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Development and Validation of Psychological Fitness to Drive Scale for Filipinos

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Abstract

Road transportation for Filipinos is a daily task that subjects an individual to risks and dangers, leading to damages and deaths annually, this leads to developing and validating a Psychological Fitness to Drive Scale for Filipinos (PFDSF) to assess Filipino drivers' mental readiness and save lives. Via test development, 154 items were generated after a rigorous process of conceptualization and item generation from pre-survey, interviews, and related literature with English and Filipino test booklets as delivered to 102 participants for pilot testing. Online field testing was delivered due to the COVID-19 pandemic. About 463 samples went through a series of factor analyses to determine the existing factors and retain highly relevant items, resulting in two factors namely, Risky Driving Behavior (RDB) with 50 items (α=0.968), and Responsible and Safe Mobility (RSM) having 22 items (α=0.915), for a total of 72 items. PFDSF was found to be psychometrically sound with validity in its content, construct, factors, and high reliability (α=0.967). Future researchers are invited to use the scale and explore other areas for utility with specific population, age, gender, exploration of a social desirability factor, further strengthening of its criterion, convergent and divergent validity considering computer-assisted online version its localization to different major dialects.

Keywords: Psychological fitness to drive, test development and validation, Filipino drivers, road safety and traffic psychology

INTRODUCTION

Reports on road safety stated that 1.3 million people die yearly and an estimate of 50 million individuals experience severe causalities in road accidents worldwide (International Transport Forum, 2017), which can be estimated to be a loss of approximately 3% of Gross Domestic Product (GDP) in low-and middle-income countries as a result of road-related accidents (World Health Organization, 2015). The same report reveals that road traffic crashes figure as the ninth leading cause of death across all ages worldwide and are predicted to escalate to the seventh leading cause of death by 2030.

Recent studies about road accidents are commonly linked to traffic psychology such as driver aggression and narcissism (Bushman et al., 2018), understanding the psycho-physical characteristics of drivers (Vujanić et al., 2016), considering driver personality as a valid predictor of risky driving (Šucha & Černochová, 2016), and locally, on helmet use, riding experience, and driving behavior to motorcycle accident severity (Seva, 2017), and traffic education awareness (Arceo et al., 2019).

In traffic psychology, in the Czech Republic, Šucha and Černochová (2016) believe that the central concept in the assessment of fitness to drive as mobility competence to some mental, physical, attitudinal, and behavioral bases for the safe and co-regulated operations of motor vehicles. In Austria, assessment involves testing driving abilities and the driver's willingness to adapt to traffic conditions, while in Portugal perceptive-cognitive, psychomotor, and psychosocial dimensions are included in their psychological exam for safe driving behavior. Switzerland, Sweden, and Italy have their legal frameworks for assessing fitness to drive (Schuhfried, 2015; Palubiski & Crizzle, 2016).

In the Philippines, the Land Transportation Office (LTO) issues student, non-professional, and professional driver's licenses, requiring mental fitness aside from physical and intellectual preparedness through written and practical examination but there is no thorough psychological assessment that will screen the psychological fitness of a person applying for driver's license. Presently, LTO now requires a Theoretical Driving Course (TDC) for student permit applicants and a Practical Driving Course (PDC) for non-professional or professional driver's license applicants as firmer policies for applicants of non-professional or professional licenses with an eight-hour practical training course from LTO-accredited driving schools (Grecia, 2020).

A plethora of studies conducted on assessing fitness to drive, in association with problematic alcohol assumptions (Reimann et al., 2014); road rage (Sagar et al., 2013); work stress and health problems (Useche et al., 2018; Unsworth et al., 2017) mild cognitive impairments (Fuermaier et al., 2017), active drivers with dementia (Ranchet et al., 2016), and simple sleep deprivation (Schwarz et al., 2015). Further, efforts were made to develop instruments that would assess the drivers' behavior behind the wheels. In 1990, Reason, Manstead, Stradling, Baxter, and Campbell developed Driver Behavior Questionnaire (DBQ; Reason et al., 2011; Lajunen & Ozkan in Porter, 2011). DBQ serves as one of the most widely used instruments for self-reported driving behavior in over 170 studies across cultures via meta-analytic review (de Winter & Dodou, 2010), and its tested validity in different age groups using exploratory analysis (Martunissen et al., 2013). Adapted DBQ was also used among the North American driving population (Cordazzo et al., 2014) while the same year, Sucha, Sramkova, and Risser (2014) used the translated and adjusted version of the DBQ in the Czech driver population with over 2,600 participants. This implies that the DBQ was found to be most frequently used in research in terms of collision risk on a foreign scale but did not address the issue of cultural boundaries regarding driver behavior and psychological fitness.

