



Interventions in Public Transport: Researching the Use and Effects of a Crowdedness Indicator of Trams and Busses

Miriam Kebernik

Master Thesis – Applied Social Psychology

s4482654
October 2021
Department of Psychology
University of Groningen
Examiner/Daily supervisor:
dr. Ellen van der Werff and dr. Janet Veldstra

A thesis is an aptitude test for students. The approval of the thesis is proof that the student has sufficient research and reporting skills to graduate, but does not guarantee the quality of the research and the results of the research as such, and the thesis is therefore not necessarily suitable to be used as an academic source to refer to. If you would like to know more about the research discussed in this thesis and any publications based on it, to which you could refer, please contact the supervisor mentioned.

Abstract

Crowdedness in public transportation can decrease satisfaction of passengers and increase Covid-19 infection rates. Crowdedness indicators (CI) were developed to counteract crowdedness by indicating how crowded public transport is likely to be, which can help passengers better decide which means of (public) transport to take. This research aims at answering whether high comfort, health, instrumental, and environmental motives for public transport use predict the use of the CI and whether the use of the CI is higher for leisure-related trips than for work-related trips. Furthermore, this research aims to study the effects of the use of the CI on travel behaviour and attitude of passengers. To answer these questions, an online questionnaire among tram and bus passengers (N = 500) was conducted to measure motives, the use of the CI depending on trip purpose, and the effects of using the CI.

Regression analyses showed that the four motives were not predictive of the use of the CI. Moreover, the t-test showed a slightly higher use of the CI for leisure-related trips than for work-related trips, yet with a small effect size, meaning the difference is negligible. Lastly, regression analyses showed that higher use of the CI was related to favourable outcomes, such as changing one's travel behaviour, feeling less at risk for Covid-19, feeling more in control of one's journey, and being more satisfied with the public transport company. Future research could study passenger's perception of crowdedness, what they would be willing to do to avoid crowdedness, and which other ways there are to decrease crowdedness.

Keywords: crowdedness indicator, public transport, motives, effects, Covid-19

Interventions in Public Transport: Researching the Use and Effects of a Crowdedness Indicator
of Trams and Busses

In the Netherlands, there is a rising trend towards public transport use (KiM Netherlands Institute for Transport Policy Analysis, 2018) which has led to high crowdedness during peak hours, i.e., during times of a day when most people use public transport, mostly after work or school (Peer et al., 2016). This in turn can result in lower satisfaction of passengers (Soza-Parra et al., 2019). Furthermore, contracting Covid-19 increases when many people share a small room, indicating another problem of crowdedness in public transport where space is limited (WHO, 2021a). These problems with crowdedness in public transport led to the development of a crowdedness indicator (CI).

A CI shows how busy it is expected to be in public transport by highlighting up to three icons. If only one icon is highlighted, it is expected to be quiet and there are many seats available. If two icons are highlighted, transportation is a bit busier. When all three icons are highlighted, there are probably only standing places available. An example of the icons can be seen in figure 1. By means of displaying predicted crowdedness in online travel planners, the CI can help passengers to better decide if a bus or tram at this time is too crowded to travel with and whether a later or earlier bus or tram may be less crowded.

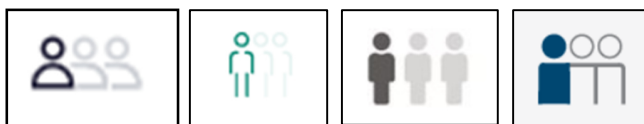


Figure 1. Icons of crowdedness indicators of several Dutch public transport companies.

