EDITORIAL

Latent Growth Mixture Models to estimate PTSD trajectories

This paper is part of the Special Issue: *Estimating PTSD trajectories*. More papers from this issue can be found at http://www.ejpt.net

Statistical models to estimate individual change over time and to investigate the existence of latent trajectories, where individuals belong to trajectories that are unobserved (latent), are becoming ever more popular. Such models are called Latent Growth Mixture Models (LGMM; Muthén & Muthén, 2000) and are often applied to estimate posttraumatic stress (PTSD) trajectories across several months/years following a traumatic event (Armour, Shevlin, Elklit, & Mroczek, 2012; Berntsen et al., 2012; Bonanno et al., 2012; Forbes et al., 2010; Galatzer-Levy et al., 2013; Mouthaan et al., 2013; Van de Schoot, Broere, Perryck, Zondervan-Zwijnenburg, & Van Loey, 2015; Van Loey, Van de Schoot, & Faber, 2012). The purpose of LGMM is to search for "hidden" subpopulations that are characterized by a different developmental process (growth trajectory). With LGMM it is hypothesized that there are different latent classes each with their own growth model.

Supported by a grant from the Netherlands Organization for Scientific Research, an international meeting was organized to present the current state of affairs concerning LGMM to investigate the causes and consequences of PTSD. Three key aspects of LGMM and its application in the field of psychotrauma were presented in the old University Hall at Utrecht University (founded in 1462), The Netherlands. The first presentation introduced LGMM and provided guidelines on which models to run, how to interpret the results, and what to report in a paper (Van de Schoot, 2015). The second presentation discussed the current state of affairs in applying LGMM models to PTSD data (Galatzer-Levy, 2015). The last presentation demonstrated that only the Bayesian approach results in a theory-driven solution of estimating the delayed onset trajectory (Depaoli, Van de Schoot, Van Loey, & Sijbrandij, 2015).

The meeting was endorsed by the International Society for Traumatic Stress Studies (ISTSS), and part of the ISTSS global meetings program. "We are excited about new and advanced statistical techniques, in particular Bayesian LGMM, since these can answer new research questions and deal with commonly encountered problems like having to deal with small data sets" (Olff, 2015).

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References

Armour, C., Shevlin, M., Elklit, A., & Mroczek, D. (2012). A Latent Growth Mixture Modeling Approach to PTSD symptoms in rape victims. *Traumatology*, *18*(1), 20–28.

Berntsen, D., Johannessen, K. B., Thomsen, Y. D., Bertelsen, M., Hoyle, R. H., & Rubin, D. C. (2012). Peace and war: Trajectories of posttraumatic stress disorder symptoms before, during, and after military deployment in Afghanistan. *Psychological Science*, *23*(12), 1557–1565.

Bonanno, G. A., Mancini, A. D., Horton, J. L., Powell, T. M., LeardMann, C. A., Boyko, E. J., et al. (2012). Trajectories of trauma symptoms and resilience in deployed US military service members: Prospective cohort study. *British Journal of Psychiatry*, *200*(4), 317–323.

Depaoli, S., Van de Schoot, R., Van Loey, N., & Sijbrandij, M. (2015). Using Bayesian statistics for modeling PTSD through Latent Growth Mixture Modeling: Implementation and discussion. *European Journal of Psychotraumatology*, *6*, 27516, doi: http://dx.doi.org/10.3402/ejpt.v6.27516

Forbes, D., Parslow, R., Creamer, M., O'Donnell, M., Bryant, R., McFarlane, A., et al. (2010). A longitudinal analysis of posttraumatic stress disorder symptoms and their relationship with Fear and Anxious-Misery disorders: Implications for DSM-V. *Journal of Affective Disorders*, *127*(1–3), 147–152.

Galatzer-Levy, I. (2015). Applications of Latent Growth Mixture Modeling and Allied Methods to Posttraumatic Stress Response Data. *European Journal of Psychotraumatology*, *6*, 27515, doi: http://dx.doi.org/10.3402/ejpt.v6.27515

Galatzer-Levy, I. R., Ankri, Y., Freedman, S., Israeli-Shalev, Y., Roitman, P., Gilad, M., et al. (2013). Early PTSD symptom trajectories: Persistence, recovery, and response to treatment: Results from the Jerusalem Trauma Outreach and Prevention Study (J-TOPS). *PLoS One*, *8*(8), e70084.

Muthén, B., & Muthén, L. K. (2000). Integrating person-centered and variable-centered analyses: Growth mixture modeling with latent trajectory classes. *Alcoholism: Clinical and Experimental Research*, *24*, 882–891. doi: 10.1111/j.1530-0277.2000.tb02070.x.

Olff, M. (2015). Quote taken. Retrieved February 5, 2015, from http://www.uu.nl/agenda/symposium-estimating-PTSD-trajectories

Mouthaan, J., Sijbrandij, M., De Vries, G. J., Reitsma, J. B., Van de Schoot, R., Goslings, J. C., et al. (2013). Internet-based early intervention to prevent posttraumatic stress disorder in injury patients: Randomized controlled trial. *Journal of Medical Internet Research*, *15*(8), e165. doi: 10.2196/jmir.2460.

Van de Schoot, R. (2015). Latent trajectory studies: the basics, how to interpret the results and what to report. *European Journal of Psychotraumatology*, *6*, 27514, doi: http://dx.doi.org/10.3402/ejpt.v6.27514

Van de Schoot, R., Broere, J. J., Perryck, K., Zondervan-Zwijnenburg, M., & Van Loey, N. (2015). Analyzing small data sets using Bayesian estimation: the case of posttraumatic stress symptoms following mechanical ventilation in burn survivors. *European Journal of Psychotraumatology*, *6*, 25216, doi: http://dx.doi.org/10.3402/ejpt.v6.25216

Van Loey, N. E., Van de Schoot, R., & Faber, A. W. (2012). Posttraumatic stress symptoms after exposure to two fire disasters: Comparative study. *PLoS One*, *7*(7), e41532.