Despite several psychological test distributors of foreign and locally developed tests, presently there are no specific measures for psychological fitness to drive as a test construct for Filipino. Further, LTO giving the examination to driver applicants requires them to be mentally and physically fit to operate a vehicle (LTO, 2016), yet no formal psychological testing is administered to quantify the applicants' mental fitness to drive. This study attempted to develop a scale that measures specific behavior, traits, or attitudes that are relevant to psychological fitness to drive, since the existing local measures may not best assess and predict driver competence and safe mobility. Furthermore, it ropes the Philippine Road Safety Action Plan (PRSAP) of the DOTr to reduce the traffic accident rate by 50% by the year 2020 by improving road safety management thru conducting research relevant to Philippine Road Safety (Francisco, 2017). Further, this may also encourage government agencies and private sectors to re-evaluate the measures and procedures in ensuring drivers can safely travel on Philippine roads. The Psychological Association of the Philippines (PAP) Code of Ethics, Section VII. Assessment, J. Test Construction, professionals are also encouraged to further innovate up-to-date assessment tools that would help resolve the present-day problems in the country.

This presently developed scale shall be categorized as a structured Personality Test, which technically states "tests that measure overt and covert dispositions." With the tendency that individuals will show a particular behavior or response in any given situation (Kaplan & Saccuzzo, 2016). Using the Psychological Fitness to Drive Scale for Filipinos (PFDSF), government agencies like DOTr, LTO, and LTFRB can be assisted in developing a culture of safe and responsible driving by assessing the psychological fitness of drivers.

This study aims to create a psychological scale that measures the psychological fitness to drive Filipinos, specifically, it sought to develop a Psychological Fitness to Drive Scale for Filipinos by generating initial items for the scale from the pre-survey and review of related literature up to the screening, evaluation, and review the initial scale by Subject Matter Experts (SMEs) for content validation, and to establish the psychometric properties of the scale, in terms validity and reliability.

A multidimensional psychological driving theories can be accounted for in the conduct of this study, primarily, the Driver Control Theory by Ray Fuller (2011, p.13), which presumes that "*driver control actions are dependent on perceptual processes that select the information that is compared to some standard or standards. Drivers act to keep resulting discrepancies within acceptable limits in a negative feedback loop as the means of control in their goal-directed behavior*".

The theory encompasses both motivational and cognitive dimensions inspected during the standard-setting and perceptual processes respectively. According to Fuller (2000), the Task Capability Interface (TCI) model describes the demand to maintain driving capability as higher than that of the task demand required for driving to avoid a collision or off-road driving, which creates the actual safety margin and driving task demands both information acquisition and control in vehicle handling, corresponding to the requirement to anticipate the driving scenario and maneuver the vehicle accordingly. The Driver Control Theory (DCT) composed of several vital elements, primarily the standards of reference for a range of acceptable task difficulties. Driving task difficulty is inversely related to the degree of separation between the demands of the task and the driver's available capability, that is, with a greater level of driver capability relative to task demand, the lower the difficulty of the task, and vice versa. Generally, the separation between these two is equivalent to space capacity and safety margin.

In DCT, the driver must be able to maintain the standard level of perceived driving capability in consonance with both perceived actual and anticipated driving task demands to avoid a collision or off-road driving. The individual continuously alters or maintains his driving behavior depending on the result of the previous perceptual driving experience to safely drive along the road considering the several external and internal factors that affect the driver's behavior in the loop. Equally, emotional responses also play part in driver behavior, Aldao (2014) believed that individuals should use their ability to down-regulate or up-regulate their emotions, depending on the demands of the situation. Thus, when drivers fail to regulate their emotions, it may result in higher risks of violating laws, rules, regulations, and norms. Consequently, Shinar and Oppenheim (2011) reviewed several models of driver behavior and found out that driver behavior can be modeled in two different approaches, the *descriptive models* (focusing on what the driver does or has to do on the road considering the entire driving task; however, the model post certain limits for it does not account for other factors such as motivation, skills, abilities, and situational limitations) and the *functional models* (explaining why the driver undertakes certain actions by investigating on the mental activities executed while driving like interactions between different components of the driving system which includes perception, decision and response selection, response execution, attention allocation mechanism, and feedback loop).