For the CI to affect travel times, it is important that passengers make use of the CI. To promote the use of the CI it is important to first understand why passengers are likely to use the CI or not. There are different factors that can influence whether passengers make use of the CI. One of these factors could be the motives for using public transport, such as wanting to travel in a sustainable, comfortable, fast, reliable, or safe way. Passengers can have different motives for using public transport, therefore it is necessary to study different categories of motives. Research on travel behaviour mostly used the categories of instrumental, environmental, and affective motives (Noppers et al., 2014; Steg, 2005). Since this study happens during the Covid-19 pandemic and health became more important when making decisions about how to interact with others, e.g., whether to take public transport, health motives are included as well (WHO, 2021a). Having high instrumental motives means finding reliability, affordability, flexibility, travelling time, and punctuality important. Environmental motives encompass valuing environmental friendliness and sustainability of public transport. Scoring high on affective motives implies one appreciates comfort and low stress in public transport (Noppers et al., 2014; Steg, 2005). Lastly, having high health motives indicates that one finds it important that public transport is safe, hygienic, Covid-19 proof, and good for one's health.

Generally, crowdedness leads to lower comfort (Çelebi & İmre, 2020), since there might be no seats available or the noise level can increase with increased crowdedness. Hence, the more important one finds comfort and thus the higher one scores on the affective motive, the more one is expected to use the CI. This is because a CI indicates when it will be crowded and thus gives valuable information to those who value comfort, i.e., those who score high on affective motives.

Furthermore, crowdedness is related to increased health risks (WHO, 2021b), since it is more likely to contract a virus in a place where there are many people, which is why it is expected that the higher one scores on health motives, the more one is expected to use the CI. Reason for this is, like above, that the CI gives valuable information, but only to those who score high on health motives. Moreover, previous research shows that health motives affect behaviour for example with regard to food choices (Hopwood et al., 2020; Rana & Paul, 2020), but it is not yet known in how far health motives affect the use of a CI.

Since crowdedness neither has an obvious relation to instrumental aspects nor to environmental aspects of public transport, as these aspects are rather dependent on other factors, like timing, machinery defects, or CO₂ consumption, it is expected that instrumental and environmental motives are unrelated to the use of the CI.

However, motives might not always influence the use of the CI, because not everyone with high affective motives or high health motives is flexible enough to be able to take public transport at a different time to avoid crowds (Thorhauge et al., 2016). Most work- and school-related trips allow for less flexibility in arrival time compared to leisure-related trips. This means that when a person has to be at work at for example 9 a.m. and is dependent on public transport, that person cannot decide to take a later public transport, even if the transport mode is busy according to the CI. Therefore, their motives are not likely to affect the use of the CI, because they cannot adjust their behaviour. In contrast, leisure-related trips mostly allow for more flexibility. For example, when going to the store, one can decide to take a later public transport that is less full, since one does not need to be at the store at a specific time. Therefore, it is expected that for work-related trips, affective and health motives are not related to the use of the

CI which is why it is expected that people use the CI less often for work-related trips as compared to leisure-related trips.

According to public transport companies, the main goal of a CI is to distribute people more evenly during the day (Redactie OV-Magazine, 2020). Therefore, one expected effect of the use of the CI is that passengers adjust their behaviour, i.e., when the means of transportation is busy, they will take a means of transportation at a different time when it is less crowded. This also indicates another expected effect, namely that passengers feel less at risk for Covid-19 due to the CI, as the CI gives information about how crowded it is. This in turn can help passengers to avoid crowds and thus decrease the risk of contamination. Moreover, as part of an exploratory analysis, it will be studied whether passengers feel more in control of their journey and are more satisfied because of the CI.

Figure 2 depicts the moderation model of this research. Motives affect the use of the CI, while this relationship is moderated by trip purpose. Moreover, the use of the CI affects the effects of the CI, namely change of travel behaviour, feeling less at risk for Covid-19, feeling more in control of one's journey, and being more satisfied with public transport due to the CI.

