



WE THE CURIOUS VIRTUAL REALITY TOUR

Experiences of autistic children

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Brief report on using a virtual reality (VR) app (application) for museum tours pre-visit for autistic users

We worked with 11 autistic children in a school setting. The age ranged from 10-14 with a mean age of 12.4. Of the 12 children invited to take part, eleven (11) completed the process. The process comprised five parts:

1. Answering questions related to their experiences of visiting museums/cultural spaces (2-3 mins.).
2. They had the chance to experience a museum tour using a VR 360-degree app (using cardboard googles) (5-10 mins.).
3. Completed follow up questions about their experience of the VR app (2-3 mins.).
4. 4 days later visited the same museum in real life (4 hours).
5. The next day completed a post museum visit questionnaire related to their experiences (5 mins).

At all points the participants were checked for any signs of 'cyber-sickness' or negative effects (feeling unwell, eye strain, etc..) when using the VR app. Teachers helped to ask the questions and performed the post-questionnaire survey. The following questions are reduced/condensed versions of the questions / questionnaire administered.

Results and insights:

Data from part one of the study revealed the following scores (1= no/not at all, 4=very much/like).

Question asked	Mean score	Standard deviation
I enjoy visiting museums/cultural spaces?	3.1	0.88
I can find them loud/distracting?	2.1	1.20
I find them confusing?	2.0	0.67
I like to know where things are in museums?	3.0	0.82

The data suggest that the participants reported enjoying visiting museums and preferred knowing where things are in museums. They reported relatively neutrally ("kind of") that they found them loud / distracting or confusing. The standard deviation for reporting museums to be loud/distracting was high, suggesting a range of scores for this criterion.

Data from part two revealed the following (1= no/not at all, 4=very much/like).

Question asked	Mean score	SD
Did you enjoy the VR app?	3.5	0.53
Was the app relaxing to use?	3.9	0.32
Did the VR app help prepare you for your visit?	3.5	0.53
Has the app helped you to understand what to expect?	3.8	0.42
What was the physical exp. of wearing the HMD like?	2.8	0.79
I feel less worried about visiting now?	2.7	1.06
Would you like to use the VR app more?	3.3	0.95
Might the VR tour help before you visit the place?	3.1	0.99

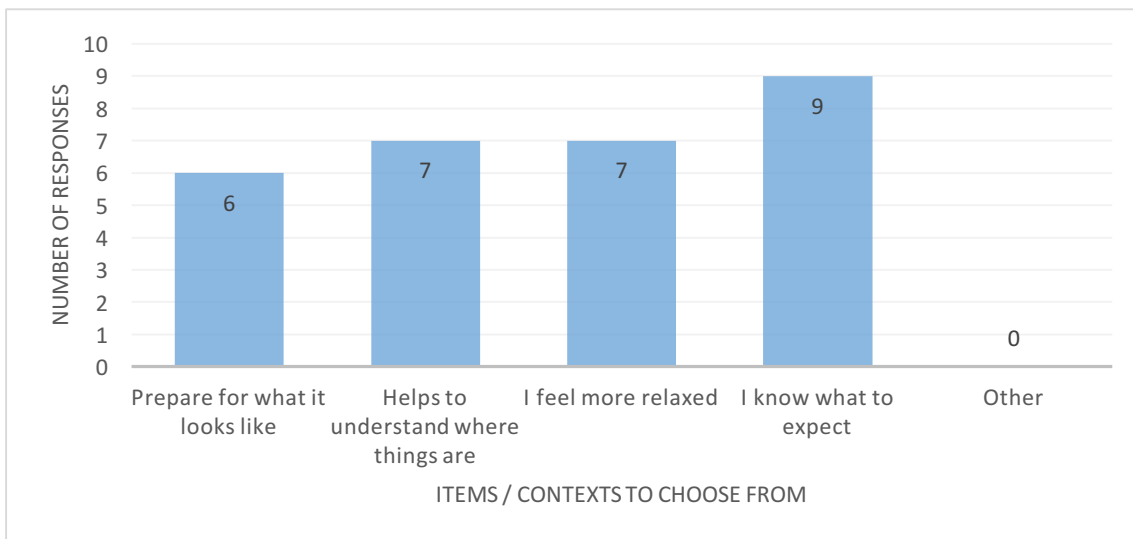
The data here suggest that the participants reported very high enjoyment using the VR app and even higher scores for the relaxing potential of VR. They also reported high scores for helping them to know what to expect / preparing them for visiting the museum in real life (a few days later). The physical experience of the cardboard HMD was reported as fairly neutral as were reports of feeling less worried about visiting the museum. Reports of using the VR app for longer / more and the app helping them before their visit were positive.