METHOD

Test development served as a research method anchored to Cohen and Swerdlik (2018) with the following stages: Test Conceptualization, Test Construction, Test Tryout, Analysis, and Revision.

Population and Sampling

Pilot testing was from the province of Cavite closest to NCR as urbanized. For field testing, participants came from the NCR where there is a high concentration of licensed drivers and a high number of recorded road accidents (Rey, 2018).

Participants were recruited by publicly posting an announcement and digital poster on different social networking platforms, those who qualified were asked to read and submit the informed consent in Google form and record their responses on the same platform. About 102 participants answered the pilot version of the test (51 answered the English Version, 51 answered the Filipino version). For field testing, the sample size was computed using Slovin's formula gaining a total of 399.9 (N=400) for professional and non-professional drivers in NCR.

For inclusion criteria, drivers to qualify as research respondents must be: (1) a holder of a valid non-professional or professional driver's license issued by the LTO; (2) must have been actively using the license to drive for the past six months; and (3) a resident of the province of Cavite for pilot testing, and a resident from any city or municipality from the NCR for the field testing.

Phases of the Study

Development Phase. This presents the stages of development and validation of PFDSF which involves the establishment of the test criterion and generation of items from the pre-survey, personal communications, and casual talk to ordinary daily passengers, subject matter experts, and licensed drivers themselves as supported by the literature. There were 201 initially drafted items categorized into 21 domains regarding the review of related literature and standardized test (appendix), with their corresponding definition.

With expert judgment, the test items gained the feature of a forced-choice format wherein a test-taker is forced to choose between two alternatives as useful when suboptimal effort, exaggeration, or malingering is of concern to the examiner (Frederick & Speed, 2007) to resolve biases of social desirability to respond in ways more socially acceptable with true answer (Lavrakas, 2008). Each question has a three-choice response option, where the middle response choice letter "b" is a question mark (?), which indicates neither option "a" nor "c" applies to the examinee. Sample item: I forget to use my signal light indicators, then choose whether. (a) True, (b) ?, or (c) False. If the individual answers option letter "a", it is indicative that the person admits to having qualities of forgetfulness, otherwise answering response option letter "c" means that the test-taker denies being forgetful. Response option "b" indicates that the option on "a" and "c" is not applicable for the examinee, like stems and items (e.g., presented in the Minnesota Multiphasic Personality Inventory-2 [MMPI-2] and the 16 PF Questionnaire 5th Edition) to avoid addressing the significant issue the test-taker is trying to avoid.

All items, test instructions, and directions were presented both in Tagalog and English being a major communication (i.e., language) used in the NCR and nearby part of South Luzon. The initial draft was checked, screened, and reviewed for content validation by five experts who specialize in psychological assessment and/or driving behavior: an attorney with relevant experience in handling road accident cases (1), a licensed psychometrician who practices assessment psychology (1), a licensed psychologist who is also a certified assessment psychologist by the PAP (1), a licensed psychologist who practices clinical psychology (1), and law enforcer from LTO (1). Using the Content Validation Ratio (CVR), items with at least 0.99 CVR were retained in the scale, consequently incorporating the quantitative and qualitative recommendations of the subject matter experts for possible inclusion of the items, following the recommendation of Frey (2018) with at least 0.78 CVR as a rule of thumb. Afterward, the translation of the contents of the entire scale was reviewed by two language experts performing translation and back-translation to ensure clarity and accuracy of the items and later generating the final test version, designing the test booklet followed for pilot testing of items. English and Filipino versions were made separately yet identically.

Validation Phase. With the unprecedented Luzon-wide lockdown due to the widespread COVID-19 in the Philippines (March 2020), some of the validation procedures were interrupted. During Modified Enhanced Community Quarantine (MECQ), researchers initiated the pilot-testing procedures. Mediums like text (SMS), call, or private messages on Facebook were delivered for inclusion. Then, meeting the qualified respondents to answer the test.

After collecting all the accomplished test booklets, the researchers scored the response to (0=not psychologically fit; 1=neutral; 2=psychologically fit) based on the related literature. Scores were tallied and analyzed using Statistical Package for Social Sciences (SPSS). Evaluating the results of the pilot testing, the researchers proceed to field testing of the instrument. With the rise of COVID-19 cases in Luzon and the unpredictability of community quarantines and lockdowns, the researchers diverted to gather the data online (Google Form). Data gathered were analyzed, and the final set of items 72 and two factors of the PFDSF was identified.

