



This is a repository copy of *Psychological distress trajectories in chronic physical health conditions*.

White Rose Research Online URL for this paper:
<http://eprints.whiterose.ac.uk/157645/>

Version: Accepted Version

Article:

Debnar, C., Carrard, V., Morselli, D. et al. (3 more authors) (2020) Psychological distress trajectories in chronic physical health conditions. *Health Psychology*, 39 (2). pp. 116-126. ISSN 0278-6133

<https://doi.org/10.1037/hea0000820>

© American Psychological Association, 2020. This paper is not the copy of record and may not exactly replicate the authoritative document published in the APA journal. Please do not copy or cite without author's permission. The final article is available, upon publication, at: <https://psycnet.apa.org/doi/10.1037/hea0000820>

Reuse

Items deposited in White Rose Research Online are protected by copyright, with all rights reserved unless indicated otherwise. They may be downloaded and/or printed for private study, or other acts as permitted by national copyright laws. The publisher or other rights holders may allow further reproduction and re-use of the full text version. This is indicated by the licence information on the White Rose Research Online record for the item.

Takedown

If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.



eprints@whiterose.ac.uk
<https://eprints.whiterose.ac.uk/>

Psychological Distress Trajectories in Chronic Physical Health Conditions

Caroline Debnar, Valerie Carrard

Swiss Paraplegic Research, National Center of Competence in Research LIVES

Davide Morselli

National Center of Competence in Research LIVES

Gisela Michel

University of Lucerne

Nicole Bachmann

University of Applied Sciences and Arts Northwestern Switzerland

Claudio Peter

Swiss Paraplegic Research, National Center of Competence in Research LIVES

Author Note

Caroline Debnar, Valerie Carrard, and Claudio Peter, Swiss Paraplegic Research (SPF), Nottwil, Switzerland; National Center of Competence in Research LIVES, Lausanne, Switzerland; Department of Health Sciences and Medicine, University of Lucerne, Switzerland; Davide Morselli, National Center of Competence in Research LIVES, University of Lausanne, Switzerland; Gisela Michel, Department of Health Sciences and Medicine, University of Lucerne, Switzerland; Nicole Bachmann, School of Social Work, University of Applied Sciences and Arts Northwestern Switzerland, Olten, Switzerland.

This project was funded by the Swiss National Center of Competence in Research LIVES, which is financed by the Swiss National Science Foundation [grant number 51NF40 - 160590]. This study also uses the data collected by the Swiss Household Panel (SHP), which is based at the Swiss Centre of Expertise in the Social Sciences FORS. The project is financed by the Swiss National Science Foundation.

Corresponding author: Caroline Debnar, Swiss Paraplegic Research, Guido A. Zäch-Strasse 4, CH-6207 Nottwil, Switzerland. E-mail: caroline.debnar@paraplegie.ch

Abstract

Objective. The onset of a chronic health condition (CHC) can have a severe impact on an individual's life, affecting mental and physical health. This study's goal was to investigate psychological distress trajectories starting from one year before to four years after the onset of a physical CHC. The specific aims were to identify the number and shape of longitudinal psychological distress trajectories and to test health-related, psychological, social, and demographic factors predicting these trajectories.

Methods. Two samples were drawn from the Swiss Household Panel dataset: a CHC sample (n = 361) and a 1 to 1 matched comparison sample of healthy individuals. Latent growth mixture modeling was used to identify psychological distress trajectories over six years. Factors predicting trajectories were then tested using multinomial logistic regression.

Results. Four psychological distress trajectories were identified in the CHC sample: *resilience* (53.9%), *chronic* (22.2%), *delayed* (15.0%), and *recovery* (8.9%). In the comparison sample, two trajectories were identified: *low psychological distress* (90%) and *elevated psychological distress* (10%). Protective factors associated with resilient trajectory membership in the CHC sample are higher emotional stability, higher relationship satisfaction, and male gender.

Conclusion. Individuals living with a CHC have an increased risk of vulnerability compared to a sample of healthy individuals. This advocates awareness of mental health issues following the onset of a CHC. In this regard, biopsychosocial factors (gender, emotional stability, and relationship satisfaction) offer prevention and intervention opportunities for more vulnerable individuals.

