TANDem: Empowering families through technology – Annual Report 2021

Annual Report 2021 (YEAR 2)
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<tr>
<th><strong>PROJECT TITLE:</strong></th>
<th>Empowering families through technology: a mobile-health project to reduce the TAND identification and treatment gap (TANDem)</th>
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<tr>
<td><strong>FUNDER:</strong></td>
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<td>2019-J1120010-213544</td>
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<td><strong>PRINCIPAL INVESTIGATOR:</strong></td>
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<td><strong>CO-PI:</strong></td>
<td>Prof. Anna Jansen, Vrije Universiteit Brussel, Belgium</td>
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<td><strong>STARTING DATE OF THE PROJECT:</strong></td>
<td>1 November 2019</td>
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Welcome to the report on year 2 of the TANDem project, generously supported by the King Baudouin Foundation in Belgium. Year 1 of the project was characterised by lots of excitement and setting up of the 4-year global project. As described in the 2020 annual report, we were fortunate to launch the project in November 2019 with in-person activities in Leuven before the COVID-19 pandemic hit early in 2020. In spite of the challenges of COVID-19 we were able to complete year 1 of the project very much on track.

Year 2 of TANDem was a full year of research in the context of COVID-19, and we had to find a range of creative strategies to keep the momentum and energy of the project going in the absence of any opportunities for in-person collaborative work. However, as you will see in this report, TAND consortium members have been remarkable in their resilience and ongoing commitment to the project and its greater goals. Despite many barriers, the project has achieved the majority of goals for year 2, and the ongoing support and enthusiasm from the global TSC community has remained strong.

We hope you will enjoy reading about this innovative and potentially transformative project and about all the year 2 achievements and deliverables of the project.

Prof. Petrus J de Vries
MBChB, FRCPsych, PhD
PI (University of Cape Town)

Prof. Anna Jansen
MD, PhD
co-PI (Vrije Universiteit Brussel)
The TAND<sup>em</sup> project in a nutshell

Tuberous Sclerosis Complex (TSC) is a rare genetic disorder that affects about 1–2 million people around the globe. People with TSC have a wide range of physical manifestations including growths in many organs of the body, including the brain. **TSC-Associated Neuropsychiatric Disorders (TAND)** represent the number one concern to families around the globe, yet they are highly under-identified and under-treated – we refer to these as an ‘identification gap’ and a ‘treatment gap’<sup>[1, 2]</sup>.

Project background

In 2012 we introduced the term ‘TAND’ and in 2015 created the TAND Checklist to reduce the ‘identification gap’<sup>[3]</sup>. Research using the TAND Checklist showed that we could identify seven natural TAND Clusters that may be useful to reduce both the identification and treatment gaps for TAND further<sup>[4, 5]</sup>. Following our earlier work, community-based participatory research with families and a range of TSC stakeholders identified three next steps for action:

1. Creation of a self-report and quantified version of the TAND Checklist
2. Creation of a digital tool such as an app for the TAND Checklist
3. Generation of evidence-based guidelines and a toolkit for next-step management of TAND Clusters

**TAND<sup>em</sup> project aims**

The TAND<sup>em</sup> project was a direct result of the feedback from our TSC stakeholders, and has three aims:

- **AIM 1:** Development and validation of a quantified, self-report TAND Checklist (TAND-SQ), built as a mobile app
- **AIM 2:** Generation of consensus clinical guidelines for identification and treatment of TAND Clusters, to be incorporated as a toolkit into the app
- **AIM 3:** Establishment of a global TAND consortium through a range of networking, capacity-building and public engagement activities

References:

Year 2 in the time of COVID-19

At the end of year 1 we set ourselves 8 next steps for the TANDem project.

The goals were:

a. Complete the Consensus Conference (scheduled as a virtual meeting in November 2020)
b. Complete development of the TAND Consortium website
c. Complete a scoping review of all TAND research to date
d. Finalise submissions to research ethics boards in all relevant research sites
e. Complete development and internal testing of the first phase of the TAND Toolkit App
f. Perform data collection and validation of the app-based TAND-SQ
g. Start development and design of the toolkit to be incorporated into the TAND Toolkit App
h. Have a Consortium meeting with impact activities in June 2021

This report outlines achievements in relation to these goals in year 2 of the TANDem project, and represents the formal report as stipulated in the specific conditions of the grant.