Data Analysis

Results of the pilot testing and field testing were analyzed by a Statistician and Ph.D. in Mathematics Education using SPSS for reliability testing, a test of internal consistency, and factor analysis, and an attempt to render Structural Equation Modeling (SEM) using Analysis of a Moment Structure (AMOS), and SPSS extension (Shaaban, Gaweesh, & Ahmed, 2020).

Ethical Considerations

The research underwent the evaluation (DLSU-DERC-2019-0142T2) to guarantee the safeguard of each participant in the conduct of the study.

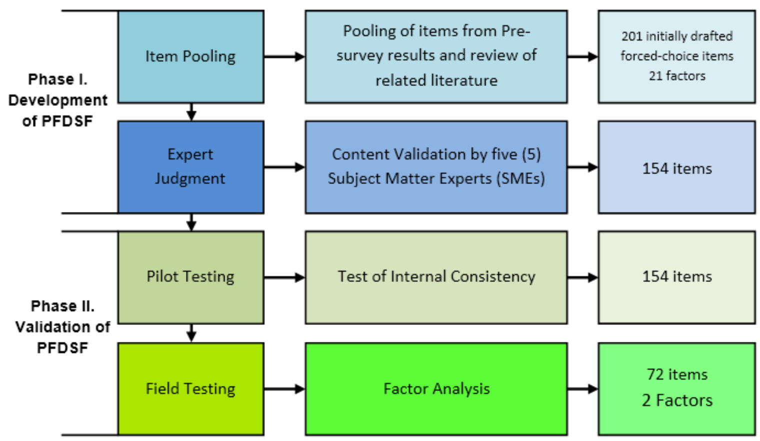

Figure 1. The flow of PFDSF Test Development and Validation

RESULT AND DISCUSSION

A total of 102 drivers from different cities and municipalities in Cavite answered for the pilot version of the instrument in English and Filipino language. The accomplished test booklets were tabulated and computed for Cronbach's alpha resulting in .879 for the English version (*very good reliability*) and .907 for the Filipino version (*excellent reliability*). Upon achieving good results in internal consistency for item deletion and generation together with the codes extracted narratives during interviews, 154 items were retained with supporting literature for field testing of the PFDSF.

As for the sampling results, most of the respondents in the pilot testing were from Trece Martires City (22.35%), General Trias City (18.82%), and Tanza (15.29%). Participants were dominated by males (88.24%), drivers ranging from young to mid-adulthood (23–37 years old), singles (50.59%), college-level drivers (68.24%), and non-professional drivers (63.53%) or various restriction codes.

Meanwhile, for field testing, out of 463 driver-participants, 137 were residents from Manila City, 78 from Caloocan City, and 57 from Quezon City. Most are male (289) than female (174). By age group, mostly 18 to 22 (44.28%), followed by 23 to 27 (29.59%), and 28 to 32 (9.07%) with a median age of 23. For their occupation, 41.25% had non-driving-related occupations, followed by those who placed none or were unemployed (26.35%), then by those who had driving-related occupations (18.79%), and students (13.61%). The majority are single (74.95%), while a small portion is married (18.57%). Further, utmost of them attained college education (46.00%), high school (29.16%), vocational (10.80%), and post-graduate education (7.13%). Consequently, 73.43% are non-professional while 26.57% are professional drivers. By restriction code, most are code 1 (87.90% or 407), followed by code 2 (29.81% or 138), while the smallest number of driver participants had restriction codes 6, 7, and 8 for articulated vehicles (2.38%; 1.73%; 2.38%).

