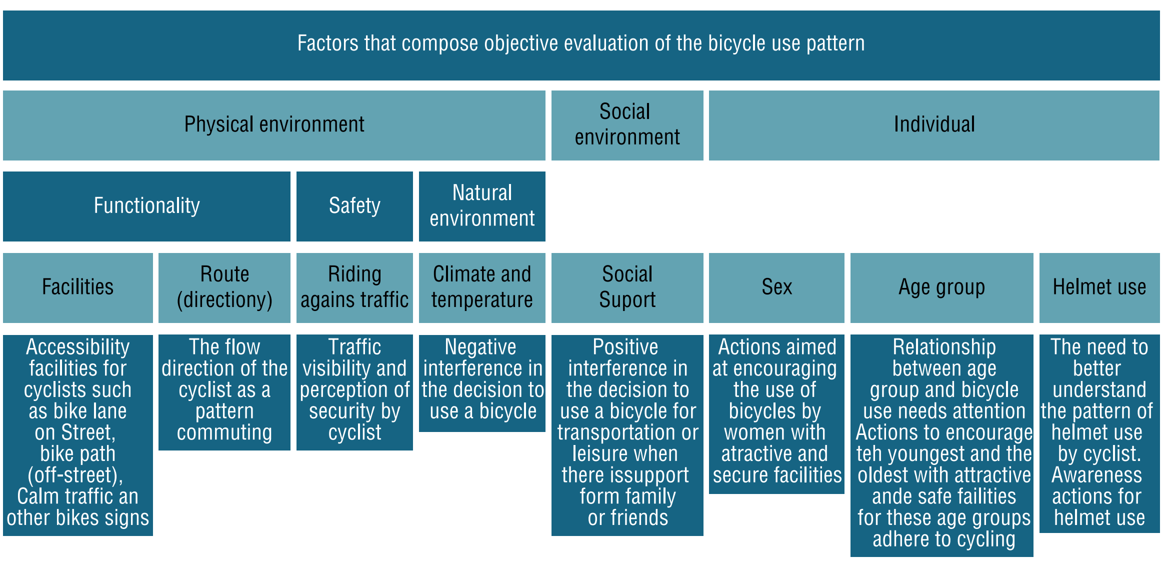

Figure 1. Individual and environmental factors that compose a conceptual model to evaluate the bicycle use pattern in the urban context.

c) wrong-way driving: it is recorded in a dichotomous way (yes or no); d) Sex: (1) male, (2) female; e) Age is categorized in age group: (1) child or adolescent, (2) adult and (3) older adult; f) Helmet use: (1) no, (2) yes and (3) the option of undefined or unidentified; g) Social support: recorded if the cyclist is: (1) bicycling alone or (2) accompanied (two or more cyclists). All items are coded to facilitate the categorized typing of data (Annex 1).

For the form application, the System for Observing Play and Recreation in Communities (SOPARC)[28] was used as reference. The SOPARC protocol was adapted, the area scan originally proposed in the protocol was replaced by an imaginary line, which was established so that the observation amplitude is limited to the observer's view field (evaluator), which contemplates the passage of the cyclist in the transverse plane of the selected urban road. This observation can be carried out in field or by recording traffic images. In the case of field observation, the evaluator's position should be the one that allows the best field of view and amplitude to establish an imaginary line of data tabulation. Image analysis will depend on the type of framing of the available urban route (area). For transversal framing of the urban route (area), which is the most appropriate, a line can be easily adapted on the video screen to facilitate data tabulation in the instrument. In the case of parallel filming of the urban route (area), the field of view of the video screen itself may set these limits. These methodological procedures make it possible to tabulate information contained in the instrument at the moment that the cyclist is crossing this line of pre-established observation, systematically and periodically, for example, hourly or continuously, depending on the study design or proposal.

Content validity

The conceptual model (Figure 1) and the respective form registration possibilities were discussed by a group of experts composed of two senior researchers and two PhD candidates in Physical Education, all experienced in environment and physical activity research. This stage was developed with the purpose of adapting the aspects reported in international studies to the Brazilian context and assisted in the agreement and definition of items selected to compose the instrument.