“I’m very curious to see how the app will be seen from the users’ point of view; how this tool will make their lives a little better.”
Given that COVID-19 prevented an in-person Consensus Conference, we switched to a virtual Consensus Conference, which took place from 9–11 November 2020.

In preparation, TAND Consortium members were asked to do the following:

a Cluster groups prepared expert chapters summarising the current literature and evidence-base relevant to the cluster, and prepared summary statements and recommendations from the current literature and evidence-base

b Summary statements and recommendations from all clusters were collated and shared with all consortium members to rate each statement and recommendation on a Likert scale (from strongly agree to strongly disagree)

c Consortium members were also asked to rank their top 3 recommendations per cluster

d All data were collected and summarised to identify items where consensus had already been reached, and to identify items that required further discussion and clarification

The Consensus Conference was divided into three sessions.

**Session 1: Consensus building (9 November 2020)**

In this session all preparatory work was presented and items that required consensus discussions were raised. After discussions, a second round of ranking was performed electronically to identify the final list of consensus items. We agreed to generate three products from the consensus-building process:

1. A book for families and practitioners (most comprehensive)
2. Consensus clinical guidelines for TAND (summary of chapters)
3. A toolkit to be built into the TAND Toolkit App (practical and specific elements from the consensus guidelines)

**Session 2: TAND Toolkit development (10 November 2020)**

This session kick-started discussions about the actual toolkit to develop for inclusion in the App. The consortium agreed on key principles for the TAND Toolkit, developed a core structure for toolkit elements, and agreed a process to start assembling elements to include or design for the toolkit.
Session 3: Next step planning  
(11 November 2020)

During this session the consortium reviewed options for the June 2021 impact activity and agreed on other actions for year 2 of the project. We ended the Consensus Conference with a ‘three-word challenge’ where all consortium members were asked to summarise the key concepts of the project in three words.

“It’s amazing to see how we went from the launch meeting, with ideas all over the place, to a tangible structure, only one year later. We did it in a year’s time, that’s impressive. It speaks of the expert level of this group.”

THREE WORD CHALLENGE

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<td>REPEAT (MONITOR)</td>
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Launching the TAND Consortium website, YouTube and Twitter

After many months of preparations, the TAND Consortium website, Twitter account and YouTube channel were launched on 1 February 2021.

The website was developed with the goal of serving as a ‘living’ resource about TAND for the global TSC- and TAND community, and includes not only project-related information, but also hosts all authorised translations of the TAND Checklist, relevant publications, talks and other TSC- and TAND-related resources. In addition, we created a page where families and people who live with TSC can upload their ‘TAND tips’ and suggestions to inform the TAND Toolkit development process. The website can be found at www.tandconsortium.org.

The YouTube channel was set up to host all relevant talks, webinars and video-based toolkit elements.

The TAND Consortium Twitter account was created to support dissemination of up to date TAND information and to increase the impact and reach of TANDem project activities.

“It’s amazing how everything is coming together and keeps on growing. It’s all connected.”
One of the goals of the TANDem project was to perform a scoping review of all TAND-related research that had ever been published in the peer-reviewed literature. The purpose of the review was to describe the landscape of TAND research to date, to identify key gaps in the TAND literature, and to make recommendations for future TAND research.

Dr Stacey Bissell (Birmingham, UK) and Dr Stephanie Vanclooster (Brussels, Belgium) led the huge task of screening 2,841 publications to identify 230 relevant ones. Ten research questions were examined. We were delighted to see a recent increase in TAND publications with more than half of all TAND research conducted after the coining of the term ‘TAND’ in 2012. The manuscript was submitted for peer-review in September 2021, and we hope that the findings and recommendations will inspire much further high-quality TAND research around the globe.

“Even though there has been an increase in TAND research over the years, we found no studies of non-pharmacological interventions such as talking treatments for any of the TAND manifestations. This was a shocking finding, and a real wake-up call for the TAND research community. We have to do better!”

