Reviewer: 3 **Editorial comments:** General: 1. Please take this opportunity to thoroughly proofread the manuscript to ensure that there are no spelling or grammar issues.	According to the suggestion, we have reviewed the manuscript for grammatical and spelling errors.
2. JoVE cannot publish manuscripts containing commercial language. This includes trademark symbols (™), registered symbols (®), and company names before an instrument or reagent. Please limit the use of commercial language from your manuscript (including Figures; e.g. Figure 2) and use generic terms instead. All commercial products should be sufficiently referenced in the Table of Materials and Reagents. For example: Oculus Rift	In accordance with the comment, we have removed the commercial language and have replaced them with generic terms. In addition, we have updated the Table of Materials to include all equipment used in the study.
Protocol: 1. There is a 10 page limit for the Protocol, but there is a 2.75 page limit for filmable content. If revisions cause the highlighted portion to be more than 2.75 pages, please highlight 2.75 pages or less of the Protocol (including headers and spacing) that identifies the essential steps of the protocol for the video, i.e., the steps that should be visualized to tell the most cohesive story of the Protocol.	We have ensured that the highlighted portions of the Protocol do not exceed 2.75 pages.
2. For each protocol step/substep, please ensure you answer the “how” question, i.e., how is the step performed? Alternatively, add references to published material specifying how to perform the protocol action. If revisions cause a step to have more than 2-3 actions and 4 sentences per step, please split into separate steps or substeps.	We have revised the protocol steps and we have made several revisions for clarity. (Please see red text in Pages 3 to 6.)

Specific Protocol steps: 1. Please provide a heading for section 1.	In accordance with the comment, we have added the following heading for section 1. Page 2 L94: 1. Preparation of Equipment
Figures: 1. Figure 5-8, Table 1: What statistical tests were used for the asterisks?	We analyzed position and velocity data using initial distance (near, intermediate, far) x gap size (3 s, 4 s) × vehicle size (car, bus) × time (3.5 s, 2.5 s, 1.5 s, 0.5 s) repeated measures ANOVA, with initial distance, gap size, vehicle size, and time as within-factor variables. The timing data were analyzed using initial distance (near, intermediate, far) × gap size (3 s, 4 s) × vehicle size (car, bus) repeated measures ANOVA, with initial distance, gap size, and vehicle size as within-factor variables. The partial eta squared (ηp^2) was used to estimate effect size. A least square mean was used for all pairwise post-hoc comparisons, and means were adjusted using a Bonferroni correction to decrease type I errors. We added the following text to the each figure caption to provide more information. Figure 3. In the figure, asterisks represent statistically significant inter-mean differences for initial distances at each time point. One asterisk represents one inter-mean difference, and two asterisks represent two or more inter-mean differences. Page 8 L321-328: We analyzed velocity data using initial distance (near, intermediate, far) x gap size (3 s, 4 s) × vehicle size (car, bus) × time (3.5 s, 2.5 s, 1.5 s, 0.5 s) repeated measures ANOVA, with initial distance, gap size, vehicle size, and time as within-factor variables. The timing data were

	analyzed using initial distance (near, intermediate, far) × gap size (3 s, 4 s) × vehicle size (car, bus) repeated measures ANOVA, with initial distance, gap size, and vehicle size as within-factor variables. The partial eta squared (η^2_p) was used to estimate effect size. A least square mean was used for all pairwise post-hoc comparisons.
2. Figure 5: Are both x-axes actually 'Time to Interception'? Please clarify.	Yes, it is time to interception. We apologize for the inconsistency. Figures 5 and 6 have been modified to include the correct x-axis labels.
Discussion: 1. Please revise the Discussion to explicitly cover the following in detail in 3–6 paragraphs with citations: a) Critical steps within the protocol b) Any modifications and troubleshooting of the technique c) The significance with respect to existing methods	As requested, the Discussion has been revised to explicitly cover the points mentioned. Page 11:L455-470 Previous studies used simulators with projected screens[16, 17], but our protocol improves ecological validity via a fully immersive virtual view (i.e. 360 degrees). In addition, having participants walk on a treadmill enabled us to examine how children and young adults calibrate their actions to a changing environment. This experimental design's virtual scene changes simultaneously with participants' motions, and the vehicles arrive at the pedestrian's crossing line at a specific time. This prevented participants from delaying their crossing times due to decisions or preparations to move—in this study, participants were already in motion when attempting to cross the road[6]. so that researcher can clearly access the control of locomotion while crossing. Critical steps in the protocol include properly setting the parameters to reflect the experimental design, stopping the experiment when motion sickness occurs, and performing the practice trials so that the participants are fully comfortable with the treadmill environment. A wide range of traffic flows beyond those discussed in the results is configurable with