To verify clarity, suitability of items and instrument application, a preliminary version was applied in real time in an urban road with exclusive bus corridor. Subsequently, researchers met to make corrections and adaptation of items that presented difficulty of definition by evaluators who contributed to the standardization of measures. These doubts were related to the sudden change of the route and cyclist traffic direction, criterion for definition of classification of adolescents or adults, and also cyclists' sex. After reviewing each item, the following criteria were adopted: a) for the sudden change of traffic lane, the place with the largest portion of the cyclist's route evaluated within the pre-established field (imaginary line) should be computed; b) for the age group, when the cyclist is on the threshold between being considered adolescent or adult, a set of situations that must present at least one of these characteristics for definition of adolescent and adults were established, namely: bicycle size (small or lowered bicycle), clothing (wearing a cap, school uniform, hooded sweatshirt, long shorts) and behavior (indefinite direction and reckless maneuvers). These criteria and procedure were recorded in a reference manual for instrument application.

Instrument reliability

The analysis of concordance among evaluators used data obtained through a partnership between the Graduate Program in Urban Management, School of Art and Design of the Pontifical Catholic University of Paraná and *Urbanização de Curitiba S/A* company (URBS)[29], which Is a mixed-economy company that controls the public transportation system of the city of Curitiba. After clarifying the study, URBS, owner of the operating system to monitor the collective transportation of the city, authorized the use of continuous images (Authorization No. 007/2014 - PPGTU).

After defining the standardization of measures, two volunteers (Evaluators A and B) received six-hour training for data tabulation, which was subdivided into two modules: 1) theoretical and practical using images for the knowledge of the instrument; 2) practical on public roads to solve questions related to the procedure. Next, a period of four hours of continuous images was used, subdivided into twelve fractions of 20 minutes for recording the codes on the form, according to the previously established protocol. Evaluators A and B recorded the information independently, but when necessary there was the possibility of reviewing images individually and without communication between them.

The frequency of observations among evaluators was tested in each category of variables using absolute and relative values and homogeneity test using the chi-square test. Reliability was analyzed by the relative agreement percentage and by the intraclass correlation coefficient (ICC) among evaluators in each category of the instrument variables, and the unit of analysis for this correlation among evaluators is the 12 blocks of 20-minute fractions of the period analyzed; for example: correlation only to yes, then to no; among male cyclist and then among female cyclists, and so on. ICC values ≥ 0.70 and relative concordance $\geq 70.0\%$ were considered as adequate reliability values[14]. Analyses were performed in SPSS 17.0 software and the significance level was 5%.

Ethical aspects

The study was submitted to and approved by the Ethics Research Committee of the Pontifical Catholic University of Paraná under number 1.281.180.

RESULTS

According to chi-square values, evaluators obtained similar total number of observations for the total number of cyclists (A = 383 and B = 378, p = 0.171), most of them were men (A=87.2% and B=87.3%; p=0.242), adults (A=84.6% and B=83.3%; p=0.313), were traveling through the BRT corridor (A=54.0% and B=55.3%; p=0.143), rode their bicycles in the downtown / neighborhood direction (A=54.3% and B=54.8%; p=0.107), in the wrong direction (A=58.2% and B=52.6%; p=0.95), used no helmet (A=76.8% and B=74.9%; p=0.233) and were riding alone (A=64.0% and B=66.7%; p=0.158).

There were some significant differences among evaluators, within the categories of variables, for example, the place of traffic in the category: sidewalk (A = 22.2% and B = 20.1%, p = 0.048), use of helmet category: yes (A = 22.7% and B = 25.1%, p = 0.031) and social support category: pedaling alone or not (A = 36.0% and B = 33.3%; p = 0.040), according to table 1.