Keywords: chronic disease, psychological adaptation, resilience, depression, latent growth mixture modeling

Psychological Distress Trajectories in Chronic Physical Health Conditions

A chronic health condition (CHC) can significantly affect a person's plans, wishes, physical, and mental health (De Ridder, Geenen, Kuijer, & van Middendorp, 2008). CHCs are defined as long-standing health problems – such as heart disease, lung disease, cancer, and diabetes (WHO, 2019). The disruption caused by a CHC implies an ongoing psychological adaptation to the demands of this new life situation. Psychological adaptation refers to the temporal process fostering mental and emotional balance in response to adversity, which can lead to more or less well adapted outcomes. These outcomes are often operationalized with life satisfaction, mental health, or other indicators of well-being (Biesecker & Erby, 2008).

Over the past decades, psychological adaptation trajectories following various adverse life events have been identified and inter-individual differences observed. A literature review summarizing findings of longitudinal studies reports that the majority of individuals are belonging to a resilient trajectory (65.7% on average) characterized by minimal impairment and a relatively quick return to baseline state. The second biggest subgroup of individuals displays a recovery trend (20.8% on average) with an eventual return to the baseline state. The vulnerable trajectory (10.6% on average) is defined by a relatively high level of psychological impairment, which may persist for years. The smallest subgroup of individuals experiences a delayed reaction (8.9% on average) with low psychological impairment around the baseline, followed by a progressive increase in psychological impairment (Galatzer-Levy, Huang, & Bonanno, 2018).

However, Infurna and Luthar criticized the constraints previously used in other studies, which might have led to an overestimation of the prevalence of the resilient trajectory following an adverse event. More studies using a methodological approach that would prevent such an overestimation (i.e. freely estimated variances) are needed to validate the actual prevalence of

psychological adaptation trajectories following adverse life events (Infurna & Luthar, 2016, 2018). Moreover, many of the past studies are limited by the absence of pre-event data (Bonanno & Diminich, 2013). Pre-event data is needed to disentangle general vulnerability to vulnerability in the face of an adverse event.

When it comes to the study of psychological adaptation following physical CHC, research has focused on single chronic diseases, such as cancer or heart disease alone in a clinical context (Galatzer-Levy et al., 2018). However, it has been suggested that similar trajectories of mental health can be identified in different diagnostic groups (e.g., cancer, arthritis, or heart disease; Van Leeuwen, Hoekstra, van Koppenhagen, de Groot, & Post, 2012). Although each CHC has distinct symptomology, they all imply the persistence of health issues for a prolonged period (WHO, 2019). Additionally, affected individuals are frequently faced with similar challenges, such as self-management, long-term engagement, work participation, or impact on mental health (Brown, Daly, & Rickel, 2007; Scharn et al., 2019). Consequently, Van Leeuwen et al. (2012) proposes that studying psychological adaptation in a sample with any type of physical CHC would enable to draw more general conclusions on the impact of CHC on mental health.

The objective of the present study was thus to investigate psychological adaptation trajectories across different types of physical CHC with the inclusion of pre-event data in a non-clinical population. The first aim of the study was to identify the number and shapes of psychological adaptation trajectories from one year before to four years after the onset of a physical non-congenital CHC, using psychological distress as psychological adaptation indicator. Consistent with past literature, we expected to identify three to five trajectories, including a resilience, a recovery, and a vulnerable trajectory (Bonanno & Diminich, 2013; Galatzer-Levy et

al., 2018) Moreover, we analyzed a comparison sample of healthy individuals to check whether the identified trajectories of psychological distress are related to the onset of a CHC or rather representing general patterns of change over time unrelated to any life event.

