Australasian Transport Research Forum 2021 Proceedings
8-10 December, Brisbane, Australia
Publication website: http://www.atrf.info

Mindfulness and commuting to campus: Pilot study from Monash University

Alexa Delbosc[1], Craig Hassed[2], Richard Chambers[2], Amanda N. Stephens[3], and Sjaan Koppel[3]

[1]Monash University Department of Civil Engineering, 23 College Walk, Clayton VIC 3800
[2]Monash Centre for Consciousness and Contemplative Studies, Monash University, VIC 3800
[3]Monash University Accident Research Centre, 21 Alliance Lane, Monash University, VIC 3800
Email for correspondence: alexa.delbosc@monash.edu

1. Introduction and background

Mindfulness refers to the state of being attentive to what is taking place in the moment with an open and non-judgmental attitude (Brown and Ryan, 2003). Mindfulness can have wide-ranging benefits including: improved attention and memory, greater physical and mental health, enhanced job performance and reduced burnout (Atanes et al., 2015, Vonderlin et al., 2020). Recent work by our research team has found that mindful drivers are less aggressive, have fewer driving violations and are less likely to be distracted (Koppel et al., 2018, Young et al., 2019, Stephens et al., 2018). Although this work demonstrates that mindfulness can improve behaviour while driving, it leaves two unanswered questions: what role might mindfulness play among other (non-driving) modes, and can the behaviours people undertake while traveling influence their levels of mindfulness?

The role of mindfulness in non-driving travel modes has rarely been researched, and to the authors' knowledge no studies have examined whether activities during travel can influence mindfulness. A few indirect studies suggest possible relationships. Although not 'mindfulness' per se, older adults instructed to feel a sense of 'awe' while walking reported greater joy and reduced stress (Sturm et al., 2020). In contrast, public transport commuters tend to engage in 'defensive behaviours' (e.g. retreating into their smartphones) when they commute (Thomas, 2009). Although not measured in past studies, this may encourage less mindful experiences of commuting on public transport.

Given that, on average, Australians spend between 3 and 4 hours per week commuting (Flood and Barbato, 2005), it is worth exploring the interaction between commute mode and mindfulness. The aim of this pilot study was to explore whether there were any significant relationships between mindfulness, commute mode and behaviours undertaken while commuting. This pilot study will help generate hypotheses that can be tested in future research.

The study was conducted among staff and students at Monash University. The Monash community was chosen due to the location of researchers and also its large size and non-central location which provides a range of commute modes.

2. Survey methods

2.1. Survey design and content

An online survey was approved by the Monash University Human Research Ethics Committee (approval number 2021-27618-54547). The survey included questions on: demographics, commute mode to campus, activities undertaken while commuting and two trait mindfulness

measures[1]. Participants were also asked about their current mindfulness practices. For commute mode, respondents were asked to select the main mode that they used to travel to campus for each of the past seven days, including the option 'did not travel'. For activities undertaken during their commute, nine activities were listed: listen to music, listen to podcast or audiobook, make phone calls, read a book/magazine/newspaper, look through your phone, check emails or send texts, talk with people around you, let your mind wander, or consciously pay attention to what is going on in the moment. Response options were: never/almost never, one to five minutes, five to 15 minutes, fifteen to thirty minutes or more than thirty minutes per trip. The last two activities (let your mind wanter and consciously pay attention) were hypothesised to be related to mindfulness; it was unknown whether the other seven activities would be associated with mindfulness.

Trait mindfulness (defined as the tendency to be consistently more mindful in daily life) was measured using the 15-item Mindful Attention Awareness Scale (MAAS; Brown and Ryan, 2003) and the 15-item version of the Five-Facet Mindfulness Questionnaire (FFMQ-15; Baer et al., 2006). The MAAS is a single-factor measure of participants' awareness of, and attention to, what is occurring in the present moment. Higher average MAAS scores equate to higher levels of attention and awareness ('Average MAAS' in Table 1). The FFMQ-15, in contrast, is a multi-factor measure with five facets, including: acting with awareness ('FFMQ act aware' in Table 1), describing ('FFMQ describe'), observing ('FFMQ Observe'), non-judging of inner experience ('FFMQ non-judge'), and non-reactivity to inner experience ('FFMQ non-react'). Higher FFMQ scores indicate greater levels of trait mindfulness. The scale can also be summed to provide an overall trait mindfulness score ('FFMQ sum').

2.2. Survey recruitment

The survey was hosted online via Qualtrics between 22 March to 7 June 2021. Distribution channels included: student social media channels, contacts of the research team, Department of Civil Engineering announcements, posters placed around campus and flyers handed out in person (including targeted recruitment at the bus loop, carpark exit and bike arrival stations). Participants could opt into a prize draw for a $100 gift voucher.