Table 1. Absolute and relative frequencies of observations, according to instrument recording categories and evaluators

Variables	Categories	1A	%	2B	%	3X2
		n=383		n=378		
Sex	Male	334	87.2	330	87.3	0.242
	Female	49	12.8	48	12.7	0.289
Age group	Children/adolescent	57	14.9	62	16.4	0.051
	Adult	324	84.6	315	83.3	0.313
	Older adult	2	0.5	1	0.3	0.167
Place of traffic	Street	91	23.8	93	24.6	0.741
	BRT4	207	54.0	209	55.3	0.143
	Sidewalk	85	22.2	76	20.1	0.048*
Route direction	Neighborhood/downtown	175	45.7	171	45.2	0.158
	Downtown / neighborhood	208	54.3	207	54.8	0.107
Wrong way?	No	160	41.8	179	47.4	0.313
	Yes	223	58.2	199	52.6	0.095
Use of helmet	No	294	76.8	283	74.9	0.233
	Yes	87	22.7	95	25.1	0.031*
	Undefined	2	0.7	0	0.0	-
Social support	Pedaling alone	245	64.0	252	66.7	0.158
	Pedaling with 2 or +	138	36.0	126	33.3	0.040*

[1]A: evaluator A; [2]B: evaluator B; [3]X^2: chi-square to verify if there is similarity among observations between evaluator A and B; [4]BRT - (bus rapid transit) (*) p=<0.05 presented significant differences between evaluators.

In order to verify the agreement percentage, each category of the twelve fractions of the four-hour period was added, and the ratio between evaluator A and B was calculated to verify the correspondence proportion for each category of variables. To verify the Intraclass Correlation Coefficient (ICC), the values corresponding to the 20-minute fractions in each category were compared between evaluator A and B through the reliability analysis (table 2).

Table 2. Relative agreement values and intraclass correlation coefficient between evaluators according to the instrument recording categories

	Evaluators					
	A	B				
	n=383	n=378	% C	¹ICC	²CI 95%	p
Traffic place						
Street	91	93	97.8	0.998	(0.994-0.999)	< 0.001
BRT	207	209	99.0	0.995	(0.981-0.998)	< 0.001
Sidewalk	85	76	89.4	0.970	(0.895-0.991)	< 0.001
Route						
Neighborhood/downtown	175	171	97.7	0.999	(0.998-0.999)	< 0.001
Downtown / neighborhood	208	207	99.5	0.994	(0.978-0.998)	< 0.001
Wrong way?						
No	160	179	89.4	0.991	(0.969-0.997)	< 0.001
Yes	223	199	89.2	0.988	(0.960-0.997)	< 0.001
Sex						
Male	334	330	98.8	0.997	(0.991-0.999)	< 0.001
Female	49	48	98.0	0.970	(0.897-0.991)	< 0.001
Age group						
Children/adolescent	57	62	91.9	0.911	(0.690-0.974)	< 0.001
Adults	324	315	97.2	0.994	(0.978-0.998)	< 0.001
Older adults	2	1	50.0	0.784	(0.251-0.938)	0.009
Use of helmet						
No	294	283	96.3	0.988	(0.957-0.996)	< 0.001
Yes	87	95	91.6	0.975	(0.915-0.993)	< 0.001
Social support						
Alone	245	252	97.2	0.995	(0.982-0.998)	< 0.001
2 or +	138	126	91.3	0.976	(0.918-0.993)	< 0.001
Total subscore	383	378	98.7	0.980	(0.960-0.993)	< 0.001

¹ICC- Intraclass Correlation Coefficient; ² 95% confidence interval

Most of the items in the scale presented high agreement (89.2-99.5%). For the ICC values, similar to the agreement percentage, the results were high (ICC> 0.900) for all items of the instrument variables categorization, except for the "older adult" category (ICC = 0.784, p = 0.009), but still within values considered adequate for this type of analysis. The lower confidence intervals of ICC values remained above 0.800 in all items, with the exception for "older adult" (0.251) and child / adolescent categories (0.690).

DISCUSSION

The present study aimed to analyze the validity and reliability of an instrument to evaluate the bicycle use patterns in urban roads through direct observation. Individual, social and environmental factors were analyzed, seeking the inclusion of information that can be identified by scanning images of public roads.

