Co-creating an application for daily use from scratch: The novel assessment of nutrition and ageing (NANA)
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Frailty and malnutrition are common in later life and often occur alongside cognitive impairment or mood disorder. Early detection of these conditions could facilitate early intervention but collecting reliable information from older adults at home is challenging. **Purpose** The Novel Assessment of Nutrition and Ageing (NANA) project set out to co-create an application for daily use comprising four modules: Cognition, Nutrition, Mood and Physical Activity to detect these conditions of ageing. To achieve this a multidisciplinary team combining expertise in the psychology of ageing, human nutrition, medical engineering and human–computer interaction (HCI) was assembled. **Method** Over the course of four years the NANA team co-created a simple and intuitive tool for daily use with more than 530 older adults. Together with 53 nutritionists, 15 health professionals and 90 adults under the age of 65 they took part in 42 separate studies to create NANA. **Results and Discussion** The NANA diet module was created to replace pen and paper food diaries and was shown to be as good or better at recording total energy intake and other nutritional markers when validated against food diaries and laboratory biomarkers (Timon et al., 2015). We developed simple cognitive tasks that can be completed every day which were validated against pen and paper measures in the laboratory and in people's homes (Brown et al., 2016a). The mood measure and physical activity module have been validated against existing gold standard measures in the laboratory and in people's homes (Brown et al., 2016b). In addition to validating all the modules separately, the integrated NANA toolkit was validated in a four-month trial with 40 older adults where all four modules worked as well in people's homes as in the separate tests (Astell et al., 2014). We demonstrated that the NANA mood data can detect early signs of mood disorder (Andrews et al., 2017). This talk will share the lessons learnt from co-creating NANA from scratch.

References
Andrews, J., Harrison, R., Brown, L. J. E., MacLean, L. M., Hwang, F., Smith, T., Williams, E. A., Timon, C. Adlam, T., Khadra, H., & Astell, A. J. (2017). Using the NANA toolkit at home to predict older adults' future depression. Journal of Affective Disorders, 213 (2017), 187-190.
Astell, A.J., Hwang, F., Brown, L.J.E., Timon, C., Maclean, L.M., Smith, T., Adlam, T., Khadra, H., & Williams, E.A. (2014). Validation of the NANA (Novel Assessment of Nutrition and Ageing) touch screen system for use at home by older adults. Experimental Gerontology, 60:100-107.
Brown, L. J., Adlam, T., Hwang, F., Khadra, H., Maclean, L., Rudd, B., Smith, T., Timon, C., Williams, E. A., & Astell, A. J. (2016a). Computer-based tools for assessing micro-longitudinal patterns of cognitive function in older adults. Age, https://doi.org/10.1007/s11357-016-9934-x
Brown, L. J., Adlam, T., Hwang, F., Khadra, H., Maclean, L., Rudd, B., Smith, T., Timon, C., Williams, E. A., & Astell, A. J. (2016b). Computerized self-administered measures of mood and appetite for older adults: the Novel Assessment of Nutrition and Ageing (NANA) toolkit. Journal of Applied Gerontechnology, published online 11th February, 2016.
Timon, C. M., Astell, A.J., Hwang, F., Adlam, T. D., Smith, T., Maclean, L., Spurr, D., Forster, S. E., & Williams, E. A. (2015). The validation of a novel method of dietary assessment for older adults (The NANA study). British Journal of Nutrition, 113 (04): 654-664