An initial total of 533 responses were recorded. After removing incomplete responses and four skimmers (who selected the same value across mindfulness scales), 368 responses were retained.

Because participants could select different commute modes for different days of the week, participants were assigned to whichever mode they used most often. If their mode use was evenly split, the longest duration mode was chosen. Using this method, 160 respondents were drivers (44%), 131 used public transport (36%), 57 used active transport (16%) and 14 were driven to campus (4%). Six participants could not be assigned to a mode group (selecting 'other mode' or three-way tie across modes) and were excluded from analysis.

3. Descriptive results

Most respondents were undergraduate (262) or postgraduate (58) students; the remainder were professional (25) and academic (23) staff. For this reason, the sample age skewed toward young adults (76% aged 18-24) and lower incomes (85% personal income below $40,000 year). The sample was predominately female (63%) and most did **not** practice mindfulness meditation (86%). The modes used to travel to campus varied, with staff more likely to be car drivers (66%

[1] 'Trait mindfulness' refers to one's underlying tendency to be consistently more mindful in daily life, as opposed to 'state mindfulness' which refers to the experience of being mindful in a given moment.

staff vs 41% students) and students more likely to be public transport users (39% student vs. 19% staff) and active travellers (16% students vs. 13% staff).

Table 1 compares the average mindfulness scores against sample demographics and mode use, as well as showing the correlation between mindfulness and activities conducted while commuting. Notably, students, younger people, lower-income individuals and women tended to have lower mindfulness scores, but commute mode was not initially associated with mindfulness (the FFMQ Non-Judge scale was significantly associated with mode but post-hoc tests found now specific differences between groups). However, most activities were correlated with lower mindfulness, except consciously paying attention which was positively correlated with the FFMQ total score and the 'Observe' facet.

Table 1: Comparison of mindfulness measures, demographics, commute mode and activities while commuting (averages values and correlations)

		Average MAAS	FFMQ Sum	FFMQ Non-react	FFMQ Observe	FFMQ Act aware	FFMQ Describe	FFMQ Non judge
Meditate?	No	3.69	**73.34**	**2.90**	**3.24**	**3.19**	**3.11**	2.87
	Yes	3.90	**80.55**	**3.11**	**3.60**	**3.55**	**3.50**	3.07
Student or staff	Student	**3.65**	**73.07**	2.90	**3.26**	**3.17**	**3.13**	**2.81**
	Staff	**4.21**	**82.81**	3.10	**3.50**	**3.72**	**3.40**	**3.54**
Age (years)	18-24	**3.64**	**72.99**	2.90	3.26	**3.16**	**3.11**	**2.82**
	25+	**3.98**	**78.57**	3.02	3.37	**3.49**	**3.35**	**3.16**
Gender	Male	**3.89**	**76.01**	3.20	3.24	**3.36**	3.17	2.88
	Female	**3.62**	**73.44**	2.77	3.32	**3.17**	3.17	2.92
Annual personal income ($)	0-40,000	**3.63**	**73.30**	2.91	3.26	**3.18**	**3.14**	**2.82**
	40,001-80,000	**4.05**	**74.15**	2.88	3.37	**3.26**	**3.10**	**2.90**
	80,001-120,000	**4.40**	**85.38**	3.04	3.63	**3.90**	**3.70**	**3.54**
	Over 120,000	**4.30**	**85.31**	3.29	3.40	**3.82**	**3.46**	**3.77**
Commute mode	Car drivers	3.71	74.31	2.94	3.25	3.18	3.14	**3.00**
	Car passengers	3.96	78.86	3.03	3.52	3.43	3.39	**3.11**
	Public transport	3.68	73.86	2.89	3.33	3.22	3.17	**2.83**
	Active transport	3.84	74.75	2.97	3.22	3.43	3.25	**2.73**
Activities while commuting (correlations)	Listen to music	**-.20**	**-.19**	**-.14**	.01	**-.20**	**-.19**	-.06
	Listen to podcast	**-.10**	-.01	-.01	-.05	-.05	.04	.01
	Make phone calls	**-.11**	-.04	-.06	.01	-.03	.00	-.05
	Read book / mag.	**-.11**	-.03	-.05	-.01	-.02	.01	-.02
	Look at phone	**-.15**	**-.10**	-.06	**-.13**	-.09	.01	-.07
	Send emails / texts	**-.11**	-.06	**-.14**	-.04	-.06	-.01	.03
	Talk with people	-.03	-.02	-.04	**.14**	-.07	-.04	-.02
	Let mind wander	**-.16**	**-.14**	-.10	-.00	**-.12**	**-.11**	-.08
	Consciously pay attention	.04	**.11**	.06	**.24**	.02	-.01	.09

Note: bold indicates significant differences at $p < .05$ using t-test or one-way ANOVA; in correlation analysis bold means a significant correlation at $p < .05$

Table 2 shows the average time (in minutes) spent on various activities while travelling. Note that because some people use multiple modes across the week, some activities (such as checking emails for car drivers) may be conducted when people use a different mode. Car drivers spent more time listening to music and consciously paying attention and less time letting their mind

wander, relative to other mode users. Car passengers were noteworthy in talking to other people. Public transport users spent the most time engaged in most activities (due to longer average commute times) except for talking to people and consciously paying attention. Active travellers equally spent their time letting their mind wander or paying attention.