The literature review provided important subsidies for the identification of factors related to bicycle use and allowed the development of a theoretical matrix that supported the conceptual basis of the study. After consulting experts, some characteristics were re-adjusted and the instrument analysis categories were determined. However, some adaptations will be necessary when applying the instrument in different urban areas. For example, BRT is a structure of exclusive bus corridors only found in large urban centers, and may not be the case in some investigations. Therefore, urban roads that do not contain similar corridors should include this structure whenever necessary (for example: railway axis, bicycle lanes shared in sidewalks, etc.).

Still in relation to content validity, consensus among specialists involved in the construction of the instrument and in the application of the observation protocol was verified. However, evaluating bicycle use both on the site in real time and through filming should be accompanied by some adaptations. For the real-time measurement, the type of road must be considered, since in cases of wide roads, with several lanes and with bicycle use structure, it may be necessary the presence of at least two evaluators in the same place. For image analysis, image quality should be investigated, as there is the possibility of distortions and lack of natural light at dawn and especially at nightfall, which may make it difficult to identify some study variables depending on the seasonality, winter time, rainfall and the region in which the instrument was applied.

A high percentage of agreement was observed in most categories of variables (89.2 - 99.5%) and similarly, intraclass correlation also showed high coefficients (0.922 - 0.999), confirming the instrument reliability. However, some categories presented low or nonexistent values, deserving attention in the study that proposed to use this instrument, for example: there may be a need to aggregate "older adult" with "adult" categories or subdivide the children / adolescent category if the study is aimed at evaluating school routes. Another variable that presented low or nonexistent observation was "undefined" helmet use category. This option was included due to the difficulty of observations in periods with little or no incidence of natural light.

This study presents an important contribution to studies seeking to evaluate the bicycle use pattern in urban areas. To date, an instrument that would allow this kind of evaluation in the Brazilian urban context has not yet been found in literature[30]. The combination of literature synthesis, conceptual framework and expert opinion has allowed content validity to be established by different sources. In addition, reliability was evaluated separately for each component of the form, and allowed identifying in detail the quality of measurement for each item of the instrument. Finally, the use of a detailed protocol based on a well-established approach in the area of systematic observation combined with the use of images with good resolution and adequate training of observers, has reduced possible classification biases.

Nevertheless, some limitations must be considered in order to extrapolate the results. The analysis of images provided by the Center for

Operations Control of the Curitiba Transportation System presented quality in image resolution, thus providing an excellent subsidy for the reproducibility of this instrument. Cyclists were observed in the morning of a single day of the week (Tuesday), with presence of sun and mild temperature (Min: 12.6°C and Max: 19.2°C), thus, the results of the bicycle use pattern recorded in this study cannot be considered as a reference for other periods and days of the week, and for different climatic conditions. In addition, the morning period was intentionally chosen, not contemplating the verification of images made at other times with little or no natural light, which may make it difficult to identify some instrument variables such as: cyclists' sex and helmet use.

Finally, the use of images can represent a facility in obtaining data, in which information can be later tabulated in laboratory. This situation may be different when it is proposed to obtain and tabulate data on the site, which may require testing the instrument on urban roads (*in loco*) by comparing it with the data simultaneously recorded by images. The lack of evidence on factors associated with bicycle use in the Brazilian population, especially bicycle use patterns, limits the comparison of findings with literature.

CONCLUSION

It was concluded that the instrument presents adequate content validity and reliability for the observation of bicycle use in urban roads through direct observation. In general, the information obtained with this instrument allows describing important characteristics about bicycle use patterns on public roads. Such information can be used in descriptive or comparative studies on sites of specific interest, as well as in the assessment of the impact of modifications of urban structures on bicycle use. The development of this instrument can also contribute to the standardization of bicycle use in an observational way, facilitating the collection of data for city halls, agencies and fundraising organizations. Ideally, these groups can work with academic researchers in the design and implementation of evaluation studies, including data collection and analysis, and publication of results through the peer review process, for dissemination and better understanding of results, especially when applied before and after the implementation of bicycle use incentive structures. Additional studies should test the attributes of this instrument in different environments and urban contexts.