Data from part five of the study revealed the following (1= no/not at all, 4=very much/like).

Question asked	Mean score	SD
I enjoyed visiting the museum?	3.6	0.52
I found it to be loud and distracting?	2.2	1.14
I found it to be confusing and I got lost?	1.7	1.06
Having used the app before I knew where things were?	3.6	0.70
Using the app first helped me to visual the space before I visited?	Yes=9, N=1	
Using the app first helped me to feel more relaxed?	3.5	0.71
The VR app helped me to enjoy the visit more than if I hadn't	Yes=8, N=2	

Here the data suggest that the participants reported enjoying the museum visit and did not find it too loud or distracting. Finding it confusing was reported as low while reports of using the app to help prepare them for the visit in person were very positive. In addition, they reported positively on the app helping them to know where things were in the museum (using the app before their visit). The app was also reported as being useful in helping them to enjoy the visit more (than if they hadn't used it before hand). Feeling relaxed was an aspect reported highly; especially after using the app (i.e. the app helped them to feel more relaxed).

Asked about what the app could be used for, the following were the responses:



From these data, knowing what to expect and feeling more relaxed were the most popular responses. Not all children responded to this question (n=9).

In comparing the pre-post visit to the museum (with the VR app used in-between), data revealed the following (1= no/not at all, 4=very much/like).

Question asked	Pre/VR	Post/after visit
Enjoy / enjoyed visiting the museum	3.1	3.6
I find them distracting/found it distracting	2.1	2.2
I find/found it confusing	2.0	1.7
I like to know where things are / using the app helped?	3.0	3.6

Pre-Post Visit:

While there were no significant differences in the pre-post visit (having used the app in-between), there are some interesting points to consider. Firstly, the possibility of enjoying a visiting a museum for the first time seemed to increase after the actual visit. This does not suggest that using the VR app increased enjoyment of the museum, but it is interesting that upon experiencing the app, children enjoyed the museum visit more when visiting in person. There is some need to investigate this factor further. In addition, the children reported finding the museum more distracting in reality than they thought they would before they visited. Reports of confusion were less once they visited. This might have been due to the using the VR app first, or could have simply been because the museum was easy to navigate in reality. Finally, after visiting the museum in real life, and having had the chance to use the VR app before hand, children reported positively when asked if they thought the VR app helped. This was much higher in practice than theory (i.e. the thought of the app helping versus having visited and reflecting on the app).

Key findings:

1. Using the VR app helped to **calm** and **relax** the children.
2. Using the VR app seemed to help the children know **what to expect** before they visited the real world museum.
3. The VR app *might* have helped to **alleviate issues of confusion** when visiting in real life.
4. The VR app was reported as helping the children to **visualize the space** before visiting in real life.
5. Reports of museums being **distracting** were similar before and after the visit.

These findings tend to suggest that children enjoy using VR as a way to become familiar with unusual/places they've not visited before. The data also revealed that the app helped the users become relaxed and they felt comfortable using the app. Related to becoming familiar with the spaces, knowing where things were, was reported as a possible affordance of using the app pre-visit.

Conclusion:

Overall, these findings support the positive role that VR used with autistic groups can have in helping to reduce stress and anxiety when visiting new, loud and large spaces for the first time. It's important that more work, over longer periods of time, with larger cohorts are conducted to take more meaning from these initial data. In addition, experimental models of data collection and analysis are needed (i.e. RCT) to verify the potential of VR for the purposes described there.