	the current software. The software may also be easily extended to include a wider range of crossing situations, for example by adding more lanes or more vehicle types.
References: 1. Please do not abbreviate journal titles.	We have checked the References for journal title abbreviations.
Table of Materials: 1. Please ensure the Table of Materials has information on all materials and equipment used, especially those mentioned in the Protocol (e.g., the Walking Simulator software).	As requested, we have updated the Table of Materials to include all materials and equipment used, including the software.
Reviewers' comments: Reviewer #1: Thanks for the opportunity to review this manuscript. It's great to see continued improvement in VR technology being used to study pedestrian behavior and decisions, and these methods clearly extend the field in an incremental manner. I have several comments for the authors to consider.	Thank you for your valuable comments to improve our manuscript and your encouraging comments about the method. We have considered your comments and have revised the manuscript as follows.
1. I found some aspects of the protocol difficult to follow. Providing more details in the introduction concerning the goals of the research and the reason certain methodological features were adapted might help the reader understand specifics. Particular issues are listed below.	We have revised the introduction as shown below to provide a better understanding of the research goals. Page 2, Lines 77-86: In addition, the spatial and temporal characteristics of intercepted objects specify how actor can move. In the gap crossing environment, changing gap size (inter-vehicle distances) and vehicle size should

	affect how pedestrian affect their locomotion. […] Thus, this study investigated how children and young adults regulate their velocity when crossing roads in various crossing environments. The speed regulation profile may be assessed for various gap-crossing environments with differing starting locations, inter-vehicle distances, and vehicle sizes.
2. Why were only sedans and buses presented? I would think it would be easy to simulate other vehicles. Was there a particular reason for these two vehicles? Were they always of the same shape and color?	We presented sedans and buses to test how children and young adults respond differently to different vehicle sizes. Since we want to access how people control their actions for the different sized vehicles, we remained the shape and color of the vehicles throughout the experiment while deviating the size of the vehicles. However, our method can be applied to include other types of vehicles, such as motorcycles. This is left for a future study.
3. On line 138, the authors refer to "continuous traffic flow". Is there an option for non-continuous or irregular traffic? That seems important for various research questions.	There is currently no option for irregular traffic flow for more than 3 vehicles. However, the software can be further developed to include such scenarios. We thank the reviewer for the interesting suggestion.
4. Line 141-142. I see there were two lanes of traffic. Were they moving in the same direction or in opposite directions? Details on the lanes and directions seem important for readers to understand the protocol.	The lanes are moving in the same direction. The protocol has been updated to be more clear on this matter. Page 4, Lines 164-169: NOTE: When using the closer lane as the primary lane, this option can be used to place additional vehicles on the farther lane going in the same direction. Hence it can be used to study the