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CORRESPONDING AUTHOR
Marilson Kienteka
Pontifícia Universidade Católica do Paraná – PUCPR
Grupo de Pesquisa em Atividade Física e Qualidade de Vida – GPAQ
Rua Imaculada Conceição, 1155 – Prado Velho – CEP 80215-901 - Curitiba-PR, Brasil
E-mail: marilson_kienteka@hotmail.com

ANNEX I - DEFINITION AND INTERPRETATION OF INSTRUMENT ITEMS

These definitions are intended to facilitate the interpretation of the instrument for better agreement among evaluators involved in data collection.

1) Place of traffic: a) street, this is the lane for motor vehicles; b) BRT, is the acronym of the term "Bus Rapid Transit" for the exclusive corridors of buses when they are intended for public transport; c) sidewalk, this is the place for pedestrians located between the curb and the buildings of the street segment; d) bicycle lanes, places reserved at the same level of the street, but with distinct signaling, which may be continuous or intermittent bands, or even separated by reflective and different paintings in their extension.
2) Route: a) BC, neighborhood / downtown direction; b) CB, downtown / neighborhood direction. In this item, since it is not possible to identify this direction by the urban configuration of the city, one side should be chosen to quantify the number of cyclists who travel in both directions, thus obtaining information on this bicycle route, for example: north / south, or east / west.
3) Wrong way: a) No; cyclists who travel in the traffic direction, even when they travel on the sidewalk. b) Yes; cyclists who travel in the opposite direction, that is, against the normal traffic flow including on the sidewalk.
4) Sex: a) M, for male cyclist, b) F, for female cyclist.

5) Age group: a) Child / adolescent, for this item, those who are under the age of 18 years were considered adolescents. For the age threshold between 17 and ≥ 18 years, an interpretation criterion becomes necessary. To solve possible doubts in the interpretation of this age group transition, a predominant combination of characteristics in adolescents can be used, such as: bicycle size, random way of driving the bicycle, wearing school uniform or typical clothing (cap, hooded sweatshirt, etc.) b) Adult; likewise, adult observation may require identification criteria at both ends, the younger part was already defined with examples, but for the transition from adult to older adult (18-65), the criterion may also need attention in the training of observers involved in data collection; c) Older adults; some characteristics of this age group were revealed in the validation study. In the same way that the adolescent can be identified by the bicycle size and model, older adults have a different style of pedaling and present different characteristics such as bicycle type (strong bar), hair, lighter pedaling cadence and conservative clothing.
6) Helmet use: a) No, tabulation of cyclists who do not use the helmet; b) Yes, tabulation of cyclists using the helmet; c) N / D, an acronym for "not defined", in this case, when using images to analyze the bicycle use pattern, other variables may interfere with the correct observation of items that make up the instrument, but in this case, images with low resolution, zoomed distance or lack of lighting, may confuse with the use of cap, which is very typical among cyclists, as a helmet user.
7) Social support: a) Alone; cyclist who travels alone, without the company of another cyclist. b) Two or more; cyclist who travels with other cyclists, next to or immediately behind. In some cases, the tracking of the cyclist's trajectory rather than just the imaginary line previously determined for the collection of these data may be necessary.