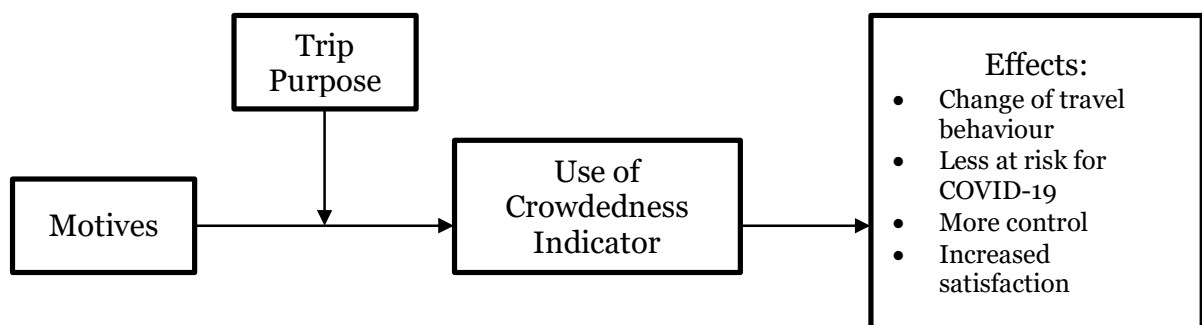


Figure 2. Moderation model, showing the influence of motives for public transport use on the use of the CI, moderated by trip purpose. Use of the CI is expected to lead to different effects.

Research Questions and Hypotheses

Based on the above-mentioned information, three main questions with their respective hypotheses arise:

1. Which motives for public transport use are related to the use of the CI?

H₁: Health motives are positively related to the use of the CI.

H₂: Affective motives are positively related to the use of the CI.

H₃: Instrumental motives are not related to the use of the CI.

H₄: Environmental motives are not related to the use of the CI.

2. Is the relationship between motives and the use of the CI moderated by the purpose of the trip?

H₅: Passengers use the CI less often for work-related trips than for leisure-related trips.

H₆: The relationship between health motives and the use of the CI is weaker for work-related trips than for leisure-related trips.

H₇: The relationship between affective motives and the use of the CI is weaker for work-related trips than for leisure-related trips.

3. What are the effects of the use of the CI on passengers?

H₈: The use of the CI is positively related to changing one's travel behaviour.

H₉: The use of the CI is positively related to feeling less at risk for Covid-19.

Methods

Participants

Initially, 584 participants answered the questionnaire, however, after excluding those who indicated being younger than 18 years of age, the sample consisted of 500 participants aged between 19 to 87 years. The mean age was 57.40 years with a standard deviation of 15.77 years. More than half of participants were male (57.8%), 41.2% were female, one participant indicated being non-binary and 4 participants indicated they prefer not to say.

An email with the link to the survey was sent to a research panel of a Dutch tram and bus company. This public transport company will in this paper be called TBC (standing for Tram and Bus Company) to ensure data privacy of that company. The research panel consists of TBC passengers who regularly participate in studies of TBC in order to improve passenger experience. Ethics approval was obtained from the Ethics Committee of the University of Groningen before the data collection started. Participation in this study was voluntary.

Procedure and Materials

The data collection lasted from 09.04.2021 – 28.04.2021 and a reminder email was sent on the 23.04.2021. Participants were invited to take part in the study through an email that explained the purpose of the study, ensured anonymity and voluntary participation, and included a button with the link to the questionnaire. Once the participants clicked on the button, they were referred to the questionnaire.

The questionnaire was conducted through the software Qualtrics XM (<https://www.qualtrics.com>) in both English and Dutch. The translation from English to Dutch was done by Dutch native speakers to ensure a good translation. 486 participants used the Dutch version and 14 participants the English one. First, participants were informed that the study is

about the experience with the CI and travel intentions, that it is conducted by the University of Groningen, who they can email for questions, that the questionnaire takes about 10 minutes, and that participation is voluntary. Participants first gave consent to participate, then the survey included questions on motives and dependency on TBC services (1), followed by travel habits of travellers (2), the use of the CI (3), the effects of the CI (4), intentions to return to TBC services after Covid-19 is over (5), personal values (6), and lastly demographics including age and gender (7). Since this study was conducted with a fellow student who researched a different topic, the aspects (2), (5), and (6) of the questionnaire will not be discussed here.

