Export Diagram for SANE Training Program Data

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1 Purpose

This file is part of a research compendium (Pierce, 2026) associated with a study about a sexual assault nurse examiner training program (Dontje & Campbell, 07/01/2021–06/30/2025). It just exports a diagram we want to include in a manuscript to a graphics file.

2 Setup

This section documents some setup tasks that are useful to the statistician on the team. Most readers of this document will probably want skip directly to **?@sec-Read-Data**.

2.1 Define Global Options

Global R chunk options are defined in the YAML header but local chunk options will over-ride global options. We can temporarily disable an individual chunk by inserting `#| eval: false` on a line at the top of the chunk. The method for creating a `cfsize` option that controls font size in code chunks and their text output is based on an answer to a question posted on stackoverflow.com.

```{r}
#| label: global-options

# Create a custom chunk hook/option for controlling font size in chunk & output.
def.chunk.hook  <- knitr::knit_hooks$get("chunk")
knitr::knit_hooks$set(chunk = function(x, options) {
  x <- def.chunk.hook(x, options)
  ifelse(options$cfsize != "normalsize",
         paste0("\n \\", options$cfsize,"\n\n", x, "\n\n \\normalsize"),
         x)
  })
```

2.2 Load Packages

R packages usually add new functions to the base R software, allowing you to do more things. Here, we load the specific R packages required for this script to work.

```{r}
#| label: load-packages
library(devtools)       # for session_info()
```

```
Loading required package: usethis
```

```{r}
#| label: load-packages
library(here)           # for here(), i_am(), makes code more portable.
```

```
here() starts at P:/Consulting/Cases_1600-1799/C1788/SANETPA/scripts
```

```{r}
#| label: load-packages
library(rmarkdown)      # for pandoc_version()
library(knitr)          # for kable()
library(DiagrammeR)     # for create_edge_df(), create_graph(),
                        #     create_node_df(), export_graph()
library(magick)         # for image_read(), image_write()
```

```
Linking to ImageMagick 6.9.13.29
Enabled features: cairo, freetype, fftw, ghostscript, heic, lcms, pango, raw, rsvg, webp
Disabled features: fontconfig, x11
```

```{r}
#| label: load-packages
library(piercer)        # for file_details(), git_report(), which_latex()
library(quarto)         # for quarto_version()
library(SANETPA)        # for version info
```

2.3 Declare Path

This next chunk declares the path to this script relative to the project-level root directory. If the file is not in the right location under the project root you'll get a warning message. This helps ensure relative paths are all working as expected. The chunk below uses the `SourceDir` and `SourceFile` parameters set in the YAML header.

```
```{r}
#| label: declare-path

# Declare path to this script relative to the project root directory.
here::i_am(path = paste0(params$SourceDir, params$SourceFile))
```
```

```
here() starts at P:/Consulting/Cases_1600-1799/C1788/SANETPA
```

3 Stage Diagram

Figure 1 shows the final set of stages and thresholds between them at which attrition from the training program could occur. The arrows associated with each threshold are labeled according to how the outcome variable is coded on the corresponding person-threshold record, depending on whether the person stopped participating at the current stage or moved on to the next stage.

```
```{dot}
//| label: fig-Stages
//| fig-cap: Stages, Thresholds (T1-T3), and Stopping Ratios (SR1-SR3) in the
//|          SANE Training Program. CSW, clinical skills workshop; DT, didactic
//|          training.
//| fig-width: 5
//| fig-height: 2.5

digraph StagesModeled {

graph [rankdir="LR"];

node [shape = "box", style= "filled", fillcolor = "Gray90", fontsize = "7"];
A1 [label = "Attrited\nBefore DT\nSR1"]
A2 [label = "Attrited\nDuring DT\nSR2"]
A3 [label = "Attrited\nBefore/During CSW\nSR3"]

S1 [label = "Stage 1\nEnrolled"]
S2 [label = "Stage 2\nStarted DT"]
S3 [label = "Stage 3\nFinished DT"]
S4 [label = "Stage 4\nFinished CSW"]

edge [fontsize = "7", arrowsize = 0.5];

