Journal of Renewable Energy and Sustainable Development (RESD) Volume 10, Issue 1, June 2024 - ISSN 2356-8569
http://dx.doi.org/10.21622/RESD.2024.10.1.757

Received on, 16 November 2023 Accepted on, 10 March 2024 Published on, 27 March 2024

Influence of shared and innovative mobility on psychological wellbeing

Rosa Arroyo López [a], Tomás Ruiz Sánchez [b], Lidón Mars Aicart [c]

[a,b] Department of Transport Engineering, Polytechnic University of Valencia, Spain
[c] Psychology Department, European University, Valencia, Spain

rarroyo@upv.es, truizsa@tra.upv.es, lidon.mars@universidadeuropea.es

ABSTRACT

Recently, new travel options such as micromobility and shared transport systems have been introduced in many urban areas in Spain, which are intended to increase the sustainability and accessibility of cities. The Covid-19 pandemic has boosted the use of these new individual travel modes. The aim of this paper is to analyze travel behavior and wellbeing of users of these new urban solutions compared to traditional transport. Face-to-face and online surveys were carried out during the Summer of 2021 in Valencia (Spain) to collect information regarding travel behavior and wellbeing. Participants were habitual users of all urban travel modes, including those who also used motosharing, carsharing or private e-scooters. 2225 valid responses were obtained after data cleaning and validation. Satisfaction with Travel Scale (STS) is used to explore subjective wellbeing of users of new and traditional transport modes. Results show that current users of motosharing and private e-scooters were former users of public transport, while users of carsharing used to utilize more car and motosharing before. On the other hand, active transport is associated with higher satisfaction compared to new urban modes, while they provide more satisfaction than urban public transport.

Index-words: *Satisfaction with Travel, Sustainable Mobility, New Transport Solutions*

I. INTRODUCTION

New transport solutions based on shared modes and micromobility have been introduced in many urban areas, which are supposed to contribute to sustainability and accessibility of cities. However, it is still not clear how is the impact of such changes. For example, the effect of sharing mobility options on the use of conventional travel modes is not well understood yet.

On the other hand, the assessment of transport measures to promote sustainable mobility is very frequently carried out through cost-benefit related analyses. These conventional evaluation methods do not usually consider how those measures influence the quality of life and wellbeing of people. Among the dimensions that are missing, one of the most important is related to emotional/psychological aspects of people when they commute to get to work or study.

This research is part of Travelwell+ project, which aims at studying the influence of using motosharing, carsharing and private electric scooter on the psychological wellbeing of their users. This project contributes to the use of psychometric scales to gather information about wellbeing which have been scarcely applied to this purpose and some of them have not been translated to Spanish yet. In particular, this paper contributes to the validation and use of Satisfaction with Travel Scale in Spain.

In this paper, travel behavior derived from this new transport solution is analyzed first. Next, psychological wellbeing associated to the use of new transport modes is explored including car sharing, moto sharing and private e-scooters in Spain. Methodology of analysis include exploratory and descriptive measurements and Cronbach Alpha to test validity and reliability of the scales. Besides, non-parametric test U Mann-Whitney and W Wilcoxon are used to explore differences among satisfaction with new transport solutions.

A. Wellbeing and Travel Behavior

The nature of wellbeing has been analyzed from two different perspectives. Firstly, wellbeing has been considered both at objective or subjective phenomenon. Subjective wellbeing (SWB) holds that an individual's perceptions and experiences are the basis for evaluations about their own life. On the other hand, the objective perspective assumes that wellbeing is configured "objectively" from the values, goals, or objectives that people have or can achieve (Nordbakke and Schwanen, 2014).

Travel behavior and wellbeing interest has increased recently. Most of the studies found in literature focus on system-wide mechanisms by which transportation can affect wellbeing (Delbosc, 2012; Reardon and Abdallah, 2013).

B. Satisfaction with Travel Scale (STS)

Various psychological scales have been developed to study wellbeing, however the development of specific scales in the transportation planning domain is still limited. The Satisfaction with Travel Scale (STS) is an exception. In 2010, Ettema, Gärling, Olsson and Friman proposed the application of the concept of wellbeing in the analysis of the behavior of transport users and developed an instrument for the measurement of subjective wellbeing, which included affective and cognitive elements related to daily trips.