Table 2: Average minutes spent on activities by commute mode

Activities while commuting	Car drivers	Car passengers	Public transport	Active travel
Listen to music	**23.3[a]**	**16.6**	**22.3[b]**	**10.2[ab]**
Listen to a podcast or audiobook	8.4	6.1	7.0	6.5
Make phone calls	3.1	3.4	2.8	2.5
Read a book, magazine or newspaper	**0.7[a]**	**3.4**	**8.3[ab]**	**2.2[b]**
Look through your phone	**1.8[a]**	**5.5[b]**	**14.0[abc]**	**5.5[c]**
Check emails or send text messages	**1.7[a]**	**4.6**	**8.0[ab]**	**3.0[b]**
Talk with people around you	**5.2[a]**	**10.4[bc]**	**1.7[ab]**	**3.0[c]**
Let your mind wander	**7.8[a]**	**8.4**	**13.6[a]**	**10.2**
Consciously pay attention to what is going on in the moment	**15.1[a]**	**7.7**	**7.9[a]**	**10.5**
Average minutes spent commuting	*33.1*	*20.1*	*55.1*	*27.5*

Note: bold indicates significant differences at p < .05 using one-way ANOVA. Shared letters indicate the difference between those means is statistically significant using a Hochberg's GT2 post-hoc test.

4. Regression results

Seven two-step linear regressions were conducted to understand associations between commute mode choice and each of the mindfulness measures (MAAS, FFMQ sum and five FFMQ facets). The first step introduced gender, age, student vs. staff and mindfulness practices; the second step added mode use and the time spent undertaking each activity while commuting.

Initial regressions found that step two only significantly improved the models predicting the average MAAS score, the FFMQ sum score and the 'Observe' facet of the FFMQ. Only those regressions will be presented. All three models were statically significant at p < .01: MAAS F(16, 343) = 4.38; FFMQ Sum F(16, 343) = 5.73; FFMQ Observe facet F(16, 343) = 4.23.

Table 3: Regressions predicting MAAS score and FFMQ Observe sub-scale

	MAAS score R^2 (adjusted) = .13			**FFMQ Sum** R^2 (adjusted) = .17			**FFMQ Observe facet** R^2 (adjusted) = .13		
	B weight	Std. Error	Beta	B weight	Std. Error	Beta	B weight	Std. Error	Beta
Constant	3.37	0.14		65.43	2.32		2.58	0.17	
Gender (male)	**0.23**	**0.08**	**0.14**	**2.71**	**1.13**	**0.12**	-0.05	0.08	-0.03
Age (25+)	-0.01	0.13	-0.01	0.26	1.74	0.01	0.02	0.13	0.01
Staff (not student)	**0.53**	**0.16**	**0.23**	**8.25**	**2.15**	**0.25**	0.23	0.15	0.10
Meditate regularly	0.15	0.12	0.06	**6.58**	**1.58**	**0.20**	**0.40**	**0.11**	**0.18**
Mode – Car driver	ref			ref			ref		
Mode - Car passenger	*0.36*	*0.21*	*0.09*	**6.61**	**2.91**	**0.12**	*0.40*	*0.21*	*0.10*
Mode - Public transport	**0.24**	**0.11**	**0.15**	**2.70**	**1.50**	**0.12**	**0.42**	**0.11**	**0.26**
Mode – Active travel	0.12	0.13	0.06	0.13	1.75	0.00	0.11	0.13	0.05
Mins. listen to music	**-0.01**	**0.00**	**-0.14**	**-0.11**	**0.04**	**-0.16**	0.00	0.00	-0.02
Mins. listen to podcasts	*-0.01*	*0.00*	*-0.09*	-0.01	0.04	-0.02	0.00	0.00	-0.07
Mins. make phone calls	-0.01	0.01	-0.07	-0.06	0.09	-0.03	0.00	0.01	0.00
Mins. read book / mag.	-0.01	0.01	-0.08	-0.04	0.07	-0.03	0.00	0.01	-0.01
Mins. look through phone	-0.01	0.01	-0.08	-0.01	0.07	-0.01	**-0.01**	**0.01**	**-0.16**

