

## Digital Narrative Approach: A Behavioural Risk Factor Modification Research in People Living with Cardiovascular Disease.

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### Introduction

Approximately 422.7million people, which is about 5% of the world population presents with cardiovascular disease, CVD. Presently, 7.4million people are diagnosed with CVD in the UK. This number is continually increasing with a lifetime risk of 1 out of 4. Heart and circulatory diseases cause more than a quarter (27 per cent) of all deaths in the UK; that is nearly 170,000 deaths each year - an average of 460 people each day or one death every three minutes. Around 80 percent of people with heart and circulatory diseases have at least one other health condition. Healthcare costs relating to heart and circulatory diseases in the UK are estimated at £9 billion each year.

Background: Approximately 50% of CVD risks are attributable to lifestyle-related risk factors. Cardio-rehabilitation centres have been the standard for CVD out-patient care especially for health behaviour change. Despite widespread education, many individuals fail to adequately address these modifiable risk factors, even after a cardiovascular event - this could be due to care centre accessibility, out-patient mobility and morbidity, comprehensibility and retainability.

Research questions:

- are digital health technologies able to modify behavioural CVD risk factors for CVD patients?
- could DNA (digital storytelling) be used as a potential alternative in behavioural change intervention for CVD risk factor modification?
- what potential CVD risk factor(s) could be suggested for modification in order to maximize behavioural intervention impact?

### Methods

- Preferred Reporting Items for Systematic Reviews and Meta-Analysis, PRISMA.
- PRISMA extension for Scoping Reviews, PRISMA-ScR.
- STROBE cross-sectional data analysis - R software.

### Results

*Systematic review and meta-analysis:* Characteristics of trials revealed mean age (years) 60.03(SD: ±2.73). Gender, M-F ratio (%) of 79:21. Total trial population of 36,303. Devices used include cell phones, smartphones, PCs, and wearables. Technologies used include SMS, software apps, the Internet, and mobile sensors. Average study period of 6 months. Identified behavioural change themes include self-management, feedback mechanism, progress recording and tracking (monitoring), one-on-one/social support, persuasion, personalization (customization), re-iteration, self-efficacy, and motivation.

Meta-analysed effect estimates (mean difference, MD; standard mean difference, SMD; and risk ratio, RR) calculated for outcomes showed benefits in total cholesterol SMD at -0.29 [-0.44, -0.15], P<.0001; high density lipoprotein SMD at -0.09 [-0.19, 0.00], P=.05; low density lipoprotein SMD at -0.18 [-0.33, -0.04] P=.01; physical activity SMD at 0.23 [0.11, 0.36], P=.0003; physical inactivity (sedentary) RR at 0.54 [0.39, 0.75], P=.0003; and diet (food intake) RR at 0.79 [0.66, 0.94], P=.007. Initial effect estimates showed no significant benefit in BMI MD at -0.37 [-1.20, 0.46], P=.38; diastolic BP SMD at -0.06 [-0.20, 0.08], P=.43; systolic BP SMD at -0.03 [-0.18, 0.13], P=.74; HbA1c RR at 1.04 [0.40, 2.70], P=.94; alcohol intake SMD at -0.16 [-1.43, 1.10], P=.80; smoking RR at 0.87 [0.67, 1.13], P=.30 and medication adherence RR at 1.10 [1.00, 1.22], P=.06.

*Scoping review:* Study characteristics revealed mean age (years) of 54. Gender, M-F ratio (%) 58:42. Total trial population of 1,769 (12 studies). Locations (publications) include USA, UK, Australia, and Canada. Devices used include DVDs, game device, and PCs. Technologies used include the Internet web, the Internet and gaming sensors. Average study period of 3 months. Population characteristics include immigrants and rural dwellers who were characterized by inequality, deprivation, and accessibility challenges.

Study outcomes revealed digital narrative interventions have been indexed in CVD-related risk factors which include excess blood sugar (diabetes), high blood pressure (hypertension), high BMI (obesity) and smoking. Intervention approach include digital storytelling framework featured by audio-visual, audio, text, and game technologies.

*Cross-sectional data analysis:* Study characteristics revealed mean age (years) of 69.47(±10.93). Total trial population of 2,025 (over 4-year period). Gender, M-F ratio (%) 75:25. Data location NHS Raigmore. Inverness. Scotland.

Study variables: Independent variables such as age, gender, SIMD groups, SIMD ranking. Dependent variables such as blood sugar level, blood cholesterol level, blood pressure level, body mass index, smoking, and risk factor, RF count(s)

Risk factors prevalence revealed obesity> hypertension> hyperlipidaemia> smoking> diabetes. A modelled analysis assessing prevalence, associations, and direction of predictions reveals an obese population which is either hypertensive or hyperlipidaemic as a cluster of interest for imminent CVD risk factor modification intervention.

### Conclusion

This research, so far, shows and concludes that 1.) the use of digital technologies did not improve all CVD risk factors. Effective digital technology interventions appear to modify healthy lifestyle behaviours (physical activity, healthy food intake) and clinical factors (TC, HDL and LDL); and potent in multiple outcome treatment (medication adherence plus...). Cell phones are considered efficient digital device with the use of cognitive intervention strategy, but smartphones are desirable because of their multiple operational functionality features. 2.) digital narrative approach, DNA is sufficiently indexed as a means of clinical intervention, and because of its potentials, could be further tested in clinical trials across CVD risk factors to increase its evidence base, and 3.) BMI modification could be a suggested cluster for a potential clinical trial in a single risk factor treatment study or with BP level (or cholesterol concentration) modification in a double risk factor treatment study.

### References

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