The scale consists of nine items: six items of affective measurement, which are based on two orthogonal dimensions of core affect (valence and activation), supported by SCAS (Västfjäll et al., 2002), derived from the affect grid (Russell, 1980; Russell, 2003; Ettema et al, 2013); and three items that correspond to the dimension of cognitive assessments of travel. A 7-point Likert scale ranging from -3 to 3 is proposed to respondents to evaluate the degree of agreement with the statements included in each item.

For the measurement of the affective part, combinations of valence and activation dimensions are used: three items between positive deactivation (e.g., relaxed) and negative activation (e.g., time pressed) and three items between positive activation (e.g., alert) and negative deactivation (e.g., tired). The concept of activation or arousal refers to the degree of stimulation of an individual, due to signals from the environment, and ranges from an activation pole to a deactivation pole or quietness–excitement, while valence refers to the evaluation made by an individual about his affects in terms of positive to negative (unpleasantness–pleasantness) (Västfjäll and Gärling, 2014). The total STS score is calculated by averaging the scores qualified for each of the three dimensions of positive activation/negative deactivation, positive deactivation/negative activation, and cognitive assessment (Ettema et al., 2011, 2012, 2013; Friman et al., 2013; Olsson et al., 2013).

Some studies are found in the literature that used the STS scale to investigate the relationship between travel satisfaction and the mode of transport used (Abou-Zeid, 2009; De Vos et al., 2015; Ettema et al., 2011; Friman et al., 2013; Olsson et al., 2013; Smith, 2017). To the best of the researchers' knowledge, the STS scale has not been used in a Spanish context, which is a gap that the present study attempts to fill.

II. METHOD

A. Questionnaire Design

The design of the questionnaires is described as follows. Firstly, a brief introduction including the project description was presented. Next, participants were asked to identify their usual transport mode and trips characteristics.

Later, four psychometric scales to measure wellbeing were included: subjective wellbeing experienced during the trip was assessed, through the STS scale (Ettema et al., 2011) and a short form of the Positive and Negative Affect Schedule (Mackinnon et al., 1999); on the other hand, eudaimonic wellbeing was evaluated with the Exercise Self-Regulation Questionnaire

(SRQ-E) (Levesque et al., 2007) and the adults' version of the Basic Psychological Needs Satisfaction and Frustration Scale (BPNSFS) (Chen et al., 2015). The four scales were translated and adapted into Spanish.

Lastly, participants were asked to provide details about trip attributes (frequency of use of usual mode of transport, purpose and trip duration) and sociodemographic characteristics (place of residence, sex, age, occupation, monthly income, etc.)

B. Participants Recruitment

An agreement was established with moto sharing and car sharing companies that operate in Valencia to recruit participants in the project. Those who completed the online survey could take part in a prize draw for three free rides to the value of 200 euro.

The method of recruitment of private e-scooter's users had to be different. Some repair shops were contacted to publicize the project. Leaflets were distributed among e-scooter's users while they wait for traffic light to change. Those who completed the online survey could take part in a prize draw for three checkup and maintenance.

Habitual users of traditional urban travel modes were also targeted, the distribution of the survey was carried out by email and social media. Additionally, face-to-face surveys were used to complete the quota of those modes with lower representation in the sample. A lottery consisting of five tablets was used to encourage participation.

III. RESULTS

A. Sample Distribution

2,286 individuals participated in the survey. Data cleaning process was performed to remove inconsistent or poorly answered responses, indicating a lack of effort or insufficient attention from participants. To identify and exclude such responses, the "R" "Careless" package developed by Yentes and Wilhelm (2021) was used. A total of 61 responses were eliminated from the database, resulting in a final sample size of 2,225 responses. Table I presents the distribution of the sample according to sociodemographic characteristics. 53% of the surveys were conducted through face-to-face interviews, while 47% of the surveys were completed online.

As it can be observed, gender distribution is reasonably balanced: 53% male and 47% female. Considering age, a higher participation of respondents under 35 is observed. 45.5% of the participants are employed individuals, while 26.5% are students. Nevertheless, retired, unemployed and other occupational situations are also represented in the sample.