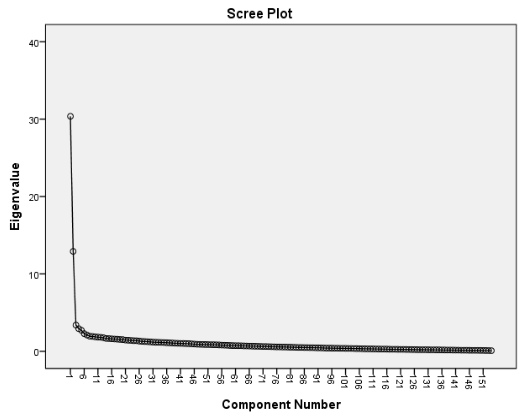

Figure 2. Total Variance Explained for the first EFA

Data generated for field testing yielded excellent reliability of .966. Thus, representatives for the field testing came from the different cities of Metro Manila. Noticeably, Manila City, Caloocan City, and Quezon City were the cities with the greatest number of participants, they may still be traversing some of the most accident-prone roads such as EDSA, C-5 Road, Commonwealth Avenue, Ortigas Avenue, Mindanao Avenue, Roxas Boulevard, and Quezon Avenue (Cayabyab, 2020) and other various roads in the NCR and neighboring provinces which makes the distribution of samples credible in establishing the scale. Further, the higher number of male driver-participants than female driver-participants was confirmed by the Labor Force Survey (LFS) in 2017 wherein more males are involved in the transport and storage service industry than females (Philippine Statistics Authority, 2018). More non-professional drivers participated in the study than professional drivers, somehow parallel to the LTO annual report in 2019 where there are more new applicants for non-professional driver's licenses than professional driver's licenses (Land Transportation Office, 2020). In the same report by LTO, the highest number of registered vehicles are from the category of motorcycles followed by utility vehicles and cars, which usually require license type restriction codes of 1, 2, and 4.

Table 1. Scree plot for EFA

	Extraction Sums of Squared Loadings		
	Total	**% of Variance**	**Cumulative %**
1	30.361	19.715	19.715
2	12.907	8.381	28.096
3	3.379	2.194	30.290
40	1.035	.672	67.057
41	1.020	.662	67.719
42	1.009	.655	68.374

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) was performed and resulted in a value of .905 which indicates very satisfactory sample size for factor analysis (Howard, 2016). Moreover, Bartlett's Test of Sphericity, which clarifies if there is a relationship between the variables, generated a p-value < 0.05 denotes that there are significant relationships between the factors. To extract the possible factors within the test, 154 items for this scale underwent Exploratory Factor Analysis (EFA) using Principal Component Analysis (PCA) with Varimax (orthogonal) rotation. The analysis yielded 42 factors (eigenvalues > 1) explaining a total of 68.37% of the variance for the entire set of variables. The top 3 highest and bottom 3 lowest extractions are mirrored in the scree plot in Table 1.

Table 2. Summarized component matrix for the first EFA

Component No.	Highest Factor Loading	Lowest Factor Loading (>.30)	Number of items with factor loading >.30
1	.717	.303	122
2	.438	-.302	66
3	.447	.308	7
4	.387	.306	4
5	.361	-.302	5
6	.335	-.308	2
8	.357	.315	3
9	.358	.345	2
12	.323	-.313	4
13	.324	-	1
14	.312	-	1
16	.336	-	1
20	-.337	-	1
28	.316	-	1
37	.333	-	1

Cohesively, parallel analysis of CPA with varimax, total variance explained by EFA and scree plot, 42 factors were determined after EFA, the component matrix revealed that most of the items loaded >.30 in factors 1 and 2 as seen on the summarized component matrix (table 2) following the recommendation of Osborne (in Samuels, 2017). Hence, table 2 presents items that gained the highest factor loading the items and only the identified factors that have at least one item that has factor loadings >.30.

Table 3. Total Variance Explained for two-factor analysis on 154 items

	Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %
1	30.361	19.715	19.715
2	12.907	8.381	28.096

For the first factor analysis, fourteen (14) items failed to load >0.30 in any of the 42 factors initially extracted. There are also evident cross-loadings in some of the items, which is not permissible and should be eradicated (Samuels, 2017). Nevertheless, the data showed evidence of high convergent validity as similar items are assembled towards factors 1 and 2. Consequently, with high discriminant validity and with limited cross-loadings in some of the items, data shows the distinction of the factors from each other, which is evidence of divergent validity. However, to further explore the placement of items in different factors, the researcher follows the recommendation of Hadi et al. (2016) on examining where most of the items load in the component matrix. Since it is evident that most of the items are loaded on factors 1 and 2, it can be assumed that a two-factor solution is more suitable for further investigation of the analysis. With this, another factor analysis on two factors for the 154 items using Principal Component Analysis (PCA) with Direct Oblimin as the rotation method, revealing a cumulative variance of 28.096% as presented (table 3).

The researchers consider the extraction values to be able to screen the items that would best load on each factor. The higher values of commonalities suggest that the item is more likely to be retained (Dombrowski, 2017). Since there were 463 adequate samples for factor analysis as supported by the results of the KMO, it is therefore permissible for the researcher to decide to consider a lower cut-off of .30 because knowing that only two items were higher than the .50 cut-off. This decision is supported by Hadi et al. (2016) as they suggest also that items that fall below .30 may not fit well with other items in their components.