Motives

Motives were measured based on the work of Noppers et al. (2014) where an indirect measure was used to measure motives for the adoption of sustainable innovations. This study included 13 items, that all started with 'How do you evaluate the following aspects of traveling by tram/bus of TBC' and after that the respective item. These items were grouped into four different motives, namely health (e.g., hygiene) (Cronbach's alpha = .84), instrumental (e.g., affordability) (Cronbach's alpha = .85), environmental (e.g., sustainability) (Cronbach's alpha = .87), and affective motives (e.g., comfort) (Cronbach's alpha = .45). Since Cronbach's alpha was very low for affective motives, I decided to only use one of the two items for the analysis, namely comfort as on the one hand some participants indicated that the stress-item was unclear and on the other hand comfort is better fitting for the analysis of the first and second research question. Participants rated these items on a 5-point-Likert-scale from 1 'very negative' to 5 'very positive'. All items and the respective clustering can be found in appendix A.

Use of the CI and Trip Purpose

The use of the CI was measured by asking how often participants make use of the CI. Thereby, one item asked about the use of the CI for commute and one item asked about the use of the CI for leisure-related trips. The answer options for all questions ranged from 1 ‘for (almost) every trip’ to 5 ‘for (almost) no trip’. The general use of the CI was calculated by adding together the values of the two items “How often do you make use of the CI for your commute?” and “How often do you make use of the CI for leisure-related trips?” and then dividing the result by two. The scale was recoded such that a higher score reflected a higher use of the CI. The items for these variables can be found in appendix B.

Effects of the CI

Effects were measured by asking participants to rate how often they adjust their behaviour according to the CI and have more control over their journey due to the CI on a 5-point Likert scale ranging from 1 ‘every trip’ to 5 ‘(almost) no trip’. The scale was recoded such that a higher score reflected a stronger effect of the use of the CI. Moreover, the answer option ‘Not applicable/I don’t use the CI’ was included. This answer option was recoded as a 1, which corresponds to ‘for (almost) no trips’.

Moreover, respondents were asked to answer to what extent they feel less at risk for Covid-19 on a 5-point Likert scale ranging from 1 ‘a lot less at risk for Covid-19’ to 5 ‘a lot more at risk for Covid-19’ due to the CI. Participants also answered to what extent they are more satisfied with TBC ranging from 1 ‘a lot more satisfied’ to 5 ‘a lot less satisfied’. Both scales were recoded so that a higher score reflected a more positive effect, i.e., feeling less at risk and being more satisfied. Furthermore, the answer option ‘not applicable / I don’t use the CI’ was included and recoded as a 3, meaning ‘neither more nor less [at risk/satisfied]’ as not using the

CI can be regarded as such that the CI does not have an effect on that person, meaning the person does not use the CI, therefore he/she is neither more nor less satisfied/at risk. The items for these variables can be found in appendix C.

Analysis and Design

A power analysis was conducted through the software G*Power 3.1.9.4, setting α at .05 and power at .8. When setting the effect size to .1 (small), the power analysis showed a required sample of 779. When setting the effect size to .3 (medium), the power analysis showed a required sample of 82. The sample size for the analysis lied in between those two calculated sample sizes.

This study employed a correlational design. The independent variables are motives for public transport use, and trip purpose. The dependent variables are use of the CI, and effects of the use of the CI. Since the CI is a central part to this analysis, only participants who indicated that they have noticed the CI were included in the analyses of this study. 74.2% answered they have not noticed the CI. Therefore, these participants were excluded, resulting in a sample size of 129 participants. The mean age of this sample was 50.63 years with a standard deviation of 16.79 years and a range of 19 to 79 years. 54.3% of participants were male, 42.6% were female, one participant was non-binary and three participants indicated they prefer not to say.