To identify vulnerable individuals and avenues of intervention, past research investigated factors predicting better psychological adaptation following physical CHC. It has been shown that some health-related (e.g. better health; Burton, Galatzer-Levy, & Bonanno, 2015; Zhu, Galatzer-Levy, & Bonanno, 2014), psychological (e.g. emotional stability; Hampson & Friedman, 2008; Strickhouser, Zell, & Krizan, 2017), and social factors (e.g. more social support; Dunn et al., 2013; Harris et al., 2010), are associated to more resilience (i.e. better mental health). On the other hand, factors such as past adverse life events (Brewin, Andrews, & Valentine, 2000; Butler, Koopman, Classen, & Spiegel, 1999), sex (Ginzburg & Ein-Dor, 2011; Moergeli, Wittmann, & Schnyder, 2012; Zhu et al., 2014), age (Havik, 1990; Moergeli et al., 2012), income (Lyons, Heywood, & Rozbroj, 2016), civil status (Havik, 1990; Moergeli et al., 2012; Morris, Yelin, Panopalis, Julian, & Katz, 2011), or education (Morris et al., 2011; Van Leeuwen et al., 2012), have been inconsistently associated to psychological adaptation following CHC. Using a sample with different types of CHCs could lead to the identification of the most important factors that are related to psychological adaptation to physical CHC overall.

The second aim of the study was thus to determine the health-related, psychological, social, and sociodemographic factors which predict membership to a resilient trajectory, i.e. good mental health, following the onset of physical CHC. Based on the reviewed literature, we hypothesized that: more positive health-related factors (e.g., self-rated health, overall health status, subjective health Burton et al., 2015; Zhu et al., 2014), higher emotional stability (Hampson & Friedman, 2008; Strickhouser et al., 2017), higher sense of spirituality (Smith,

2011), lower number of past negative life events (Brewin et al., 2000; Butler et al., 1999), more social support (Dunn et al., 2013; Harris et al., 2010), and less financial scarcity (Lyons et al., 2016) increase the probability to belong to a more resilient trajectory. We further hypothesized that trajectory membership is not predicted by age, sex, civil status, and education (Bonanno & Diminich, 2013; Ginzburg & Ein-Dor, 2011; Moergeli et al., 2012; Morris et al., 2011).

Method

Design and Dataset

The present longitudinal study examined the evolution of psychological distress across six measurement time points: from one year before to four years after the onset of a CHC onset. Data were drawn from the waves 2007-2015 of the Swiss Household Panel dataset (SHP). This nationally representative panel study includes Swiss private households and their inhabitants aged 14 or older. The SHP was initiated in 1999 and is annually collected via telephone interviews from September until February (see Graf, 2009 for further information).

Samples and Participants

Two samples were selected from the SHP individual dataset. First, individuals from the SHP 2013 wave who indicated the presence of a “chronic (long-standing) illness or condition (health problem) with a physical cause” having started between 2009 and 2011 were included in a CHC sample (n=361, 204 women and 157 men). Individuals reporting a congenital CHC or a CHC due to psychological causes were excluded. Second, a comparison sample of healthy individuals was selected including 361 individuals from the SHP 2013 wave who never indicated any CHC, accident, or illness between 2007 and 2015. To ensure the similarity and hence comparability between the CHC and the comparison sample, 1 to 1 propensity scores matching

(nearest neighbor) were implemented accounting for sex, age, residence region, and interview language (German, French, Italian; the three main languages in Switzerland).

Measures

Psychological adaptation indicator.

Psychological distress was assessed from one year before to four years after the CHC onset with the following single item of the World Health Organization Quality Life Survey (WHOQOL-100; The WHOQOL Group, 1998) “Do you often have negative feelings such as blue mood, despair, anxiety, depression?” (0 = “never”, 10 = “always”). This item has been shown to have good content validity (Yao, Wu, & Yang, 2008) as well as good responsiveness (Chiu et al., 2006). This psychological distress item is a good indication of mental health, because it has been showed to correlate well with the number of admissions in Swiss psychiatric hospitals over the years (Spearman correlation $p = 0.75$; Morselli, 2017).

Health-related, psychological, social, and sociodemographic factors.