Table 4. Total Variance Explained for two-factor analysis on 74 items

	Extraction Sums of Squared Loadings		
Component	**Total**	**% of Variance**	**Cumulative %**
1	22.933	30.991	30.991
2	5.878	7.944	38.935

After all, items have been ranked based on the extracted commonality with a mean extraction of .28, having item 11 with the highest extraction of .54, eighty (80) items have been found to have <.30 extracted commonality, meaning, these items may not best represent the most factors that have been identified. Finally, 74 items left were further examined for the second-factor analysis on two factors. PCA with Direct Oblimin as the rotation method was used in the analysis of 74 items for 2 components, explaining 38.935% of the variance for the entire set of variables as presented in table 4, implying an improved representation of items in each factor for this analysis than the previous factor on two components.

Table 5. Summarized pattern matrix for two-factor analysis on 74 items

Item no.	Component Loading		Rank
	Factor 1	**Factor 2**	
86	.693	-.105	1
73	.680	-.047	2
1	.507	.320	51
132	.493	.307	52
49	-.003	.627	1
59	.008	.625	2
116	.042	.541	21
39	.034	.539	22
Mean	.435	.195	

74 retained items presented, 52 items loaded stronger in factor 1 and 22 items loaded stronger than factor two. However, the cross-loading in items 1 and 132, both with a difference of .19, must be considered for deletion if the loading difference is less than .20 (Fields in Samuels, 2017; Ros-Gálvez, 2017). Hence, items 1 and 132 were deleted, then the researchers performed another factor analysis for the 72 items.

Table 6. Total Variance Explained for two-factor analysis on 72 items

	Extraction Sums of Squared Loadings		
Component	**Total**	**% of Variance**	**Cumulative %**
1	22.032	30.600	30.600
2	5.847	8.121	38.721

72 items were run for another time in factor analysis, the total variance explained in table 6 showed that 38.721% explains the total variance for the entire set of items.

Upon careful investigation of the items comprising each factor, the researcher named factor 1 ("Risky Driving Behavior") as these were the themes most evident upon examining the items included in it. Mekonnen et al. (2019) described risky driving behavior as those who engage in speeding, drunk driving, driving with an unfastened seatbelt, sleepy driving, and highway code violations. Likewise, Ivers et al. (2009) identified several risky driving behaviors including high-level speeding and speeding for the thrill, following too closely to the vehicle ahead, violating traffic rules, not using seatbelts, using mobile phones while driving, driving during high-risk nighttime hours, and driving older vehicles. Mikler and Almakadma (2016) additionally discovered that a lack of respect for traffic laws is also a risk factor. Cognitive (Kazemi et al., 2017; Elfering et al., 2013), perceptual (Green in Sy, 2017), and performance (da Silva et al., 2014) difficulties which put drivers to higher risks in getting involved in possible accidents are also included in this factor. With this, the "Risky Driving Behavior" factor generally measures a driver's tendency to demonstrate high-risk driving habits and maladjusted behaviors which may eventually result in road crashes.

Table 7. Summarized pattern matrix for two-factor analysis on 72 items

	Component Loading		
Item no.	**Factor 1**	**Factor 2**	**Rank**
86	.692		1
73	.679		2
4	.677		3
34	.547		48
60	.547		49
52	.509		50
49		.629	1
59		.627	2
37		.625	3
92		.557	20
116		.542	21
39		.539	22

Factor 2 ("Responsible and Safe Mobility") directly pertains to safe driving behavior amidst performing the driving functions and attitudes towards road regulation compliance, responsible driving, and safe mobility. Şimşekoğlu et al. (2012) believed that from the Theory of Planned Behavior (TPB), aside from risks, road safety attitudes relate to driver behavior and may impact the risk of road traffic accidents. By these, it can be understood that the items in the factor 2 generally measure the driver's degree of good driving accountability and cautious driving habits to avoid future road problems and crashes

As an initial step to establish convergent validation through the conglomeration of 50 and 22 items in factors one and two, respectively, with no cross-loadings, one way to determine good discriminant validity when conducting factor analysis is to examine the component correlation matrix. The correlation between Factor 1 and Factor 2 rendered a coefficient of .414. Engellant et al. (2016) mentioned that discriminant validity is evident when factors are significantly yet weakly or not correlated with each other.

Each identified item loaded a good regression standardized estimate, scoring .541 to .731 (Risky Driving Behavior), and .516 to .611 (Responsible and Safe Mobility). Cohen and Swerdlik (2018) mentioned that CFA produces fit statistics, which tells whether the models tested agreed with the data (table 8).