The Scoping Review Research Questions

1. How much TAND research has been done over the years?
2. Where has TAND research been done in the world?
3. Which TSC age groups have been investigated?
4. What is the overall quality of existing TAND research?
5. Which TAND levels have been investigated?
6. Which research methods and measures have been used to investigate TAND?
7. How much qualitative and quantitative research has been conducted?
8. In human studies, how many intervention studies have been conducted?
9. Have remote technologies been utilised to study TAND?
10. Which TAND clusters have been studied?
Number of TAND studies across years according to study type

![Number of TAND studies across years according to study type](image)

* = Search was completed in March 2020, and therefore does not represent full number of TAND studies published in 2020.

World map depicting the geographical location of 341 individual research sites across 230 studies

![World map depicting the geographical location of 341 individual research sites across 230 studies](image)

Legend
- 251
- 41–50
- 11–40
- 06–10
- 01–05
- 0

Darker colours depict greater number of research sites per country.
One of the features of year 2 was the processing of vast amounts of paperwork. This included finalisation and signing of:

a. The ethics submissions in Cape Town, Brussels, Leuven, Boston, Cincinnati and by the TSC Alliance (USA)
b. The Data Transfer Agreement between all relevant institutions
c. Privacy Policy and Terms of Use of the TAND Toolkit App
d. Privacy Policy and Terms of Use of the TAND Consortium website
e. TAND Consortium Publication Policy
f. Consenting all TAND Consortium members

“I’m so glad to be part of this multidisciplinary group. I feel so supported.”
Over the last year Dr Tosca Heunis (Brussels, Belgium) has continued to work very closely with ITHands, our app developers based in India. She has weekly meetings with them and has been performing interim iterative testing of the app and the data administration panel. The initial projected timeline for phase I of the app was delayed due to various factors, including technical development limitations, changes to the structure of the TAND-SQ, developing and incorporating the Electronic Informed Consent, Privacy Policy and Terms of Use documents, obtaining an Apple Developer Programme license, and the impact of COVID-19. The slowing down of the process in 2021 has fortunately allowed the team to improve a number of elements in the app that will improve user-friendliness in the long run.

The app will allow users to register in a secure way and to add a number of members to their ‘TSC family’ profile. Once registered, users will be able to capture a ‘TSC story’ (information about the TSC diagnosis), complete a self-report, quantified version of the TAND Checklist (to identify and quantify the severity of TAND difficulties experienced), view the cluster profile (that illustrates how different TAND clusters are affected), and to view the ‘TAND toolkit’. The TAND toolkit will provide evidence-informed information about each cluster, including an introduction to the cluster, what should families seek (e.g. assessment, diagnosis, and treatment by a professional), and what can families do for themselves (e.g. self-help, home-based actions, strategies and interventions). The final component of the TAND Toolkit app is the ability to do ‘surveys’ (to collect additional information from users about various aspects of TAND). Phase I of the app includes all development except for the toolkit, which forms part of phase II. The app can be used on Android and iOS mobile devices.

We plan to complete internal user acceptance testing (within the consortium) of phase I of the app on Android and iOS devices in October 2021.

“Seeing the first version of the app was the highlight for me. It has become something very real.”
One of the exciting achievements of year 2 was the development, design, and pre-piloting of the self-report and quantified version of the TAND Checklist, referred to as the TAND-SQ. Through an iterative process, core elements from the original TAND Checklist (TAND-L) were revised and augmented to generate the self-complete version. A user-friendly quantification component was added to relevant items, and the draft checklist was reviewed by members of the consortium and a wider group of TAND stakeholders.

The formatting of the TAND-SQ went through five rounds of proofing (thanks to our talented and patient graphic designer, Deborah White from the Department of Shapes and Colours in the UK) and further review by the consortium members. Following finalisation of the paper version, all consortium members participated in a formal feasibility evaluation of the TAND-SQ. These results will be combined with the pre-piloting data of a small group of families and individuals with TSC in the USA.
The TAND Toolkit development was kick-started at the November 2020 Consensus Conference. Consortium discussions led to the identification of the key purpose and principles of the TAND Toolkit, and generated options for potential components of the toolkit. In 2021 cluster teams were supported to start thinking about toolkit components.

Further teamwork and discussions at the June 2021 consortium meeting helped to create an overall structure for toolkit elements which will include introductory videos about each cluster, and sections on ‘what to seek’ and ‘what to do’. Creative toolkit design sessions were scheduled from September – October 2021.

“I’m looking forward to see the toolkit becoming a real living tool. It will mean so much to families who could use all the help they can get.”