	impedance of the view of a vehicle by a parallel vehicle. This section has parameters “type” and “distance” with the same definitions as above. This option was not used in the Representative Results.
5. Participants were asked to hold the handrails at all times. This seems somewhat concerning to me, as it is an unnatural walking behavior and could alter behavior, speeds, judgments, and balance. Any thoughts? Perhaps this should be listed as a study limitation?	This is an excellent point and it may influence walking behavior. Following the suggestion, we have mentioned this point in the discussion section as a study limitation. Page 12 Lines 502-503: Additionally, the participants hold the handrails during walking, and this may interrupt the natural walking motion. This could be a limitation of the current methodology.
6. The practice trials seem logical to me, but I was confused by the "sets" of trials. We learn that two successful trials were required. Were there always only two trials? Or was a third trial run if the participant was unsuccessful (in other words, perhaps they were struck by a vehicle)?	Yes we have provided one more opportunity to cross if there was a misunderstanding of the protocol, for example, if participants crossed the road without seeing vehilcles, or does not strat on time or mechanical errors occurs. However, we did not provide extra trial when collisions with vehicles occurred. We did not provide more than third trails even if they were unsuccessful. The Protocol was revised to clarify this point. Page 6 L225-229 NOTE: 4.5-4.7 describe three sets of practice trials, which are designed to gradually allow the participant to become accustomed to the simulator environment. In each “set” the practice routine is repeated for a total of two trials. However, when the participant fails the trial due to a misunderstanding of the instructions, an extra trial is done for a total of three. Extra trials are not done in cases of failure to cross for reasons other than misunderstanding the rules, e.g. if a collision occurs.

7. I am a little confused about how the treadmill functioned. Normally treadmills move constantly. I assume that was not the case here - the treadmill began moving only when the pedestrian began walking? And how was speed manipulated by the pedestrian? Details on the engineering of the treadmill might be valuable, so we understand how pedestrians changed their walking speed, and how the treadmill responded to those changes.	We used a customized treadmill that moves forward by the frictional force exerted by the participants when walking. The treadmill does not move with an internal motor. The internal friction of the treadmill was kept minimal. The manuscript has been revised to include a more detailed description of the treadmill's mechanics. Page 3 L101-102: NOTE: The equipment includes a customized manual treadmill. The treadmill turns via the walking motions of the participants, and does not use an internal motor.
8. The representative results are great, but in the paragraph on lines 292-296, I was led to assume we would see results based on participant age - that is, we would see comparisons between different age groups. From what I can tell, however, the results are largely presented within age groups. Could we see comparisons across age groups, which of course is of greatest interest to developmental change, as the authors allude to in the paragraph on lines 292-296?	In the current manuscript, we present the velocity dependence on initial distance (Figure 5) of young adults and children groups. Because young adults clearly walk faster than children, we did not find it to be significant to compare their velocity profiles. The effects of vehicle size were more significant for the children group, so only the children group was shown (Figures 6, 7).
9. A major issue: unless I missed it somehow, we do not know the age groups studied. How old are the children in the representative results? This seems like absolutely critical information for scientific interpretation of the study.	The age of the groups studied is indeed critical information, and was left out by mistake. Details about the age of the participants were added in the results section.
10. I became very confused in understanding and interpreting the study results. The figures were hard to understand and the rationale for	In accordance with the comment, we have revised the Representative Results section for overall clarity. The hypotheses tested are stated more clearly. In addition, we shorted the

the comparisons unclear to me. Much more information might be provided to clarify the results and their interpretation.	exposition to be more clear and concise. We hope these modifications make the results sufficiently clear. (Please see Page 8 L312 – Page 10 L403).
11. On lines 309-311, it appears that participants who faced a wider (safer) gap actually crossed more quickly. This seems contrary to what I would expect. Am I interpreting it correctly?	Yes, this is correct. In our experimental setup, the LV in the 4-s gap begins closer to the interception point than the LV in the 3-s gap. Thus, this result reflects safe crossing behavior. However, we have removed these results from the manuscript to focus on reporting the vehicle size effects.
12. I like the focus on the car vs bus, and how pedestrians react to vehicles of different sizes. The authors might look up a very recent publication in Journal of Injury and Violence Research by Yu and colleagues that investigated this topic in China (via self-report, not in a virtual reality simulation).	Following the comment we have revised the Results section to focus on the effect of vehicle size and overall improve the clarity of the results. We thank the reviewer for the interesting reference.
13. There is mention of an article by Chung et al in the figure captions, but that reference does not appear in the references list.	We thank the reviewer for spotting the error. The article has been added to the References. Page 13 L558-560: [15] Chung, H. C., Choi, G., Azam, M. Effects of Initial Starting Distance and Gap Characteristics on Children's and Young Adults' Velocity Regulation When Intercepting Moving Gaps. *Human factors* (2019).