TABLE 1. SAMPLE CHARACTERISTICS

	N	%
Female	1038	46.7%
Male	1183	53.2%
Other	4	0.2%
Age		
18-24	217	9.8%
25-34	310	13.9%
35-44	225	10.1%
45-54	146	6.6%
55-65	113	5.1%
>65	156	7.0%
Missing	19	0.9%
Occupation		
Employee	647	29.1%
Student	170	7.6%
Employee and student	108	4.9%
Retire or inactive	198	8.9%
Unemployed	45	2.0%
Missing	18	0.8%
Income		
No income	153	6.9%
1€ - 999€	187	8.4%
1000€-1999€	397	17.8%
2000€-2999€	218	9.8%
3000€ or more	81	3.6%
Missing	150	6.7%

Volume 10, Issue 1, June 2024 - ISSN 2356-8569
http://dx.doi.org/10.21622/RESD.2024.10.1.757

A. Use of New Transport Solutions

Considering shared and micro mobility users: 146 individuals are e-scooter users, 324 correspond to moto sharing users and 291 to car sharing users. As it can be observed in Table 2, traditional modes are also represented in the sample

TABLE II. MODAL SPLIT DISTRIBUTION

Mode	Sample N	Percentage
Walking	386	17.3%
Bicycle (own)	176	7.9%
Bicycle (shared)	123	5.5%
E-Scooter	146	6.6%
Urban bus	156	7.0%
Interurban bus	102	4.6%
Metro or tram	113	5.1%
Train	117	5.3%
Car	267	12.0%
Car sharing	291	13.1%
Moto sharing	324	14.6%
Other modes	24	1.1%
Total	**2225**	100%

These new transport solutions could contribute to sustainable mobility as long as their current users derive from private modes substantially. Further analyses are employed to explore this modal shift. As it can be observed in Figure 1, 26.6% of e-scooter adopters are previous users of urban bus, followed by 16.6% who used to cycle and 15.9% users of metro, tram or train and 14.5% were walking trips. Thus, more than 70% of modal shift towards e-scooter is derived from public transport and active modes. Whereas, only in 15.9% of the cases, the private car is replaced.

Motosharing customers are also former public transport users: 30% correspond to railway and 17.4% were bus passengers. Participants who used active transport modes represent a lower quota: 8% walking and 3.7% cycling. However, in this case, previous users of bikesharing represent a percentage of 9.5%. Private modes replacement is slightly higher in this case with 18% of drivers and 8.6% of moto users.

Conversely, modal shift to carsharing is derived from car drivers in first place (26.8%). Surprisingly, 17.6% current users of carsharing were previously motosharing users. This result reveals that sharing systems can be seen as competitors. This is especially true in the case of Valencia, where carsharing system is working recently. Motosharing service has been available for a few years and several companies have been operating. On the other hand, it is still relevant that the modal shift obtained from public transport is 13% and 10.6% for urban bus and railway modes, respectively. Lastly, actives modes former users represent 10.9% of cyclists (considering both owning a bike and sharing systems) and 6.7% of pedestrians.

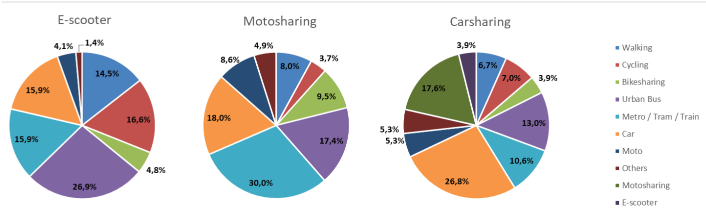

Fig. 1. Shared and micromobility modes. Modal shift.

Later, adoption of these new mobility solution is addressed. Figure 2 shows that nearly 60% of e-scooter and motosharing users started to use these transport modes more than one year ago. Contrary to that, carsharing seems much more recent due to its novel implementation. In this case, 22% of participant's report using this mode only for one month or less, while 52% use carsharing between 1 and 6 months.