Table 8. Model Fit Summary

Fit Indices	Values		Acceptable Fit
	Factor 1 – RDB	Factor 2 – RSM	
χ^2/df	2.474	2.791	$2 < \chi^2/df \leq 3$
RMSEA	.056	0.62	.05 < RMSEA ≤ .08
CFI	.847	.886	.90 ≤ CFI <.95
TLI	.840	.874	.90 ≤ TLI <.95

Model Fit Summary (MFS) shows an acceptable fit for both factors for CMIN/df and RMSEA, However, the results of the CFI and TLI failed to achieve the acceptable threshold, and thus, can be reviewed and improved. With this, the final set of items was once again tested for the reliability of internal consistency.

With .968, .915, and .967 coefficients for factor 1, factor 2, and overall items, all yielded excellent reliability. The item-total statistics also revealed that no item needs to be deleted to further increase the internal consistency of the items. Finally, attempting to develop initial norms for the scale using 463 samples. Using stanine, which divides the distribution into nine parts, cut-off scores were established for each factor with their corresponding percentile ranks, as presented in table 7.

Noticeably, the maximum score for the factor the Risky Driving Behavior (RDB) was reached on stanine 8. Likewise, the Responsible and Safe Mobility (RSM) factor reached the maximum score at stanine 5. This implies that the data that were gathered may have been negatively skewed in the distribution. The skewness of the data can be attributed to the nature of participants since they have foreknowledge and experience in safe driving on the road as they are already LTO licensed drivers and have passed the test for driving administered by the said government agency. For the scoring, the researchers suggest reversing first the score for RDB, then adding it to the score in RSM, to result in the overall score for the Psychological Fitness to Drive.

Using the stanine scores and raw scores, an overall score on psychological fitness to drive can be interpreted into three categories: **high** (indicate that the driver is mentally equipped to course along the road safely with minimal risks of driving errors), **moderate** (signify that the driver can safely course the road yet may need to improve some maladjusted and risky driving habits and engage in a more responsible driving behavior), and **low** (suggests that the driver could perform the driving task but may not be ready to safely course the road and is recommended to undergo further training and intervention programs due to high risk of road collision).

The PFDSF is a structured personality test that can be categorized under level B where knowledge of test construction and psychological statistics may be required for the test to be administered, scored, and interpreted (Cohen & Swerdlik, 2018; Singh, 2016), preferably by a licensed psychometrician. For the initial attempt at standardization, a test booklet with an answer sheet and individual record form, a test manual with a scoring key, and a guide for interpretation were designed and developed for possible utilization by future researchers.

Strength and Limitations

With the barriers and limitations of the COVID-19 pandemic, the researchers come up with measures and established the psychometric properties of PFDSF. From 201 items during development, there was corresponding pre-survey/interview transcription, and related literature to support the relevance of the item to the scale. Further, expert validation from five professionals who are practitioners in their fields of specialization for content validation for a more intricate screening of items. Equally, expertise for both internal and external language experts to strengthen the accuracy of translation and back translation conducted to the instrument was made, allowing both English and Filipino versions, and combined versions, as well as in printed and online versions be tested gaining a very good reliability value indicative of good internal consistency.

Table 9. Summarized process of development and validation of PFDSF

	Procedures undertaken	Statistical Results	Number of items retained	Number of items deleted
Development Phase	Item generation from five (5) interviews, twenty-seven (27) pre-surveys, and literature review (See Appendix E)	-	201	-
	Identification of initial content domains (21 content domains)	-	201	-
Validation Phase	Face and Content validation by five (5) subject matter experts	Items with >.78 CVR were retained	154	47
	Validation by two (2) language experts	-	154	-
	Test of Internal Consistency (Pilot Testing)	English $\alpha = .879$ (n=43)	154	-
		Filipino $\alpha = .907$ (n=42)	154	-
	Construct Validation using Factor Analysis (Pilot Testing)	-	154	-
	Test of internal consistency (Field Testing)	$\alpha = .966$ (n=463)	154	-
	Construct Validation through Exploratory Factor Analysis (42 factors identified)	-	154	-
	Item reduction through extracted commonalities (2 factors)	Items with >.30 extracted communality were retained	74	80
	Removal of cross-loaded items through factor analysis (2 factors)	Cross-loaded items with >.20 difference was retained	72	2
	Confirmatory two-factor analysis (2 factors)	-	72	-
	Test of internal consistency	RDB $\alpha = .968$	50	-
		RSF $\alpha = .915$	22	-
		Overall PFD $\alpha = .967$	72	-

There are some limitations: (1) even though driving skills can be associated with the type of vehicle being driven, researchers designed every single item to apply to the knowledge and experience of psychologically fit drivers regardless of their driving restriction codes; (2) to address the changes from the printed test material to its online version due to the threat of the COVID-19 pandemic, reliability estimate was computed again before reducing the items and after the establishment of its model with very good reliability, however, supplemental confirmatory factor analysis was not performed anymore in the final version of the scale.