S1 -> A1 [label = "T1\nAttrit = 1"]
S2 -> A2 [label = "T2\nAttrit = 1"]
S3 -> A3 [label = "T3\nAttrit = 1"]

S1 -> S2 [label = "Attrit = 0"]
S2 -> S3 [label = "Attrit = 0"]
S3 -> S4 [label = "Attrit = 0"]

}
```
```

Below, I use the `DiagrammeR` package to create a graph object corresponding to the contents of Figure 1.

```
```{r}
#| label: create-diagram

my_nodes <- create_node_df(n = 7, shape = "box", style= "filled",
                           color = "black", fillcolor = "Gray90",
                           fontname = "Times New Roman", fontsize = "12",
                           fontcolor = "black", fixedsize = FALSE,
                           label = c("Attrited\nBefore DT\nSR1",
                                     "Attrited\nDuring DT\nSR2",
```
```

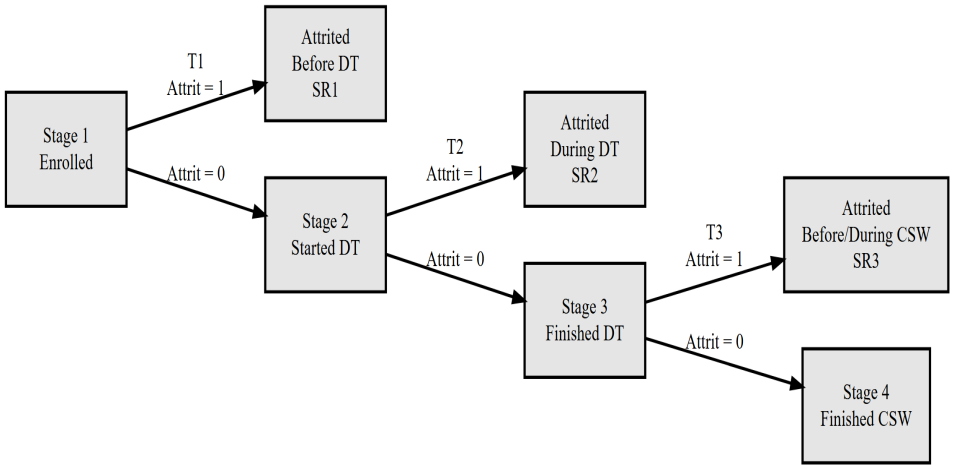

Figure 1: Stages, Thresholds (T1-T3), and Stopping Ratios (SR1-SR3) in the SANE Training Program. CSW, clinical skills workshop; DT, didactic training.

```
                                "Attrited\nBefore/During CSW\nSR3",
                                "Stage 1\nEnrolled",
                                "Stage 2\nStarted DT",
                                "Stage 3\nFinished DT",
                                "Stage 4\nFinished CSW"))

my_edges <- create_edge_df(from = c(4, 5, 6, 4, 5, 6),
                           to =   c(1, 2, 3, 5, 6, 7),
                           label = c("T1\nAttrit = 1",
                                     "T2\nAttrit = 1",
                                     "T3\nAttrit = 1",
                                     "Attrit = 0",
                                     "Attrit = 0",
                                     "Attrit = 0"),
                           fontname = "Times New Roman", fontsize = "12",
                           color = "black", arrowsize = 0.5)

stage_diagram <- create_graph(nodes_df = my_nodes, edges_df = my_edges,
                              directed = TRUE, attr_theme = "lr",
                              graph_name = "StagesModeled")
```

Now we need to export the graph to a PNG file with sufficient resolution. I converted the `fig-width` and `fig-height` settings for Figure 1 from inches to pixels in `export_graph()` width and height settings by multiplying by 300 dpi.

```
```{r}
#| label: export-diagram-png

png_file <- paste0("scripts/output/Campbell_Figure_1_", Sys.Date(), ".png")

export_graph(graph = stage_diagram,
             file_name = here(png_file),
             file_type = "png", width = 1500, height = 750)

file_details(here(png_file))
```
```

```
# A tibble: 1 x 3
  File_Name                            Size Last_Modified
  <chr>                         <fs::bytes> <dttm>
1 Campbell_Figure_1_2026-02-14.png      90.6K 2026-02-14 13:02:51
```