To answer the research questions, first, a multiple regression analysis was conducted to see whether motives are predictive of the use of CI. Furthermore, a *t* test was run to analyse whether passengers use the CI more often for leisure-related trips than for work-related ones. To test whether the relationship between motives and the use of the CI is weaker for work-related trips than for leisure-related trips, linear regression analyses were conducted. To answer the last research question – namely whether the use of the CI is positively related to the expected effects, i.e., changing ones travel behaviour, feeling less at risk for Covid-19, feeling more in control of

one's journey, and being more satisfied with the public transport company – regression analyses were conducted.

Results

Motives for the use of the CI

A multiple regression analysis was run to predict general use of the CI from the four different motives. These motives did not significantly predict the general use of the CI ($F(4, 122) = 2,345, p = .058, R^2 = .071$). Moreover, none of the four motives predicted the general use of the CI on its own when the other motives were accounted for. Hence, the first and second hypotheses – namely that health motives and affective motives are positively related to the use of the CI – are rejected. Moreover, the third and fourth hypotheses – that instrumental and environmental motives are not related to the use of the CI – are supported.

The Influence of Trip Purpose on the use of the CI

To test whether passengers use the CI more often for leisure-related trips as compared to work-related trips (hypothesis 5), a one-tailed paired-samples t-test was run to compare the use of CI for work-related and for leisure-related trips. The significance level here is 0.1 since it is a one-tailed and not a two-tailed t-test. There was a significant difference in the use of the CI for work-related trips ($M=1.84, SD=1.39$) and leisure-related trips ($M=1.94, SD=1.39$), ($t(126) = -1.68, p = .096$), with an effect size of Cohen's $d=0.07$. These results suggest that passengers use the CI more often for leisure-related trips than for work-related ones, however, the difference between these two groups is very small according to the effect size, meaning the difference is significant but negligible. Hence, the fifth hypothesis is rejected.

To test whether the relationship between health motives and the use of the CI is weaker for work-related trips than for leisure-related trips (hypothesis 6), two linear regression analyses were conducted. The first linear regression analysis was conducted with health motives and work-related use of the CI. The result showed that health motives were statistically significantly related to the use of the CI for work-related trips ($F(1, 126) = 6,690, p = .011, R^2 = .050, B = 0.402$ with a 95% confidence interval of 0.095 – 0.710). This indicates the stronger one's health motives the more likely they are to use the CI for work-related trips. Additionally, the relationship between health motives and the use of the CI for leisure-related trips was also statistically significant, $F(1, 125) = 5,816, p = .017, R^2 = .044, B = 0.381$ with a 95% confidence interval of 0.068 – 0.693. This implies the stronger one's health motives the more likely they are to use the CI for leisure-related trips. However, because the confidence intervals of B overlap more than half a SD, it can be concluded that the relationship between health motives and the use of the CI is not weaker for work-related trips than for leisure-related trips. Therefore, the sixth hypothesis is rejected.

To test whether the relationship between the comfort motive and the use of the CI is weaker for work-related trips than for leisure-related trips (hypothesis 7), again two linear regression analyses were conducted. The regression analysis with comfort motive and work-related use of the CI showed no statistically significant relationship between these two ($F(1, 126) = 2,234, p = .138, R^2 = .017, B = 0.233$ with a 95% confidence interval of -0.075 – 0.541). Lastly, the regression analysis, conducted with comfort and leisure-related use of the CI, showed a significant relationship, $F(1, 125) = 6,331, p = .013, R^2 = .048, B = 0.388$ with a 95% confidence interval of 0.083 – 0.693. The stronger one's comfort motive the more likely they are to use the CI for leisure-related trips. Yet, since the confidence intervals of B overlap more than half a SD,

the relationship between comfort and the use of the CI is not significantly weaker for work-related trips than for leisure-related trips. Therefore, the seventh hypothesis is rejected.

Use of the CI and Effects of the CI

The 8th hypothesis, namely that the use of the CI is positively related to changing one's travel behaviour, was tested by running a regression analysis between general use of CI and the item was 'I adjust my behaviour according to the CI of TBC (e.g., if it shows that it is crowded, I use a different tram/bus and vice versa). The result shows the more passengers use the CI, the more they change their travel behaviour, $F(1, 125) = 164,848, p < .001, R^2 = .569, B = 0.391$. Hence, the 8th hypothesis is supported.