CONCLUSION

To give resolution to the objectives of this research, the study was able to establish a 72-item scale with two identified factors: Risky Driving Behavior (RDB) and Responsible and Safe Mobility (RSM). Items in the scale were primarily developed from the intensive investigation of related literature, supported by pre-survey and interview results. Thereafter, 201 initial items were content validated by five subject-matter experts and two language experts. With 154 items retained after expert validation, the English and Filipino versions of the printed scale were tested separately on 51 independent samples during the pilot testing of the scale yielding very good to excellent internal consistency. However, with the increasing number of COVID-19 cases in NCR, gathering the data physically in the designated location was not pushed through. To resolve this, the scale of combined English and Filipino version of the scale was converted to Google Forms and distributed via an online platform, acquiring a total of 463 results, which were run through a series of Exploratory Factor Analysis (EFA), yielding a final set of 72 items, 50 items for RDB and 22 items for RSM. The scale was again tested for the reliability of internal consistency, resulting in excellent reliability.

Recommendations

Even with promising results, the PFDSF may be used for small-scale research, yet it is recommended that a supplementary Confirmatory Factor Analysis (CFA) be performed to further strengthen the validity of the scale. Further investigation on neuropsychological factors affecting the number of roads crashes in the Philippines may also be done by future researchers to supplement the exploration of the items and the identified factors. They are likewise encouraged to explore specific populations, age, gender, and other socio-demographic criteria for accurate norming (Finch, 2019). Researchers who intend to revalidate the scale or perform similar test development research, are encouraged to involve more professional drivers in validating the items within the scale. Also, since the scale uses a forced-choice format, future researchers are encouraged to further explore and test the PFDSF for a measure of social desirability, to gather more precise data, reinforcing its efficacy. Additionally, researchers in LTO and traffic psychology are invited to utilize the scale and test its criterion validity among drivers apprehended for road or traffic violations. An exploration of other scales from local test distributors may also be considered to supplement the convergent and discriminant validity of the developed scale. Since the scale has been tried already in an online format, a computer-assisted online/offline format may also be developed by future researchers. Lastly, the localization of the PFDSF in different major dialects in the Philippines is highly suggested, to respond to the needs of the Filipinos in the specific assessment of psychological fitness to drive.

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Appendix

Initial Content Domains

Content Domain	Definition
1. Risk-taking behavior	tendency to be thrill-seeking; take high-risk hazardous driving decisions
2. Perceptual Accuracy	accurate interpretation of perceptual stimulus in the driving environment
3. Road regulations Compliance	degree of compliance with road policies, rules, and regulations
4. Time Pressure	impact of time pressure of an individual's driving behavior
5. Safety Mobility	ability to drive safely, minimizing risks of accidents
6. Traffic Adaptability	ability to cope and adapt with various traffic situations
7. Emotion Regulation	ability to manage and regulate emotions to reduce its impact on one's driving behavior
8. Driving Knowledge	knowledge on basic driving information
9. Performance Capacity	ability to perform basic driving skills
10. Cognitive Processing	ability to process information and retrieve them from the memory whenever necessary
11. Social Pressure	influence of people around that may negatively influence driving behavior
12. Driving Confidence	the driver's personal belief of his/her own ability to perform driving tasks
13. Driving Anxiety	degree of anxiety that helps maintain the driving performance within the safety margin
14. Social Concern	concern with other drivers or pedestrian on the road
15. Responsible Driving	taking charge of doing essential driving functions
16. Distraction Management	ability to focus on driving despite the emergence of distracting stimuli
17. Defensive Driving	ability to identify and avoid road hazards, keeping self and others from harm
18. Assertive Driving	drivers' imposing their own standards in driving
19. Openness to Criticisms	degree of receptiveness to corrections and criticisms to one's driving behavior or habit
20. Mental Alertness	ability to quickly perceive and respond appropriately to driving situations
21. Readiness for Emergency	being fully prepared if an emergency (situation) arises before and during driving task