Now, I read in the PNG file and convert it to a TIFF file suitable for submission to the intended journal (which requires a JPEG or TIFF file with dpi $\geq$ 300).

```{r}
#| label: convert-diagram-tif

tif_file <- paste0("scripts/output/Campbell_Figure_1_", Sys.Date(), ".tif")

image_write(image = image_read(path = here(png_file)),
            path = here(tif_file),
            format = "tiff")

file_details(here(tif_file))
```

```
# A tibble: 1 x 3
  File_Name                            Size Last_Modified
  <chr>                         <fs::bytes> <dttm>
1 Campbell_Figure_1_2026-02-14.tif         77K 2026-02-14 13:02:52
```

4 References

Dontje, K., & Campbell, R. (07/01/2021–06/30/2025). *Increasing access, recruitment, and retention of sexual assault nurse examiners in rural michigan* (Grant No. T96HP42059). Health Resources and Services Administration.

Pierce, S. J. (2026). *SANETPA: Research compendium for a study of sexual assault nurse examiner training program attrition* (Version 1.0.1) [Reproducible Research Materials and Computer Program, R Package, Public Repository]. GitHub. https://github.com/sjpierce/SANETPA. Zenodo. https://doi.org/10.5281/zenodo.18643254

5 Software Information

This section documents information that is important for reproducibility. Most users will not need to read it. It is primarily here for use by the statistician on the team if we need to troubleshoot reproducibility issues because someone else is unable to get the same results from the same code. Start by checking for differences in package versions.

We used R as our main computing environment and Quarto scripts to enhance reproducibility. We used RStudio as the editor to interface with R and Quarto.

- Software chain: **qmd file > RStudio > Quarto > R > knitr > md file > Pandoc > tex file > TinyTeX > PDF file**.
- Source file: `Export_Diagram.qmd`
- Output file: `Export_Diagram_2026-02-14.pdf`
- Quarto 1.8.27 runs `*.qmd` files through R and knitr to produce `*.md` markdown files.
- Pandoc 3.6.3 converts markdown files (`*.md`) to other formats, including LaTeX (`*.tex`) and HTML (`*.html`) among others.
- TinyTeX compiles LaTeX files (`*.tex`) into PDF files. It should be viable to use MiKTeX or another LaTeX distribution instead.