Furthermore, the 9th hypothesis – that the use of the CI is positively related to feeling less at risk for Covid-19 – was also tested by conducting a regression analysis between general use of CI and feeling less at risk for Covid-19. The results showed that the more a person uses the CI, the less they felt at risk for Covid-19 due to the CI, $F(1, 125) = 34,135, p < .001, R^2 = .215, B = 0.118$. Hence, the 9th hypothesis is supported.

Exploratory Analyses

In the following, the results of exploratory analyses will be described. The regression analyses showed that the relationship between instrumental motives and the use of the CI was not statistically weaker for work-related trips than for leisure-related trips, since the confidence intervals of B overlapped too strongly. The same holds for the relationship between environmental motives and the use of the CI for work-related trips and for leisure-related use of CI.

The regression analysis between general use of CI and feeling more in control of one's journey was significant, $F(1, 125) = 157,483, p < .001, R^2 = .557, B = 0.421$, meaning that

passengers who use the CI more often feel more in control of their journey due to the CI. The regression analysis between general use of CI and satisfaction with TBC was significant, $F(1, 125) = 29,551$, $p < .001$, $R^2 = .191$, $B = 0.117$; meaning that passengers who use the CI more often feel more satisfied with TBC due to the use of the CI.

Discussion

This study aimed to answer three general questions: (1) Which motives for public transport use are related to the use of the CI? (2) Is the relationship between motives and the use of the CI moderated by the purpose of the trip? And (3) What are the effects of the use of the CI on passengers? In the following, the answers to these questions from the current data will be discussed and compared with previous literature. Then, strengths and limitations of this study will be outlined and in the end implications of the results and recommendations for future research will be given.

Regarding the first question, results showed that, the four motives do not predict the use of the CI. This means that health, comfort, instrumental, and environmental motives are not suitable as predictors of the use of the CI. This could be because using the CI might depend on factors other than health and comfort motives, as expected in this study. These other factors might include trusting the information to be accurate (Thielsch et al., 2018) or having a tight schedule which does not allow one to change one's travelling time. Both of these alternative factors were mentioned in the questionnaire by participants who commented that they do not use the CI because they have a fixed schedule and cannot change their travelling time or because they do not trust the CI to be reliable.

Regarding the second question, results showed that while the use of the CI for leisure-related trips is significantly higher than for work-related trips, the effect size was so small that this difference is negligible from a practical point of view. Moreover, the mean frequency of using the CI was low in both categories, lying between the answer options “using the CI for (almost) no trips” and “using the CI for some of their trips”. Both the very small effect size as well as the low means indicate that passengers generally use the CI rarely. Moreover, in contrast to the expectations, health and comfort motives were not more strongly related to the use of the CI for leisure-related trips than for work-related trips, indicating that trip purpose did not moderate these relationships. These results could be because both work-related as well as leisure-related trips might have a clear time frame which is why crowdedness will not affect travelling time. For example, when someone is going to the store (doing a leisure-related trip) during their lunch break, they cannot afford to take a later tram or bus as this would mean that they will take longer for the shopping trip which in turn will lead to coming late to work after the lunch break. Moreover, passengers might also not mind the crowds and hence are not interested in changing travelling times because of crowdedness. Lastly, passengers might use a different mode of transportation if they anticipate public transport to be crowded and might do so without using the CI. These two latter options find support in some of the comments participants gave in the questionnaire, for example that they do not care about the crowds and that they estimate the crowdedness themselves, however, future research is needed to investigate passenger’s perception of crowdedness and what they would be willing to do to avoid crowdedness.