Health-related factors. Four health-related variables were included as predicting factors of psychological adaptation: *daily health impediment* (“To what extent, generally, your health is an impediment in your everyday activities, in your housework, your work or leisure activities?” 0 = “not at all”; 10 = “a great deal”), *improvement in health* (“Has your health improved or worsened during the last twelve months?” 0 = “greatly worsened”; 10 = “greatly improved”), *health status* (“Talking about your health: How do you feel right now?” 1 = “very well”; 5 = “not well at all”), and *satisfaction with health status* (“How satisfied are you with your state of health?” 0 = “not at all satisfied”; 10 = “completely satisfied”).

Psychological factors. Three psychological factors were included: *personality*, *number of past negative life events*, and *spirituality*. *Personality* was assessed with the 10-Items Big Five

Inventory (Rammstedt & John, 2007). This validated questionnaire assesses extraversion, emotional stability, conscientiousness, agreeableness, and openness with two items each. Participants indicated to which extent they see themselves as someone who, for instance, “is outgoing, sociable”, “is reserved”, “does a thorough job”, or “has artistic interests” (0 = “completely disagree”, 10 = “completely agree”). The *number of past negative life events* was measured by summing the number of adverse life events reported between 2007 and 2015 for each individual. The list of adverse life events included is : “illness, accident of closely related person”, “death of closely related person”, “termination of close relationship”, “dismissal, unemployment”, “financial difficulties”, “material damage”, and “psychological trauma”. For *spirituality*, participants indicated their praying habits (how frequently they pray apart from church from 0 = “never” to 4 = “daily or almost daily”).

Social factors. *Relationship satisfaction* and *social contacts* were included as social factors. *Relationship satisfaction* was measured with the single item: “How satisfied are you with your personal, social, and family relationships?” (0 = “not at all”; 10 = “completely”). *Social contacts* were measured as an aggregation of the number (“With how many [...] are you on good terms and enjoy a close relationship?”) and the frequency (“How frequently do you see them?”) of contacts with close friends, relatives, and neighbors.

Sociodemographic factors. The following sociodemographic characteristics were included: *years of education* (based on the International Standard Classification of Education; Schneider, 2013), *partnership status* (having a partner or not), *occupation* (paid work or not), and *financial scarcity* (“If you consider the total of your household's income and expenses, would you say that currently your household: 1 = can save money or spends what it earns; 2 = eats into its assets and savings or gets into debts?”).

Control variables. Sex and standardized age were used as control variables in all the regression models.

As the factors tested are considered as predictors of the trajectory membership and in order to avoid an influence of the CHC on the measures, all psychological, social, and sociodemographic factors were measured one year before onset except for personality (measured at the onset year) and spirituality (measured two years before the onset) due to data collection inconsistency in the SHP. Moreover, health-related factors were measured one year after the onset in order to capture the influence of the CHC.

Data Analyses

Latent growth mixture modeling (LGMM) was used to identify the number and shapes of psychological distress trajectories. LGMM is a person-centered approach that identifies unobserved subgroups sharing similar trajectories. It simultaneously models growth parameters (slope indicating the rate of change and intercept representing the baseline status) and classifies individuals in different trajectories according to these parameters (Wickrama, Lee, O'Neal, & Lorenz, 2016). Following standard LGMM procedure, an iterative process was applied to test increasing numbers of subgroup trajectories until the best fitting model was acquired and the corresponding number of trajectories identified. The best fitting model was defined according to multiple fit statistics: Bayesian information criterion (BIC), Akaike information criterion indices (AIC), Lo-Mendell-Rubin adjusted likelihood ratio test (LRT), bootstrap likelihood ratio test (BLRT), entropy values, and sample size per trajectory; as well as interpretability of the trajectory parameters based on theoretical meaningfulness and past literature.