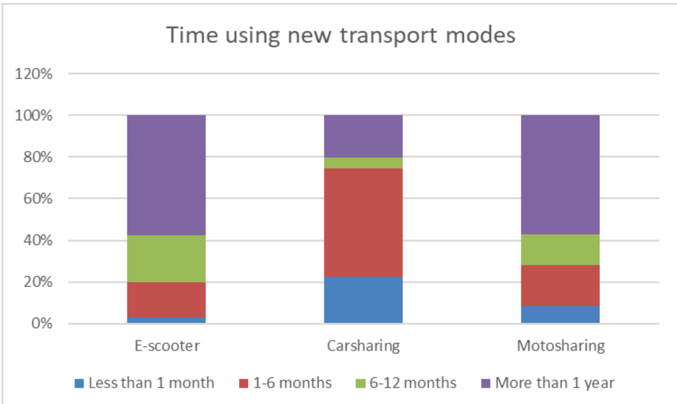

Fig. 2. Shared micromobility adoption. Time using new modes.

 Volume 10, Issue 1, June 2024 - ISSN 2356-8569
http://dx.doi.org/10.21622/RESD.2024.10.1.757

Considering now frequency of use, significant differences are observed (Fig. 3). E-scooter is used every day by 73% of participants, while only 5% use this mode less 1-2 days per week. Thus, e-scooter seems to replace traditional modes for day-to-day mobility. Contrary to that, shared options are used in a more occasional base. Motosharing is used every day by 14% of respondents, and the major quota is associated with casual trips, 53% use this mode 1-2 days per week. On the other hand, 92% of carsharing users choose this mode only 1-2 days per week. Consequently, shared modes are considered as complementary options, while e-scooter might produce modal shifts.

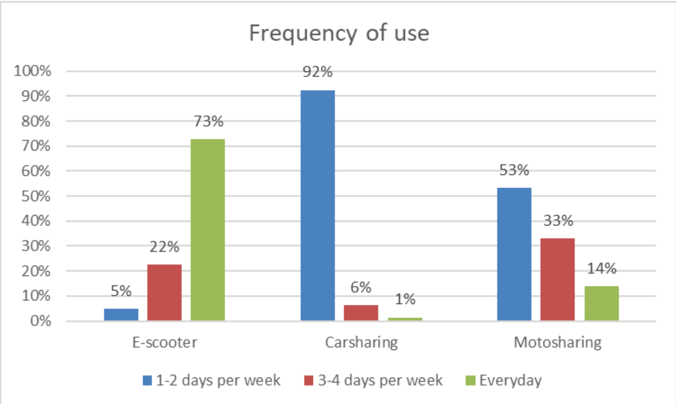

Fig. 3. Shared and micromobility modes. Frequency of use.

A. *Wellbeing and New Transport Solutions*

Cronbach Alpha was obtained to measure the internal consistency, or reliability of the scale. High values are obtained: positive activation (0.831), positive deactivation (0.841) and cognitive evaluation (0.864). Thus, the scale reliability is confirmed.

Differences between satisfaction associated with new transport modes (e-scooter, carsharing and motosharing) and traditional transport modes are presented next. Results of non-parametric tests U-Mann Whitney and W Wilcoxon are presented in Table III, P-values lower than 10% are considered significant. Besides, Table IV shows differences between average values of new and traditional transport modes. Thus, positive values represent a major satisfaction associated to the mode selected in relation to the rest.

Considering e-scooter first, a higher satisfaction is found for walking and cycling (both with own bicycle and shared systems) compared to e-scooter use. Next, higher positive activation is found for e-scooter use compared to urban bus, while the three dimensions are significant for interurban bus which is associated with higher satisfaction than e-scooter. On the other hand, e-scooter uses provides higher positive activation than train, while no significant differences arise for metro or tram. With respect to private vehicle, car use is associated with higher positive deactivation than e-scooter use.

Taking into account carsharing, negative results are also obtained for active modes. Thus, this new service is associated with less satisfaction than walking and cycling. Interestingly, carsharing provides more positive activation than public transport modes in general (urban bus, metro/tram and train), On the opposite, interurban bus is related to higher positive deactivation. Lastly, positive activation is found higher for carsharing than private car.

Similarly, motosharing is associated with lower satisfaction than active transport as well. Same results as those described previously for carsharing are obtained related to public transport and private car.