Lastly, as expected, results show that those who use the CI more often tend to change their travel behaviour more often, feel less at risk for Covid-19, feel more in control of their journey, and are more satisfied with the public transport company. Therefore, it can be concluded

that those who make use of the CI experience positive effects. Hence, it could be helpful to promote or highlight the CI more, as many participants did not even notice it, so that more people can make use of the CI and then also the experience of positive effects can increase.

Strengths and Limitations

This study used cross-sectional data to examine the use of the CI which has the advantage that participants indicated how often they actually make use of the CI, instead of – like in many experiments – how often they would make use of it, which measures intentions. Measuring actions rather than intentions leads to higher validity regarding the use and effects of the CI.

Yet, measuring motives for the use of public transport in an indirect way might have not been suitable in this study and led to low validity regarding motives in this study. This is because participants could have low control over which means or modes of transportation to use (because of financial, physical, or other restrictions), which means that attitudes about the attributes of public transport are not always translated into behaviour. Hence those, who evaluated certain attributes as negative but are still using that public transportation might not necessarily find this attribute unimportant, rather they might have low control over choosing a different means of transportation. The indirect measurement was used because this study was conducted in cooperation with other researchers and the majority was for the indirect measurement of motives. Future research can add another question to increase the level of perceived behaviour control, by for example asking, “Imagine that you can choose any mode of transportation, which one would you take?”. This question combined with the original motives-question asked in this study can give more insight into what passengers find important when choosing a mode of transportation.

Since the data was gathered within the scope of TBC, a tram- and bus-company, the results about the CI can be generalizable towards other tram- and bus-companies, however, the

results might not be generalizable to train-companies. The reason for this is that passengers usually travel longer distances by train and shorter by tram and/or bus. This might lead to a different perception of and varying emotions towards crowdedness on longer versus shorter trips. Future research can look into the difference of the CI-use between train passengers and tram/bus passengers to see whether the CI is being used more often for longer rides (i.e., train rides) versus shorter ones.

Implications and Recommendations

The results are important when considering how to avoid crowdedness. Generally, it seems that the CI is used rarely and that the reasons for why passengers (do not) use it still have to be explored. One possible explanation could be that many passengers are not flexible enough to change their travel time and hence see no reason in using the CI. Another explanation could also be that passengers do not mind the crowds when travelling and thus are not interested in changing their travelling time when it is crowded. However, those who could and did make use of the CI generally experienced positive effects from the CI.

Since this study showed that not many passengers made use of or even noticed the CI, future research could study how to make a CI more appealing. Moreover, future studies could look into what passengers' perception about crowdedness is and what they would be willing to do in order to avoid crowds, e.g., pay higher fees, wait for a less crowded means of transportation, go by bike, etc. Furthermore, future research is needed to find more suitable ways of decreasing crowdedness by for example studying the cost-effectiveness of offering more rides.

References

- Çelebi, D., & İmre, K. (2020). Measuring crowding-related comfort in public transport. *Transportation Planning and Technology*, *43*(7), 735–750.
<https://doi.org/10.1080/03081060.2020.1805546>
- Hopwood, C. J., Bleidorn, W., Schwaba, T., & Chen, S. (2020). Health, environmental, and animal rights motives for vegetarian eating. *PLOS ONE*, *15*(4), e0230609.
<https://doi.org/10.1371/journal.pone.0230609>
- KiM Netherlands Institute for Transport Policy Analysis. (2018, October). *Key Transport Figures 2018*. Ministry of Infrastructure and Water Management.
<https://english.kimnet.nl/mobility-report/publications/documents-research-publications/2019/01/11/key-transport-figures-2018>
- Noppers, E. H., Keizer, K., Bolderdijk, J. W., & Steg, L. (2014). The adoption of sustainable innovations: Driven by symbolic and environmental motives. *Global Environmental Change*, *25*, 52–62. <https://doi.org/10.1016/j.gloenvcha.2014.01.012>
- Peer, S., Knockaert, J., & Verhoef, E. T. (2016). Train commuters' scheduling preferences: Evidence from a large-scale peak avoidance experiment. *Transportation Research Part B: Methodological*, *83*, 314–333. <https://doi.org/10.1016/j.trb.2015.11.017>
- Rana, J., & Paul, J. (2020). Health motive and the purchase of organic food: A meta-analytic review. *International Journal of Consumer Studies*, *44*(2), 162–171.
<https://doi.org/10.1111/ijcs.12556>

Redactie OV-Magazine. (2020, October 19). *RET introduceert drukte-indicator*. OV-Magazine.