Five types of longitudinal models were estimated with decreasing constraints applied to the model parameters (Infurna & Luthar, 2018). First, simple growth models (GM) were applied

to determine the shape and growth parameters of the overall sample trajectory. Second, a latent class growth analysis (LCGA) was performed to determine subgroup trajectories while constraining within and between class variance. Third, a latent growth mixture models (LGMM) with released within-class variance were modeled. Fourth, models with freely estimated within- and between-class variances (LGMMvar) were computed. Fifth, variances and covariances were freely estimated (LGMMvarcov). In the LCGA, LGMM, LGMMvar, and LGMMvarcov 2- to 6-trajectory solutions were tested, but the 6-trajectory solutions never converged despite extensive increasing of random starts. The decision to test a range of 2- to 6-trajectory is based on Ram and Grimm (2009) suggestion to test at least one additional trajectory than the expected number of trajectories. Every model has been rerun with at least twice the random starts (default used = 10 2; maximum tested = 3000 300) to confirm that the best log-likelihood is replicated. The number of individuals with missing values varied between 4.99% and 23.55% among the different time points (see Table 1). Incomplete data were handled using full information maximum likelihood.

To identify how health-related, psychological, social, and sociodemographic factors predict trajectory membership, Vermunt's 3-steps approach was used (Vermunt, 2010). This approach (1) estimates the LGMM model, (2) computes the misclassification errors rate (trajectory membership uncertainty rate), and (3) tests predicting factors with multinomial logistic regression directly in the LGMM model while adjusting for misclassification errors (Wickrama, Mancini, Kwag, & Kwon, 2012). The predictors were tested in two steps, because a multinomial logistic regression with 20 predictors lacked statistical power. First, four separated multinomial logistic regressions were run: one with the five health-related factors, one with the seven psychological factors, one with the two social factors, and one with the three demographic factors. Then, in a final multinomial regression model, the predictors that were significant ($<.05$)

or marginally significant ($<.10$) in the first regressions were included in the final model. Only this final model is presented in the results section, but the results of the other models are available as supplementary material. Note that sex and age were controlled for in every regression model in order to identify the factors related to trajectory membership over and above the influence of sex and age. The models were also run with standardized age squared to control for the potential curvilinear impact of age, but this control variable was not included in the final analysis because it was never significantly related to the outcomes. The number of missing values varied between 9.97% and 39.36% among the different predicting factors (see Table 1). Missing values were imputed at the mean level using multiple imputations (20 imputed datasets) taking into account the item level variables. All analysis were run using Mplus version 8 (Muthén & Muthén, 2010). The Mplus syntax is available as online supplementary material. The present paper followed the Guidelines for Reporting on Latent Trajectory Studies (GRoLTS: Van De Schoot, Sijbrandij, Winter, Depaoli, & Vermunt, 2017).

Results

Descriptive

Demographic characteristics and descriptive statistics are provided in Table 1. Skewness and kurtosis coefficients indicate that the psychological distress items were non-normally distributed (range = 0.86 – 1.15 and 3.13 – 4.21 for skewness and kurtosis respectively). Robust maximum likelihood estimation was thus used in order to withstand the non-normal distribution of the data (Muthén, 2010). Intercorrelation between the variables of interest is available as online supplementary material.

The SHP questionnaire does not contain information on specific CHC diagnoses. Hence, to better describe our CHC sample, a CHC typology was computed using latent class analysis

(LCA). LCA is a person-centered approach that classifies individuals based on the similarity of their scores on several variables (Magidson & Vermunt, 2002). Fifteen variables measured one year after the CHC onset were used to conduct the LCA (e.g., self-reported health status, everyday impediment, medication needed, worsening in health, back problems, frequency of doctor consultations; see online supplementary material for the full list). Seven types of CHC with different functioning issues and varying levels of severity were identified as best representing our data (see online supplementary material for the fit indices and estimated probabilities of the best-fitting typology). This implies that our sample represents a large variety of CHC such as accident with moderate functioning, illness with three different degrees of functioning (low, moderate, and high), or good functioning with pain symptoms. The seven CHC types identified and their prevalence are displayed in Table 1.