ANNEX II - BICYCLE USE OBSERVATION INSTRUMENT – PORTUGUESE VERSION

IOUB – INSTRUMENTO DE OBSERVAÇÃO DO USO DE BICICLETA

Data da observação: ___/___/___	Avaliador: __________	ID local: 1[ ]______________ 2[ ]______________ 3[ ]					
Fase do Estudo:	1[ ] Baseline	2[ ] 1ª fase	3[ ] 2ª fase	4[ ] 3ª fase	5[ ] 4ª fase		
Dia da semana:	1[ ] Segunda-feira	2[ ] Terça-feira	3[ ] Quarta-feira	4[ ] Quinta-feira	5[ ] Sexta-feira	6[ ] Sábado	7[ ] Domingo
Fração do período:	[ ]01 07:00:00-07:59:59	[ ]02 08:00:00 08:59:59	[ ]03 09:00:00-09:59:59	[ ]04 10:00:00-10:59:59			
	[ ]05 11:00:00-11:59:59	[ ]06 12:00:00 12:59:59	[ ]07 13:00:00-13:59:59	[ ]08 14:00:00-14:59:59			
	[ ]09 15:00:00-15:59:59	[ ]10 16:00:00 16:59:59	[ ]11 17:00:00-17:59:59	[ ]12 18:00:00 19:00:00			
Clima predominante:	[ ]1 sol /entre nuvens	[ ]2 nublado	[ ]3 garoa ou chuva	Tempo aval: Iníc:______Fim:_______Total_____min.			
Direção da filmagem:	[ ]1 BC: Bairro-Centro	[ ]2 CB: Centro-Bairro		Temperatura: Máx. ________Min. _______			

