

SCIENTIFIC BACKGROUND: SILVERFIT MILE

This white paper gives a brief overview of the scientific background of training with virtual images for cycling and walking.



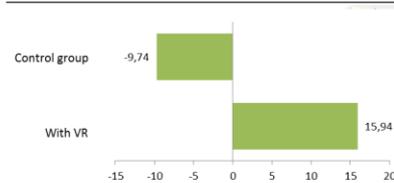
Virtual therapy for walking or cycling leads to better results on cognitive tests, higher exercise adherence, better results on balance parameters, quicker achievement of training goals; and in addition, people enjoy it much more.

Cognition

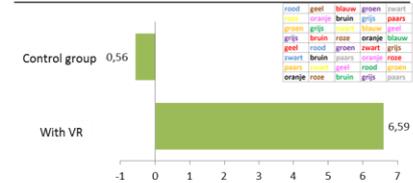
A study by Anderson-Hanley et al. (2012) explored the effect of exercise on cognitive function in older adults. They looked specifically at executive functions such as planning and divided attention. To identify this effect, three tests were used. The results (see the below figure) show that the group that cycled with virtual images (with VR) showed a significantly better cognitive performance than the control group.

Cycling with virtual images improves cognitive function

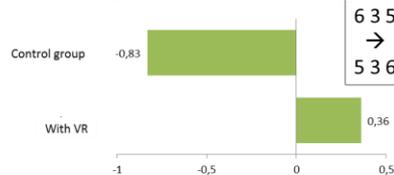
Color Trail Test
improvement post intervention (seconds)



Stroop Test
improvement post intervention (seconds)



Digits Backward Test
improvement post intervention (total score)



Source: Anderson-Hanley et al. (2012)

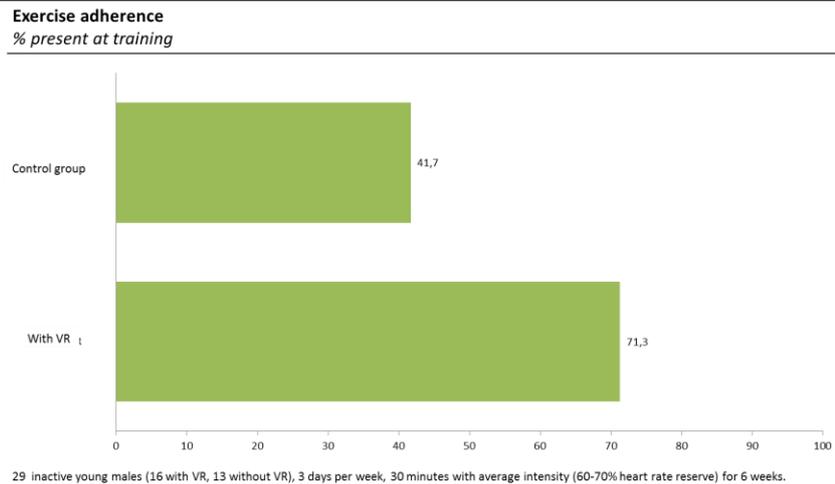
63 participants (aged 58 to 99), cycled for 30-45 minutes an average of 3 times per week for 3 months, with a normal bike /ergometer and a bike with virtual reality tours

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Exercise adherence

The study by Rhodes et al. (2009) into cycling with and without video games showed that exercise adherence was higher when cycling with video games compared to cycling without video games. The study showed that this higher exercise adherence was caused by the fact that the participants found training with the video games to be more fun.

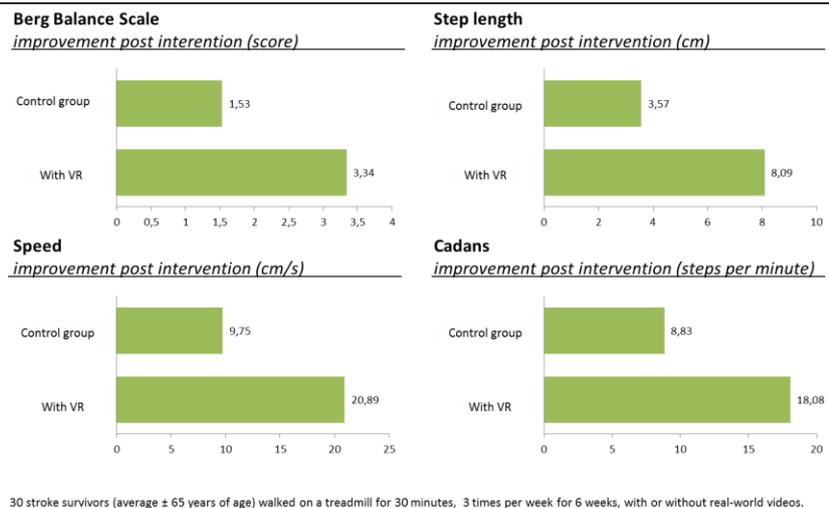
Cycling with videogames improves exercise adherence



Balance

Cho and Lee (2014) showed that using virtual images has a positive effect on balance during walking. Compared to the control group, the VR group scored significantly better after the intervention with regard to the parameters and test, shown below.