Psychological Distress Trajectories

An LGMM was performed to identify the best fitting trajectories of psychological distress covering a period of six-time points. A quadratic model with freely estimated variances across trajectories (LGMvar) best fitted the data (see Table 2). The BIC and AIC (lower numbers indicate better fit) indicate that a 3-trajectory solution should be preferred. The LRT (one less trajectory should be preferred if n.s.) points to a 3- or a 4-trajectory solution. However, the 3-trajectory solution's entropy is less optimal (recommended value $> .70$) and more constraints had to be applied to the 3-trajectory model in order to avoid non-positive definite matrix. Consistent with recommendations for mixture model testing (Muthén, 2004), the less constrained 4-trajectory solution was chosen for parsimony and theoretical interpretability reasons. Indeed, the 4-trajectory solution (see Figure 1. B for the estimated mean trajectories and supplementary material for individual trajectories) identifies an additional unique trajectory potentially clinically

relevant characterized by very high psychological distress, which would have been unobserved in the 3-trajectory solution (see Figure 1. A).

The most common subgroup of the final 4-trajectory solution is characterized by a resilient trajectory (53.9% of the sample) with stable low psychological distress from one year before to four years post-CHC onset. The second subgroup describes a chronic psychological distress trajectory (22.2%) with elevated levels of psychological distress already before the onset year and across all time points. The third subgroup describes a delayed trajectory (15.0%) with a stable low psychological distress until one year after the onset followed by a progressive rise in psychological distress starting at two years after the onset of the CHC and the highest level of psychological distress four years after the onset. The fourth subgroup describes a recovery trajectory (8.9%) with an increase in psychological distress from one year before to one year after the CHC onset followed by a gradual decline three and four years after the onset of the CHC. Parameter estimates of the four identified trajectories are available as online supplementary material.

Results of the comparison sample trajectory analysis identified a 2-trajectory linear model with freely estimated variances across trajectories as best fitting the healthy individual's data (fit indices for the comparison sample are available as supplementary material). The great majority of the comparison sample belongs to a *stable low* psychological distress trajectory (90%), and a minority displays a *chronic high* psychological distress trajectory (10%), with consistently elevated levels of psychological distress across all time points (see Figure 1. C).

Predicting Factors

Multinomial logistic regressions (see Table 3) identified sex, relationship satisfaction, and emotional stability as significant predictors of more resilient response to the onset of CHC.

Hence, males and individuals with a higher relationship satisfaction had an increased probability to show a resilient trajectory compared to the delayed trajectory. Also, higher emotional stability increased the probability to show a resilient trajectory in comparison to the chronic trajectory. Additionally, some marginally significant results can be noticed with higher daily health impediment, higher satisfaction with health, higher extraversion, less praying, and less past negative life events increasing the probability to be in the resilient trajectory compared to one of the other trajectories. Note that the CHC typology identified by the LCA was also tested as a predictor of the psychological distress trajectories. Results showed that none of the CHC types was related to trajectory membership.

Discussion

The present study identified heterogeneous psychological distress trajectories from one year before to four years following the onset of a physical CHC. In the CHC sample a *resilience* (53.9%), *chronic* (22.2%), *delayed* (15.0%), and *recovery* (8.9%) trajectories were identified. In the comparison sample with no CHC, accident, or illness during the observed time period a *low psychological distress* (90%) and *elevated psychological distress* (10%) trajectories were identified. Concerning protective factors associated with resilient trajectory membership in the CHC sample are higher emotional stability, higher relationship satisfaction, and male gender.

Psychological Adaptation Trajectories

The comparison of the two samples validates the claim that the elevated levels of psychological distress are the consequence of the physical CHC rather representing general patterns of change over time. Results indicated that only 10% of the healthy individuals (comparison group) show a chronic high psychological distress trajectory whereas 46.1% of the

CHC sample individuals show elevated levels of psychological distress at least over two years following CHC.