N - ID	1. Local do trânsito	2. Rota	3. Contramão	4. Sexo	5. Faixa etária pedalando	6. Uso de capacete?	7. Apoio social
01 _______	1-☐ Rua 3-☐Calçada 2-☐ BRT 4-☐Ciclofaixa	1-☐ BC 2-☐ CB	0-☐ Não 1-☐ Sim	1-☐ M 2-☐ F	1-☐ Criança/adolescente 2-☐ Adulto 3-☐ Idoso	0-☐ Não 1-☐ Sim 2-☐ N/D	1-☐ Sozinho 2-☐ 2 ou +
02 _______	1-☐ Rua 3-☐Calçada 2-☐ BRT 4-☐Ciclofaixa	1-☐ BC 2-☐ CB	0-☐ Não 1-☐ Sim	1-☐ M 2-☐ F	1-☐ Criança/adolescente 2-☐ Adulto 3-☐ Idoso	0-☐ Não 1-☐ Sim 2-☐ N/D	1-☐ Sozinho 2-☐ 2 ou +
03 _______	1-☐ Rua 3-☐Calçada 2-☐ BRT 4-☐Ciclofaixa	1-☐ BC 2-☐ CB	0-☐ Não 1-☐ Sim	1-☐ M 2-☐ F	1-☐ Criança/adolescente 2-☐ Adulto 3-☐ Idoso	0-☐ Não 1-☐ Sim 2-☐ N/D	1-☐ Sozinho 2-☐ 2 ou +
04 _______	1-☐ Rua 3-☐Calçada 2-☐ BRT 4-☐Ciclofaixa	1-☐ BC 2-☐ CB	0-☐ Não 1-☐ Sim	1-☐ M 2-☐ F	1-☐ Criança/adolescente 2-☐ Adulto 3-☐ Idoso	0-☐ Não 1-☐ Sim 2-☐ N/D	1-☐ Sozinho 2-☐ 2 ou +
05 _______	1-☐ Rua 3-☐Calçada 2-☐ BRT 4-☐Ciclofaixa	1-☐ BC 2-☐ CB	0-☐ Não 1-☐ Sim	1-☐ M 2-☐ F	1-☐ Criança/adolescente 2-☐ Adulto 3-☐ Idoso	0-☐ Não 2-☐ N/D 1-☐ Sim	1-☐ Sozinho 2-☐ 2 ou +
06 _______	1-☐ Rua 3-☐Calçada 2-☐ BRT 4-☐Ciclofaixa	1-☐ BC 2-☐ CB	0-☐ Não 1-☐ Sim	1-☐ M 2-☐ F	1-☐ Criança/adolescente 2-☐ Adulto 3-☐ Idoso	0-☐ Não 2-☐ N/D 1-☐ Sim	1-☐ Sozinho 2-☐ 2 ou +
07 _______	1-☐ Rua 3-☐Calçada 2-☐ BRT 4-☐Ciclofaixa	1-☐ BC 2-☐ CB	0-☐ Não 1-☐ Sim	1-☐ M 2-☐ F	1-☐ Criança/adolescente 2-☐ Adulto 3-☐ Idoso	0-☐ Não 2-☐ N/D 1-☐ Sim	1-☐ Sozinho 2-☐ 2 ou +
08 _______	1-☐ Rua 3-☐Calçada 2-☐ BRT 4-☐Ciclofaixa	1-☐ BC 2-☐ CB	0-☐ Não 1-☐ Sim	1-☐ M 2-☐ F	1-☐ Criança/adolescente 2-☐ Adulto 3-☐ Idoso	0-☐ Não 2-☐ N/D 1-☐ Sim	1-☐ Sozinho 2-☐ 2 ou +
09 _______	1-☐ Rua 3-☐Calçada 2-☐ BRT 4-☐Ciclofaixa	1-☐ BC 2-☐ CB	0-☐ Não 1-☐ Sim	1-☐ M 2-☐ F	1-☐ Criança/adolescente 2-☐ Adulto 3-☐ Idoso	0-☐ Não 2-☐ N/D 1-☐ Sim	1-☐ Sozinho 2-☐ 2 ou +
10 _______	1-☐ Rua 3-☐Calçada 2-☐ BRT 4-☐Ciclofaixa	1-☐ BC 2-☐ CB	0-☐ Não 1-☐ Sim	1-☐ M 2-☐ F	1-☐ Criança/adolescente 2-☐ Adulto 3-☐ Idoso	0-☐ Não 2-☐ N/D 1-☐ Sim	1-☐ Sozinho 2-☐ 2 ou +
11 _______	1-☐ Rua 3-☐Calçada 2-☐ BRT 4-☐Ciclofaixa	1-☐ BC 2-☐ CB	0-☐ Não 1-☐ Sim	1-☐ M 2-☐ F	1-☐ Criança/adolescente 2-☐ Adulto 3-☐ Idoso	0-☐ Não 2-☐ N/D 1-☐ Sim	1-☐ Sozinho 2-☐ 2 ou +
12 _______	1-☐ Rua 3-☐Calçada 2-☐ BRT 4-☐Ciclofaixa	1-☐ BC 2-☐ CB	0-☐ Não 1-☐ Sim	1-☐ M 2-☐ F	1-☐ Criança/adolescente 2-☐ Adulto 3-☐ Idoso	0-☐ Não 2-☐ N/D 1-☐ Sim	1-☐ Sozinho 2-☐ 2 ou +
13 _______	1-☐ Rua 3-☐Calçada 2-☐ BRT 4-☐Ciclofaixa	1-☐ BC 2-☐ CB	0-☐ Não 1-☐ Sim	1-☐ M 2-☐ F	1-☐ Criança/adolescente 2-☐ Adulto 3-☐ Idoso	0-☐ Não 2-☐ N/D 1-☐ Sim	1-☐ Sozinho 2-☐ 2 ou +
14 _______	1-☐ Rua 3-☐Calçada 2-☐ BRT 4-☐Ciclofaixa	1-☐ BC 2-☐ CB	0-☐ Não 1-☐ Sim	1-☐ M 2-☐ F	1-☐ Criança/adolescente 2-☐ Adulto 3-☐ Idoso	0-☐ Não 1-☐ Sim 2-☐ N/D	1-☐ Sozinho 2-☐ 2 ou +
15 _______	1-☐ Rua 3-☐Calçada 2-☐ BRT 4-☐Ciclofaixa	1-☐ BC 2-☐ CB	0-☐ Não 1-☐ Sim	1-☐ M 2-☐ F	1-☐ Criança/adolescente 2-☐ Adulto 3-☐ Idoso	0-☐ Não 2-☐ N/D 1-☐ Sim	1-☐ Sozinho 2-☐ 2 ou +
16 _______	1-☐ Rua 3-☐Calçada 2-☐ BRT 4-☐Ciclofaixa	1-☐ BC 2-☐ CB	0-☐ Não 1-☐ Sim	1-☐ M 2-☐ F	1-☐ Criança/adolescente 2-☐ Adulto 3-☐ Idoso	0-☐ Não 2-☐ N/D 1-☐ Sim	1-☐ Sozinho 2-☐ 2 ou +