5.1 Versions

This document was generated using the following computational environment and dependencies:

```
# Check and report whether we used TinyTex or other LaTeX software.
which_latex()
```

```
is_tinytex = TRUE. We used TeX Live 2025 (TinyTeX) with tlmgr 2025-11-06.
```

```
tlmgr revision 76773 (2025-11-06 20:43:29 +0100)
tlmgr using installation: C:/Users/pierces1/AppData/Roaming/TinyTeX
TeX Live (https://tug.org/texlive) version 2025
```

```
# Get R and R package version numbers in use.
devtools::session_info()
```

```
Warning in system2("quarto", "-V", stdout = TRUE, env = paste0("TMPDIR=", :
running command '"quarto"
TMPDIR=C:/Users/pierces1/AppData/Local/Temp/RtmpqQkkOS/file291445d45e89 -V' had
status 1


- Session info -------------------------------------------------------------
 setting  value
 version  R version 4.5.2 (2025-10-31 ucrt)
 os       Windows 11 x64 (build 26100)
 system   x86_64, mingw32
 ui       RTerm
 language (EN)
 collate  English_United States.utf8
 ctype    English_United States.utf8
 tz       America/New_York
 date     2026-02-14
 pandoc   3.6.3 @ C:/Program Files/RStudio/resources/app/bin/quarto/bin/tools/ (via rmarkdown)
 quarto   NA @ C:\\PROGRA~1\\Quarto\\bin\\quarto.exe

- Packages -----------------------------------------------------------------
 package       * version  date (UTC) lib source
 assertthat      0.2.1    2019-03-21 [1] CRAN (R 4.5.0)
 backports       1.5.0    2024-05-23 [1] CRAN (R 4.5.0)
 broom           1.0.12   2026-01-27 [1] CRAN (R 4.5.2)
 cachem          1.1.0    2024-05-16 [1] CRAN (R 4.5.0)
 cli             3.6.5    2025-04-23 [1] CRAN (R 4.5.0)
 curl            7.0.0    2025-08-19 [1] CRAN (R 4.5.1)
 devtools      * 2.4.6    2025-10-03 [1] CRAN (R 4.5.1)
 DiagrammeR    * 1.0.11   2024-02-02 [1] CRAN (R 4.5.0)
 DiagrammeRsvg   0.1      2016-02-04 [1] CRAN (R 4.5.0)
 digest          0.6.39   2025-11-19 [1] CRAN (R 4.5.2)
 dplyr           1.2.0    2026-02-03 [1] CRAN (R 4.5.2)
 ellipsis        0.3.2    2021-04-29 [1] CRAN (R 4.5.0)
 evaluate        1.0.5    2025-08-27 [1] CRAN (R 4.5.1)
 farver          2.1.2    2024-05-13 [1] CRAN (R 4.5.0)
 fastmap         1.2.0    2024-05-15 [1] CRAN (R 4.5.0)
 forcats         1.0.1    2025-09-25 [1] CRAN (R 4.5.1)
 fs              1.6.6    2025-04-12 [1] CRAN (R 4.5.0)
 generics        0.1.4    2025-05-09 [1] CRAN (R 4.5.0)
 ggplot2         4.0.2    2026-02-03 [1] CRAN (R 4.5.2)
 git2r           0.36.2   2025-03-29 [1] CRAN (R 4.5.0)
 glue            1.8.0    2024-09-30 [1] CRAN (R 4.5.0)
 gtable          0.3.6    2024-10-25 [1] CRAN (R 4.5.0)
 haven           2.5.5    2025-05-30 [1] CRAN (R 4.5.0)
 here          * 1.0.2    2025-09-15 [1] CRAN (R 4.5.1)
 hms             1.1.4    2025-10-17 [1] CRAN (R 4.5.1)
 htmltools       0.5.9    2025-12-04 [1] CRAN (R 4.5.2)
 htmlwidgets     1.6.4    2023-12-06 [1] CRAN (R 4.5.0)
 httr            1.4.8    2026-02-13 [1] CRAN (R 4.5.2)
 jsonlite        2.0.0    2025-03-27 [1] CRAN (R 4.5.0)
 knitr         * 1.51     2025-12-20 [1] CRAN (R 4.5.2)
 later           1.4.5    2026-01-08 [1] CRAN (R 4.5.2)
 lifecycle       1.0.5    2026-01-08 [1] CRAN (R 4.5.2)
 magick        * 2.9.0    2025-09-08 [1] CRAN (R 4.5.1)
 magrittr        2.0.4    2025-09-12 [1] CRAN (R 4.5.1)
 MBESS           4.9.42   2026-01-08 [1] CRAN (R 4.5.2)
 memoise         2.0.1    2021-11-26 [1] CRAN (R 4.5.0)
 mvtnorm         1.3-3    2025-01-10 [1] CRAN (R 4.5.0)
 otel            0.2.0    2025-08-29 [1] CRAN (R 4.5.1)
 pbivnorm        0.6.0    2015-01-23 [1] CRAN (R 4.5.0)
 piercer       * 0.23.0   2025-09-07 [1] Github (sjpierce/piercer@7e53e10)