Mins. check email / text	0.00	0.01	-0.02	-0.03	0.09	-0.02	0.00	0.01	-0.02
Mins. talking	0.00	0.01	0.02	0.00	0.07	0.00	**0.01**	**0.01**	**0.14**
Mins. mind wander	*-0.01*	*0.00*	*-0.09*	*-0.09*	*0.05*	*-0.09*	0.00	0.00	-0.03
Mins. consciously pay attention	*0.01*	*0.00*	*0.10*	**0.16**	**0.04**	**0.20**	**0.02**	**0.00**	**0.26**

Note: Bold = statistically significant p <.05; Italics = statistically marginally significant p < .10

As Table 3 shows, on all three measures being a public transport user was associated with higher mindfulness relative to car drivers, and being a car passenger was associated with higher mindfulness on the FFMQ sum (the other two scales were marginally significant). Consciously paying attention was associated with higher mindfulness and listening to music was associated with lower mindfulness. Letting one's mind wander was marginally significant. Looking through one's phone was associated with lower mindfulness but only on the FFMQ Observe scale.

5. Discussion

The findings of this pilot study demonstrate relationships between certain facets of mindfulness and commute mode choice. Interestingly, these appear to be areas of mindfulness that are most related to situational awareness. For example, the MAAS measures attention to current situations, while the FFMQ observe facet measures observation of the external environment. These are arguably some of the most critical for road safety, across a number of mode types. Road users with lower attention and observation may be more likely to be distracted when walking, riding or driving, contributing to a greater likelihood of crashes.

Nonreactivity to inner experience may also be important in car users and cyclists, as prior research has shown higher levels of mindfulness to be associated with reduced driving anger in car users (Stephens et al., 2018). People who react immediately to their emotional impulses may be more predisposed to road rage, which can have significant road safety consequences.

5.1. Future research

Given the cross-sectional nature of the data, causal links between mindfulness and mode choice cannot be determined. The links we found suggest that either a) mode choice may be influenced by mindfulness, or b) mindfulness is higher because certain mode choices allow for it. The exact nature of these relationships is worthy of further exploration. For example, if a mindfulness intervention can improve attentiveness and awareness while commuting, this may have positive benefits for reducing distraction (thereby improving road safety) and perhaps increasing satisfaction with one's commute.

Future research will use a representative sample and include additional measures such as reason for commute choice, as well as commute and workplace satisfaction to explore whether mindful commuters experience further benefits. This will be important to improve uptake of sustainable transportation, while also providing further evidence of ways to support more vulnerable road users (i.e. active commuters) through mindfulness training.

6. Acknowledgements

We would like to thank Tze Zee Yang, Yee Yang Quah, Phu Khanh Tang and Naveen Ponnampalam for distributing this survey as part of their final-year civil engineering undergraduate research project.

7. References

Atanes, A. C., Andreoni, S., Hirayama, M. S., Montero-Marin, J., Barros, V. V., Ronzani, T. M., Kozasa, E. H., Soler, J., Cebolla, A. & Garcia-Campayo, J. 2015. Mindfulness, perceived stress, and subjective well-being: a correlational study in primary care health professionals. *BMC complementary and alternative medicine,* 15**,** 1-7.

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J. & Toney, L. 2006. Using self-report assessment methods to explore facets of mindfulness. *Assessment,* 13**,** 27-45.

Brown, K. W. & Ryan, R. M. 2003. The benefits of being present: mindfulness and its role in psychological well-being. *Journal of personality and social psychology,* 84**,** 822.

Flood, M. & Barbato, C. 2005. Off to work: Commuting in Australia. The Australian Institute.

Koppel, S., Stephens, A. N., Young, K. L., Hua, P., Chambers, R. & Hassed, C. 2018. What is the relationship between self-reported aberrant driving behaviors, mindfulness, and self-reported crashes and infringements? *Traffic injury prevention,* 19**,** 480-487.

Stephens, A. N., Koppel, S., Young, K. L., Chambers, R. & Hassed, C. 2018. Associations between self-reported mindfulness, driving anger and aggressive driving. *Transportation research part F: traffic psychology and behaviour,* 56**,** 149-155.

Sturm, V. E., Datta, S., Roy, A. R., Sible, I. J., Kosik, E. L., Veziris, C. R., Chow, T. E., Morris, N. A., Neuhaus, J. & Kramer, J. H. 2020. Big smile, small self: Awe walks promote prosocial positive emotions in older adults. *Emotion*.

Thomas, J. 2009. *The social environment of public transport.* Doctorate of Philosophy in Psychology, Victoria University of Wellington.

Vonderlin, R., Biermann, M., Bohus, M. & Lyssenko, L. 2020. Mindfulness-based programs in the workplace: a meta-analysis of randomized controlled trials. *Mindfulness,* 11**,** 1579-1598.

Young, K. L., Koppel, S., Stephens, A. N., Osborne, R., Chambers, R. & Hassed, C. 2019. Mindfulness predicts driver engagement in distracting activities. *Mindfulness,* 10**,** 913-922.