<https://www.ovmagazine.nl/2020/10/ret-introduceert-drukke-indicator-1713/>

Soza-Parra, J., Raveau, S., Muñoz, J. C., & Cats, O. (2019). The underlying effect of public transport reliability on users' satisfaction. *Transportation Research Part A: Policy and Practice*, 126, 83–93. <https://doi.org/10.1016/j.tra.2019.06.004>

Steg, L. (2005). Car use: lust and must. Instrumental, symbolic and affective motives for car use. *Transportation Research Part A: Policy and Practice*, 39(2–3), 147–162.

<https://doi.org/10.1016/j.tra.2004.07.001>

Thielsch, M. T., Meeßen, S. M., & Hertel, G. (2018). Trust and distrust in information systems at the workplace. *PeerJ*, 6, e5483. <https://doi.org/10.7717/peerj.5483>

Thorhauge, M., Cherchi, E., & Rich, J. (2016). How flexible is flexible? Accounting for the effect of rescheduling possibilities in choice of departure time for work trips.

Transportation Research Part A: Policy and Practice, 86, 177–193.

<https://doi.org/10.1016/j.tra.2016.02.006>

WHO. (2021a, April 9). *Advice for the public*. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>

WHO. (2021b, April 30). *Coronavirus disease (COVID-19): How is it transmitted?*

<https://www.who.int/news-room/q-a-detail/coronavirus-disease-covid-19-how-is-it-transmitted>

Appendix A

Measuring Motives:

How do you evaluate the following aspects of traveling by tram/bus of TBC

	Very negative (1)	Negative (2)	Neither negative nor positive (3)	Positive (4)	Very positive (5)
Comfort (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reliability (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Affordability (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Safety (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hygiene (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The extent to which it is Covid-19 proof (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The stress it causes you (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Flexibility (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Environmental friendliness (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Travelling time (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Punctuality (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sustainability (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The extent to which it is good for your health (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Clustering of motives:

Health motives:

- Safety (4)
- Hygiene (5)
- The extent to which it is corona proof (6)
- Good for health (13)

Affective motives:

- Comfort (1)
- [initially also Stress (7), but later taken out]

Instrumental motives:

- Reliability (2)
- Affordability (3)
- Flexibility (8)
- Travelling time (10)
- Punctuality (11)

Environmental motives:

- Environmental friendliness (9)
- Sustainability (12)

Appendix B

Measuring Use of CI:

Please select the answer that is most applicable.

	For (almost) every trip (5)	For many of my trips (4)	For around half of my trips (3)	For some of my trips (2)	For (almost) no trips (1)
How often do you make use of the crowdedness indicator for your commute (e.g. going to work or school)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often do you make use of the crowdedness indicator for leisure-related trips (e.g. going to the store, going to meet friends, going shopping)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often will you make use of the crowdedness indicator once the Covid-19 pandemic is over?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Due to the crowdedness indicator, I feel

- a lot more satisfied with TBC. (5)
- somewhat more satisfied with TBC. (4)
- neither more nor less satisfied with TBC. (3)
- less satisfied with TBC. (2)
- a lot less satisfied with TBC. (1)
- not applicable / I don't use the crowdedness indicator

Due to the crowdedness indicator, I feel I am

- a lot less at risk for Covid-19. (5)
- somewhat less at risk for Covid-19. (4)
- neither less nor more at risk for Covid-19. (3)
- somewhat more at risk for Covid-19. (2)
- a lot more at risk for Covid-19. (1)
- not applicable / I don't use the crowdedness indicator