 pillar          1.11.1   2025-09-17 [1] CRAN (R 4.5.1)
 pkgbuild        1.4.8    2025-05-26 [1] CRAN (R 4.5.0)
 pkgconfig       2.0.3    2019-09-22 [1] CRAN (R 4.5.0)
 pkgload         1.5.0    2026-02-03 [1] CRAN (R 4.5.2)
 pROC            1.19.0.1 2025-07-31 [1] CRAN (R 4.5.1)
 processx        3.8.6    2025-02-21 [1] CRAN (R 4.5.0)
 PropCIs         0.3-0    2018-02-23 [1] CRAN (R 4.5.0)
 ps              1.9.1    2025-04-12 [1] CRAN (R 4.5.0)
 purrr           1.2.1    2026-01-09 [1] CRAN (R 4.5.2)
 quarto        * 1.5.1    2025-09-04 [1] CRAN (R 4.5.1)
 R6              2.6.1    2025-02-15 [1] CRAN (R 4.5.0)
```

```
 RColorBrewer    1.1-3    2022-04-03 [1] CRAN (R 4.5.0)
 Rcpp            1.1.1    2026-01-10 [1] CRAN (R 4.5.2)
 remotes         2.5.0    2024-03-17 [1] CRAN (R 4.5.0)
 rlang           1.1.7    2026-01-09 [1] CRAN (R 4.5.2)
 rmarkdown     * 2.30     2025-09-28 [1] CRAN (R 4.5.1)
 rprojroot       2.1.1    2025-08-26 [1] CRAN (R 4.5.1)
 rstudioapi      0.18.0   2026-01-16 [1] CRAN (R 4.5.2)
 rsvg            2.7.0    2025-09-08 [1] CRAN (R 4.5.1)
 S7              0.2.1    2025-11-14 [1] CRAN (R 4.5.2)
 SANETPA       * 1.0.1    2026-02-14 [1] Github (sjpierce/SANETPA@482345e)
 scales          1.4.0    2025-04-24 [1] CRAN (R 4.5.0)
 sessioninfo     1.2.3    2025-02-05 [1] CRAN (R 4.5.0)
 stringi         1.8.7    2025-03-27 [1] CRAN (R 4.5.0)
 stringr         1.6.0    2025-11-04 [1] CRAN (R 4.5.2)
 texreg          1.39.5   2025-12-22 [1] CRAN (R 4.5.2)
 tibble          3.3.1    2026-01-11 [1] CRAN (R 4.5.2)
 tidyr           1.3.2    2025-12-19 [1] CRAN (R 4.5.2)
 tidyselect      1.2.1    2024-03-11 [1] CRAN (R 4.5.0)
 tinytex         0.58     2025-11-19 [1] CRAN (R 4.5.2)
 usethis       * 3.2.1    2025-09-06 [1] CRAN (R 4.5.1)
 utf8            1.2.6    2025-06-08 [1] CRAN (R 4.5.0)
 V8              8.0.1    2025-10-10 [1] CRAN (R 4.5.1)
 vctrs           0.7.1    2026-01-23 [1] CRAN (R 4.5.2)
 visNetwork      2.1.4    2025-09-04 [1] CRAN (R 4.5.1)
 withr           3.0.2    2024-10-28 [1] CRAN (R 4.5.0)
 xfun            0.56     2026-01-18 [1] CRAN (R 4.5.2)
 yaml            2.3.12   2025-12-10 [1] CRAN (R 4.5.2)

 [1] C:/Users/pierces1/AppData/Local/R/win-library/4.5
 [2] C:/Program Files/R/R-4.5.2/library
 * -- Packages attached to the search path.

------------------------------------------------------------------------------
```

5.2 Git Details

The current Git commit details and status are:

```
git_report()
```

```
Local:    main P:/Consulting/Cases_1600-1799/C1788/SANETPA
Remote:   main @ origin (https://github.com/sjpierce/SANETPA.git)
Head:     [482345e] 2026-02-14: Update version number.



Untracked files:
    Untracked:  scripts/Export_Diagram.rmarkdown
    Untracked:  scripts/Production_Run.rmarkdown
    Untracked:  scripts/output/Campbell_Figure_1_2026-02-14.png
    Untracked:  scripts/output/Campbell_Figure_1_2026-02-14.tif
    Untracked:  scripts/output/Campbell_Figure_2_2026-02-14.tif
```

This is useful because it tells us exactly which commit in the Git history we would need to be using to make sure we are running the exact same code. Sometimes another person is not using the most current code, or has changed the code in some way since it was last committed.

> **Tip**
>
> - Untracked files are files located in the repository that Git has not been told to entirely ignore, but have also not been committed into the version history.
> - Unstaged changes to files indicate that some of the contents have been modified since the last time the file was committed to Git. In production runs, we want the Git output to not show any unstaged changes to key files!