The comparison between other innovative transport solutions is relevant as well. E-scooter provides more satisfaction than motosharing, whereas the opposite result is found for carsharing. No differences are found between motosharing and carsharing use.

http://dx.doi.org/10.21622/RESD.2024.10.1.757

TABLE III. U MANN-WHITNEY AND W WILCOXON TEST

Walking									
	E-scooter			Carsharing			Motosharing		
Test	PA	PD	CE	PA	PD	CE	PA	PD	CE
U Mann-Whitney	25082.00	21599.50	21906.50	55582.5	46452.00	51288.5	58913.000	52651.00	53693.500
W Wilcoxon	35813.00	32330.50	32637.50	98068.50	88938.00	93774.50	111563	105301.00	106343.5
Z	-1.88	-4.10	-3.91	-0.12	-3.77	-1.84	-1.220337	-3.54	-3.154237
P-value	0.06	0.00	0.00	0.908	0.00	0.067	.222	0.00	.002
Bicycle (own)									
	E-scooter			Carsharing			Motosharing		
Test	PA	PD	CE	PA	PD	CE	PA	PD	CE
U Mann-Whitney	9907.00	10206.00	9284.00	21898.50	21833.00	21308.00	23108.5	24733.50	22344
W Wilcoxon	20638.00	20937.00	20015.00	64384.50	64319.00	63794.00	75758.5	77383.50	74994
Z	-3.70	-3.34	-4.44	-2.82	-2.87	-3.24	-3.704	-2.65	-4.194
P-value	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00
Bicycle (shared)									
	E-scooter			Carsharing			Motosharing		
Test	PA	PD	CE	PA	PD	CE	PA	PD	CE
U Mann-Whitney	9907.00	10206.00	9284.00	16067.50	13854.50	13622.50	16804.5	15665	14089.5
W Wilcoxon	20638.00	20937.00	20015.00	58553.50	56340.50	56108.50	69454.500	68315.000	66739.500
Z	-3.70	-3.34	-4.44	-1.65	-3.65	-3.86	-2.574	-3.513	-4.810
P-value	0.00	0.00	0.00	0.10	0.00	0.00	.010	.000	.000
E-scooter									
	E-scooter			Carsharing			Motosharing		
Test	PA	PD	CE	PA	PD	CE	PA	PD	CE
U Mann-Whitney				19038.00	19417.50	18537.00	21943.5	21149.000	21907
W Wilcoxon				29769.000	30148.500	29268.000	32674.5	31880.000	32638
Z				-1.78	-1.47	-2.18	-1.262	-1.851	-1.288
P-value				.075	.140	.029	0.207	.064	0.198
Urban bus									
	E-scooter			Carsharing			Motosharing		
Test	PA	PD	CE	PA	PD	CE	PA	PD	CE
U Mann-Whitney	9412.50	10689.00	11359.50	15928.50	22406.50	19457.00	18741.000	24519.500	23075.000
W Wilcoxon	21658.50	21420.00	23605.50	28174.50	34652.50	31703.00	30987	36765.500	35321
Z	-2.62	-0.93	-0.04	-5.23	-0.23	-2.50	-4.612918	-0.532	-1.55123
P-value	0.01	0.35	0.97	0.00	0.82	0.01	.000	.594	.121
Interurban bus									
	E-scooter			Carsharing			Motosharing		
Test	PA	PD	CE	PA	PD	CE	PA	PD	CE
U Mann-Whitney	6823.00	4972.00	5879.50	11885.000	10768.000	13744.500	13916.000	12235.500	14484.000
W Wilcoxon	11383.00	15703.00	16610.50	16445.000	53254.000	18304.500	18476.000	64885.500	67134.000
Z	-0.21	-3.73	-2.01	-2.062	-3.251	-.083	-1.428	-3.059	-.878
P-value	0.83	0.00	0.04	.039	.001	.934	.153	.002	.380
Metro / Tram									
	E-scooter			Carsharing			Motosharing		
Test	PA	PD	CE	PA	PD	CE	PA	PD	CE
U Mann-Whitney	7551.00	7337.50	7645.50	12977	15903.00	15044	15204.000	18035.500	17876.500
W Wilcoxon	13992.00	18068.50	18376.50	19418.00	58389.00	21485.00	21645	70685.500	24317.5