14. The issue of motion sickness arises in the final paragraph of the manuscript. This seems a very important topic for a methods paper and has implication for research ethics. I recommend adding considerably more information about the frequency and severity of these symptoms among study participants.	In accordance with this comment, we have added the following in the Results section. Page 8 L317-319: Of the recruited participants, two young adults experienced motion sickness during the experiment; the experiments were immediately stopped and they were excluded from the study.
15. Figure 2 makes it appear as if the treadmill is on an upward incline. Is this correct? If so, why? Or is the photograph misleading?	The treadmill is on a slight upward incline of about 10 degrees. This was done to make it easier for the participants to apply frictional force on the treadmill.
16. How does this methodology offer methodological advantages or improvements over VR pedestrian simulations that allow participants to walk in an empty room, such as those by Plumert/Kearney and colleagues at University of Iowa, and that by Morrongiello and colleagues at University of Guelph?	This methodology has the advantage of not being limited by the spatial constraints of the room. When using an empty room, the participant is limited by the boundaries. However, the treadmill method is limited in that it only allows walking in one direction. Therefore, we see free walking experiments as important as well, and such experiments are also done in our lab. However, that is beyond the scope of the current manuscript.
Reviewer #2: The manuscript is good, and I recommend it be published in JoVE.	
Reviewer #3: Manuscript Summary: The last sentence "This methodology can help ...interceptive action." is not clear and needs to be rephrased. It is important to clearly state the value of the work and potential beneficiaries.	In accordance with the comment, we have revised the last sentence of the Abstract to more clearly reflect the goals of the study. Page 2 L47-48: This methodology can be used by researchers

	of pedestrian behavior and behavioral dynamics to study with human participants in a safe and realistic setting.
Minor Concerns: The protocol itself is described clearly and with adequate detail. The most critical steps are highlighted and the results from the preliminary analysis show promise. On step 2.7 the use of the word "alternative lane" is ambiguous. The authors should clarify if they mean "opposing traffic lane" or something else.	In order to be more clear about that option in the protocol, we have added a Note as follows: Page 4 L164-169: NOTE: When using the closer lane as the primary lane, this option can be used to place additional vehicles on the farther lane going in the same direction. Hence it can be used to study the impedance of the view of a vehicle by a parallel vehicle. This section has parameters “type” and “distance” with the same definitions as above. This option was not used in the Representative Results.
Also the term "gap" should be clearly defined.	In accordance with the comment, definitions of the terms “gap” and “gap size” have been added to the Protocol section. Page 4 L146-149: NOTE: In two-vehicle studies, the gap is defined as the empty space between the two vehicles. The gap size, defined as the length of time during which the gap is along the participant’s walking path, is a function of the “distance”, “speed”, and “type” parameters of [CAR] and [SECONDCAR].

With respect to data analysis and in order to further strengthen the value of the work the reviewer recommends that all assumptions be stated clearly.	The Result section has overall been revised for better clarity. (Please see Pages 7-9)
Also, the authors should discuss when, where, how they recruited participants; how many subjects were involved in the experiments, if a process to eliminate participants was followed, what were the age ranges associated with "children" and with "young adults".v	The Representative Results Section has been revised to include these important details. Page 8, L313-322: These representative results use data from sixteen young adults (mean age = 22.75 yr., *SD* = 2.56) and sixteen children (mean age = 12.18 yr., *SD* = .83). Children undergo developmental changes in their ability to coordinate movements with moving objects[9–14], so varying the initial distance provided an opportunity to compare children's and young adults' functional adjustment of approaching velocity. The participants were recruited in a university social media posting. Of the recruited participants, two young adults experienced motion sickness during the experiment; the experiments were immediately stopped and they were excluded from the study. Across all participants, the success rate was 98.95% for children and 99.48% for young adults. We analyzed only the data from successful trials. Thank you for the helpful feedback to improve the quality of the paper.