Using real-world videos improves balance and gait in stroke patients.

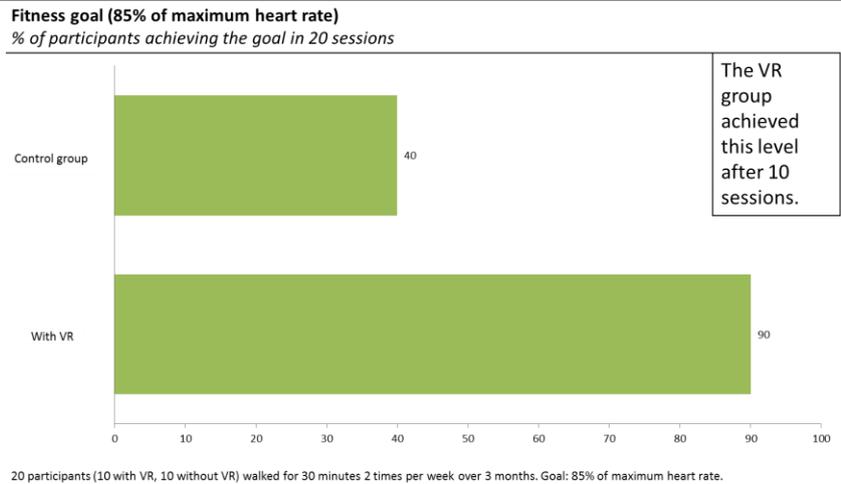


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Cardiovascular function

Chuang et al. (2006) showed that walking with virtual images has a positive impact on achieving fitness goals. After a coronary bypass, one of the training goals was to reach 85% of maximum heart rate. After 20 training sessions, it was observed that less than half of the control group had achieved this. However, almost all of the VR group achieved this goal. Moreover, the VR group achieved this after 10 training sessions.

Treadmill training in a virtual environment increases the recovery of cardiovascular functions after coronary bypass



Source: Chuang et al. (2006)

Exertion and enjoyment

Feenstra (2013, unpublished) studied the effects on exertion while cycling with or without virtual images using the SilverFit Mile. The results show that patients enjoyed cycling with images much more than without. The addition of virtual images to cycling in most cases improved exertion tolerance as well.

Cycling with the SilverFit Mile is more fun than cycling without it.

PP	Enjoyment	Perceived exertion			Conclusion
	How did you find it?	VAS	BORG	Cycle further?	
1	+	-	=	-	reduced
2	+	-	+	+	mixed
3	+	=	=	+	improved
4	+	+	+	+	improved
5	+	+	-	=	mixed
6	=	+	+	=	improved
7	+	-	=	-	reduced
8	+	=	-	=	reduced
9	+	=	=	+	improved
10	+	+	+	+	improved
11	+	+	=	-	mixed

It was observed that people who can cycle a short distance cycle further with VR. People who cycle a relatively long distance cycle slightly less far with VR.

Source: Feenstra (2013, unpublished)

11 frail elderly people (aged 81 -96), cycle 3x10 minutes; baseline (cycling with effort between rather light and very hard; Borg score 12 to 16), 1x with VR, 1x without VR. Minimum of 48 hours between sessions.

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Interested?

For more information, please visit our website: www.silverfit.nl. You can also contact us by e-mail: info@silverfit.nl or by phone: 0348-769 110.

References

Anderson- Hanley, C., Arciero, P.J., Brickman, A.M., Nimon, J.P., Okuma, N., Westen, S.C., Merz, M.E., Pence, B.D., Woods, J.A., Kramer, A.F. & Zimmerman, E.A. (2012). Exergaming and older adult cognition: a cluster randomized clinical trial. *American Journal of Preventive Medicine*, 42(2), 109-119.

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Rhodes, R.E., Warburton, D.E.R. & Bredin, S.S.D. (2009). Predicting the effect of interactive video bikes on exercise adherence: an efficacy trial. *Psychology, Health & Medicine*, 14 (6), 631-640.