http://dx.doi.org/10.21622/RESD.2024.10.1.757

Z	-1.17	-1.53	-1.02	-3.304	-0.51	-1.333	-2.697	-0.235	-.374
P-value	0.24	0.13	0.31	0.001	0.61	0.182	.007	.814	.709
Train									
	E-scooter			**Carsharing**			**Motosharing**		
Test	PA	PD	CE	PA	PD	CE	PA	PD	CE
U Mann-Whitney	18349.50	16653.50	17031.00	12411	16497.50	16388	14572.000	18598.500	18360.500
W Wilcoxon	50989.50	27384.50	27762.00	19314.00	58983.50	23291.00	21475	71248.500	71010.5
Z	-0.24	-1.76	-1.43	-4.303	-0.49	-0.592	-3.728	-0.302	-.505
P-value	0.81	0.08	0.15	0.00	0.62	0.554	.000	.762	.614
Car (private)									
	E-scooter			**Carsharing**			**Motosharing**		
Test	PA	PD	CE	PA	PD	CE	PA	PD	CE
U Mann-Whitney	18349.500	16653.500	17031.000	32646.5	36178.500	35180	38002.000	40944.500	41243.000
W Wilcoxon	50989.500	27384.500	27762.000	65286.5	78664.500	67820	70642.000	93594.500	93893.000
Z	-.239	-1.764	-1.426	-2.433	-0.505	-1.051	-1.663	-.184	-.034
P-value	.811	.078	.154	0.015	.614	0.293	.096	.854	.973
Carsharing									
	E-scooter			**Carsharing**			**Motosharing**		
Test	PA	PD	CE	PA	PD	CE	PA	PD	CE
U Mann-Whitney	19038.00	19417.50	18537.00				45313.500	46252.500	44663.000
W Wilcoxon	29769.00	30148.50	29268.00				97963.500	88738.500	97313.000
Z	-1.78	-1.47	-2.18				-.837	-.407	-1.133
P-value	0.08	0.14	0.03				.403	.684	.257
Motosharing									
	E-scooter			**Carsharing**			**Motosharing**		
Test	PA	PD	CE	PA	PD	CE	PA	PD	CE
U Mann-Whitney	21943.50	21149.00	21907.00	45313.5	46252.50	44663			
W Wilcoxon	32674.50	31880.00	32638.00	97963.5	88738.50	97313			
Z	-1.26	-1.85	-1.29	-0.84	-0.41	-1.13			
P-value	0.21	0.06	0.20	0.40	0.68	0.26			

*PA: positive activation, PD: positive deactivation, CE: cognitive evaluation

TABLE IV. AVERAGE VALUES DIFFERENCES

E-SCOOTER											
	Walking	Bicycle (own)	Bicycle (shared)	E-scooter	Urban bus	Interurban bus	Metro / Tram	Train	Car	Car-sharing	Moto-sha-ring
PA	-0.3	-0.7	-0.5		0.5	0.1	0.3	0.5	0.1	-0.3	0.9
PD	-0.7	-0.6	-0.8		-0.2	-0.8	-0.3	-0.3	-0.3	-0.2	0.6
CE	-0.5	-0.7	-0.8		0.1	-0.3	-0.1	-0.3	-0.2	-0.3	0.8
CARSHARING											
PA	0.0	-0.4	-0.3	0.3	0.8	0.3	0.5	0.7	0.3		1.1
PD	-0.4	-0.4	-0.6	0.2	0.1	-0.6	-0.1	-0.1	0.0		0.8
CE	-0.2	-0.4	-0.6	0.3	0.4	-0.1	0.2	0.0	0.1		1.0
MOTOSHARING											
PA	-0.1	-0.5	-0.4	0.2	0.7	0.2	0.4	0.6	0.2	-0.1	
PD	-0.4	-0.3	-0.5	0.3	0.1	-0.5	0.0	0.0	0.0	0.1	
CE	-0.3	-0.5	-0.7	0.2	0.2	-0.2	0.1	-0.1	0.0	-0.1	
N	384	178	123	146	156	95	113	117	255	291	324

*PA: positive activation, PD: positive deactivation, CE: cognitive evaluation

IV. DISCUSSION AND CONCLUSION

This paper is part of Travelwell+ project, which aims at studying the influence of using motosharing, carsharing and private electric scooter on the psychological wellbeing of their users.