Consensus Clinical Guidelines have:
- Ten core principles
- Recommendations specific to the 7 clusters
- Recommendations for a ‘wraparound’ psychosocial cluster
Purpose and principles of the TAND Toolkit

- First aid to families
- Personalised
- Tailored information targeted at TSC
- Key resources
- Usable
- Strategies
- Practical
- Short, simple and generalisable
- Universal and locally implementable
- Open-access and free

Potential components of the TAND Toolkit

- Short videos about concepts
- Short demonstration videos
- Active learning sheets
- Infographics
- Collated links to resources
- FAQs including who does what around the world?
- Healthy habits

Introductory Movie/Podcast

- What education can look like in different settings with different levels of support (inclusive, separate class, specialized school settings)
- Individual Education Plans (sometimes called IEPs)
- Importance of parent advocacy in education (building relationships with school, participating in meetings etc)
- Ways to support at home (reading, counting, expanding communication, shared goals)
- A word about homework
- When to seek additional support
The original goal of the June 2021 Consortium Meeting was to hold an in-person event in London on the day before the International TSC Research Conference which was scheduled for 17–19 June 2021. As a result of the COVID-19 pandemic, the TSC conference was switched to a virtual meeting, and the TAND Consortium decided also to have our consortium meeting via Zoom.

The goals for the 2021 consortium meeting were to:

a) Provide updates on project goals and activities  
b) Work on the TAND Toolkit  
c) Plan actions and next steps for the remainder of year 2 and into year 3  
d) Discuss potential activities in 2022 (year 3 of the project)

“Seeing our recommendations coming out in the near future, that will be great. Such a support to so many families.”
Impact and dissemination activities

Even though our original grant outline scheduled impact and dissemination activities only for year 4 of the project, the COVID-19 pandemic allowed us to refocus and implement a range of impact and dissemination activities already in year 2. The dissemination team, led by Prof. Liesbeth De Waele (Leuven, Belgium), coordinated a broad range of impact and dissemination activities.

Dissemination activities included:

- Submission of TANDem abstracts to a range of conferences and audiences across the world
- Keynote presentations at international conferences
- A dedicated session on TANDem at the International TSC Research Conference
- Dissemination activities to the TSC community in South Africa, USA, Germany, UK, Netherlands and Australia
- Emerging researcher presentations of posters and talks at various conferences
- Registration of Ms Shoba Srivastava (Mumbai, India) as PhD student at the University of Cape Town for a project on TAND in India

“I’m surprised that our group works so perfectly, everyone with a different background. It’s nice to be part of such a broad community worldwide.”

Abstracts all over the globe

- 50th CNS Annual Meeting
  • Boston, MA, USA
  • 29 Sept – 2 Oct 2021
- International Tuberous Sclerosis Complex Research Conference 2021
  • Virtual
  • 17 – 19 June 2021
- 23rd SSBP Research Symposium
  • Virtual
  • 9 – 11 Sept 2021
- 6th IASSIDD Europe Congress
  • Amsterdam
  • 6 – 8 July 2021
- INSAR 2021
  • Virtual
  • 3 – 7 May 2021
- SA-ACAPAP Congress
  • Virtual
  • 27 – 29 July 2021
- 24th IACAPAP World Congress
  • Virtual
  • 1 – 5 December 2020
- 23rd SSBP Research Symposium
Next steps for 2022

Over the next 12 months (year 3 of the project), we will:

a. Complete pre-piloting of the paper version of the TAND-SQ
b. Publish the TAND-SQ in the peer-reviewed literature and make it available through the TAND Consortium website
c. Complete phase I app development
d. Collect TAND-SQ data via the app and via the TSC Alliance portal
e. Complete evaluation of the technical feasibility of the app
f. Complete validation of TAND-SQ data in relation to expert data (Boston/Cincinnati) and real-life clinical data (TSC Alliance)
g. Complete development and design of the TAND Toolkit materials
h. Incorporate the toolkit into the app (phase II of app development)
i. Perform evaluation of the feasibility of the complete TAND Toolkit app (Belgium, USA)
j. Publish a range of peer-reviewed articles related to the project
k. Participate in the 2022 World TSC Conference (USA), including TANDem activities with the TSC community
l. Participate in other dissemination activities