In this study, travel behavior of new transport modes users is explored, including modal shift from traditional modes. Next, Satisfaction with Travel Scale (STS) is used first time in Spain to analyze the differences in satisfaction between new and traditional transport modes.

Findings indicate that 70% of modal shift towards e-scooter is derived from public transport and active modes. Although this percentage is lower for carsharing and motosharing, it is still relevant. Additionally, sharing systems are seen as competitors among them. More attention should be paid to these modal shifts which derive from sustainable transport modes to new urban solutions. These implications should be considered when defining transport policies to promote sustainable transportation. On the other hand, participants who use carsharing report a frequency of use of less than two days per week. Further studies on the influence of private car owning and recent implementation of carsharing services in Spain should be made.
Subsequently, results of non-parametric tests such as U-Mann Whitney and W Wilcoxon reveal significant results of satisfaction associated with daily travel with different transport modes. In general, active transportation is associated with higher satisfaction compared to the use of new transport modes. This result is observed for the three dimensions of the STS scale: positive activation, positive deactivation and cognitive evaluation. Walking and cycling (both with own or shared system bikes) provide more satisfaction than any motorized vehicle as well as public transport.
V.
E-scooter is associated with higher satisfaction compared to urban bus, while no significant results were found for the rest of public transport modes analyzed. Otherwise, for interurban buses, a higher satisfaction is found. Users could see e-scooter as a competitor mode for urban context that can replace urban bus for instance, and at the same time could be seen as a complementary mode for train or tram, railway, and interurban buses.

Next, satisfaction related to the use of public transport is lower than satisfaction produced by the use of motosharing and carsharing, especially for urban transport (urban bus and metro or tram) and train. Contrary to that, carsharing is associated with lower satisfaction compared to interurban bus. This result suggests that carsharing is valuable for users only in the urban context. In addition, the restrictions of the companies with limitations of use to specific cities could explain this result. The absence of significant results between motosharing and carsharing systems might point out that users from these modes do not use frequently both of them, or simply that the wellbeing associated to both of them is similar.

Later, carsharing and motosharing are associated with a higher satisfaction with private car while e-scooter seems to provide less satisfaction than private car. This result suggests a possible change on the tendency of owning private vehicles. The satisfaction provided by sharing systems could be higher than acquiring own cars. On the other hand, e-scooters could provide less satisfaction due to different facts, such as distance. Further research is needed to understand these new trends.

The possible competition between different sharing systems should be also addressed in further studies. Their interaction with traditional transport modes and the relations of complementarity in multimodal transport or substitution need to be explored.

In conclusion, the contribution of new mobility solutions to sustainability and wellbeing is not clear yet. The study of these factors is crucial for the development of transport policies and transport planning. For instance, the promotion of innovative transport solutions from the public perspective should consider the effects on sustainability, quality of life, wellbeing, etc. These findings will be relevant for sustainable urban mobility plans development and transport planning in cities. The introduction of wellbeing in transport planning will contribute to healthier and more sustainable cities.

This research brings light into the application of wellbeing measures to micromobility, carsharing and motosharing users. Future work should include the validation of the scales using exploratory and confirmatory analyses and the estimation of Structural Equation Modeling.

Limitations include sample size and use of different survey strategies, including online and face-to-face interviews.

ACKNOWLEDGMENTS

This research was supported by Travelwell+ project (PID2019-108843RB-I00) funded by MCIN/ AEI /10.13039/501100011033"

I. References

[1] C. S. Levesque, G. C. Williams, D. Elliot, M. A. Pickering, B. Bodenhamer, and P. J. Finley, 'Validating the theoretical structure of the Treatment Self-Regulation Questionnaire (TSRQ) across three different health behaviors', *Health Educ Res*, vol. 22, no. 5, pp. 691–702, Oct. 2006, doi: 10.1093/her/cyl148.

[2] A. H. , & W. A. D. Yentes, 'Use of the satisfaction with travel scale across diverse travel modes and trip purposes', *Transp Res Part F Traffic Psychol Behav*, vol. 79, pp. 250–259, 2021.

[3] D. Västfjäll, M. Friman, T. Gärling, and M. Kleiner, 'The measurement of core affect: A Swedish self-report measure derived from the affect circumplex', *Scand J Psychol*, vol. 43, no. 1, 2002, doi: 10.1111/1467-9450.00265.

[4] V. R. Smith, 'Transportation, activity space, and subjective wellbeing: How the environment determines when travel enhances subjective well-being', *J Transp Geogr*, vol. 64, pp. 181–193, 2017.

[5] L. Reardon and S. Abdallah, 'Well-being and Transport: Taking Stock and Looking Forward', *Transp Rev*, vol. 33, no. 6, 2013, doi: 10.1080/01441647.2013.837117.

[6] J. A. Russell, 'Core Affect and the Psychological Construction of Emotion', *Psychol Rev*, vol. 110, no. 1, 2003, doi: 10.1037/0033-295X.110.1.145.

[7] J. A. Russell, 'A circumplex model of affect. Journal of Personality and Social Psychology', vol. 39, no. 6, pp. 1161–1178, 1980.

[8] L. E. , G. T. , & E. D. Olsson, 'A comparison of the satisfaction with travel scale and the day reconstruction method', *Transp Res Part F Traffic Psychol Behav*, vol. 15, no. 6, pp. 686–695, 2012.

[9] S. Nordbakke and T. Schwanen, 'Well-being and Mobility: A Theoretical Framework and Literature Review Focusing on Older People', *Mobilities*, vol. 9, no. 1. 2014. doi: 10.1080/17450101.2013.784542.

[10] D. P. MacKinnon, G. Warsi, and J. H. Dwyer, 'A Simulation Study of Mediated Effect Measures', *Multivariate Behav Res*, vol. 30, no. 1, 1995, doi: 10.1207/s15327906mbr3001_3.

[11] C. S. Levesque, G. C. Williams, D. Elliot, M. A. Pickering, B. Bodenhamer, and P. J. Finley, 'Validating the theoretical structure of the Treatment Self-Regulation Questionnaire (TSRQ) across three different health behaviors', *Health Education Research*, vol. 22, no. 5. 2007. doi: 10.1093/her/cyl148.

[12] M. Friman, S. Fujii, D. Ettema, T. Gärling, and L. E. Olsson, 'Psychometric analysis of the satisfaction with travel scale', *Transp Res Part A Policy Pract*, vol. 48, 2013, doi: 10.1016/j.tra.2012.10.012.

[13] D. Ettema, T. Gärling, L. E. Olsson, M. Friman, and S. Moerdijk, 'The road to happiness: Measuring Dutch car drivers' satisfaction with travel', *Transp Policy (Oxf)*, vol. 27, 2013, doi: 10.1016/j.tranpol.2012.12.006.

[14] D. Ettema, T. Gärling, L. Eriksson, M. Friman, L. E. Olsson, and S. Fujii, 'Satisfaction with travel and subjective well-being: Development and test of a measurement tool', *Transp Res Part F Traffic Psychol Behav*, vol. 14, no. 3, 2011, doi: 10.1016/j.trf.2010.11.002.

[15] D. Ettema, T. Gärling, L. E. Olsson, and M.

http://dx.doi.org/10.21622/RESD.2024.10.1.757

Friman, 'Out-of-home activities, daily travel, and subjective well-being', *Transp Res Part A Policy Pract*, vol. 44, no. 9, 2010, doi: 10.1016/j.tra.2010.07.005.

[16] A. Delbosc, 'The role of well-being in transport policy', *Transp Policy (Oxf)*, vol. 23, 2012, doi: 10.1016/j.tranpol.2012.06.005.

[17] J. , S. T. , V. A. V. , W. F. , & M. P. De Vos, 'Travel and subjective wellbeing: A focus on findings, methods and future research needs', *Transp Rev*, vol. 35, no. 1, pp. 93–112, 2015.

[18] Y. , Z. H. , & C. X. Chen, 'The relationship between daily travel and subjective wellbeing: A comparative study of car-dependent cities and public transport-oriented cities', *Transp Res Part A Policy Pract*, vol. 74, pp. 71–85, 2015.

[19] M. Abou-Zeid, 'Impact of commuting mode choice on commuting satisfaction and wellbeing: Evidence from the Montreal metropolitan region', *Transp Res Part A Policy Pract*, vol. 43, no. 7, pp. 692–709, 2009.