Regarding the CHC sample, as hypothesized, four distinct psychological distress trajectories were identified. This supports the assumption of a common experience in terms of psychological distress regardless of the CHC type (Van Leeuwen et al., 2012). If the psychological adaptation response was very different for every physical CHC, then a higher number of trajectories would have been observed. Moreover, the identified trajectories correspond to the four most consistently found in past research examining isolated CHC or other negative life events (Bonanno & Diminich, 2013; Galatzer-Levy et al., 2018). However, the resilient trajectory identified in this study shows a slightly different shape compared to the one described in previous research (Bonanno, Westphal, & Mancini, 2011), since increased levels of psychological distress were not observed at any time point. This difference is probably due to the yearly measurement time-points that preclude identification of an early change in psychological distress during the first months. Past studies using narrow measurement time points (e.g. monthly measurement) indeed reported a transient minimal impairment in the resilient trajectory (Chilcot et al., 2013; Nash et al., 2015; Zhu et al., 2014), whereas studies with wider measurement time-points (yearly measurement) do not observe such minimal impairment (Bonanno, Kennedy, Galatzer, Lude, & Elfstrom, 2012; Burton et al., 2015; Galatzer-Levy & Bonanno, 2014) and identified – similarly to the present study – stable low impairment resilient trajectory.

The majority of our sample belongs to the resilient trajectory (53.9%) with stable low psychological distress. Nonetheless, the percentage of individuals belonging to the resilient trajectory is lower than the percentage reported by several past reviews (65.7% on average Bonanno & Diminich, 2013; Bonanno et al., 2011; Galatzer-Levy et al., 2018). Specific studies

of adaptation following physical CHC found also higher proportions of resilient trajectory compared to the present study: 74% after cancer diagnosis (Burton et al., 2015), 72% after the onset of chronic pain (Zhu et al., 2014), 68% after heart attack (Galatzer-Levy & Bonanno, 2014), and 66.1% after onset of a spinal cord injury (Bonanno et al., 2012). The lower rates of resilient individuals in the present study might be due to the statistical method used to identify the trajectories. Indeed, most of the past psychological adaptation studies constrained by default the variance around the mean to be equal across trajectories. It implies that the model tested will constrain the individuals in a resilient trajectory to have a similar variance to the chronic or the recovery trajectory. As noted by Infurna and Luthar (2016) such a constrain does not make theoretical sense, because individuals are expected to vary less in the shape of their resilience, but vary highly in the case of more vulnerable trajectories (e.g., individuals in a more vulnerable trajectory would show more ups and downs around their respective trajectory means). Research showed that constraining the variances across trajectories leads to a model with higher percentages in the resilient trajectory compared to the same model with freely estimated variance (Infurna & Luthar, 2016). The present study followed this line of reasoning and suggests that the proportion of individuals struggling with psychological distress following the onset of a physical CHC might be higher than past studies suggest.

Another methodological particularity of the present study is the inclusion of pre-event data. This enabled to observe that the elevated psychological distress of the chronic trajectory does not start with the CHC onset, but pre-existed it in a higher percentage (22.2%) compared to the healthy individuals in the comparison group (10%). Part of the individuals in the chronic trajectory might thus have suffered from early lower mental health due to the presence of health

symptoms years before the actual diagnosis of the CHC (Costanzo, Ryff, & Singer, 2009; Verbrugge & Jette, 1994).

Predictor of Psychological Distress Trajectories

Results showed that the factors increasing the probability to show a resilient trajectory are male gender, having a higher emotional stability, and indicating higher relationship satisfaction. All other hypothesized factors did not have an effect on trajectory membership. In the CHC literature, personality traits such as emotional stability have been consistently shown to influence psychological adaptation (Strickhouser et al., 2017). As hypothesized the present results further confirm that higher emotional stability is associated with resilience. Concerning social factors, the results of the present study were also in line with the hypothesis and the past literature. Several studies have indeed shown that higher social support is related to more positive outcomes following the onset of a CHC (Dunn et al., 2013; Harris et al., 2010). A review by Hogan, Linden, and Najarian (2002) highlights the average effectiveness of social support interventions across different areas of application (including CHC). For instance, psychological education for friends as well as relatives of elderly patients with lung disease have been shown to effectively increase the patients' size of social network, emotional and practical support received, as well as support-seeking behaviors (Li et al., 2018). Such education could be implemented by local policies and be recommended by general practitioners treating CHC patients with the intent to increase social support. As shown in the present study, this could in turn improve psychological adaptation and lower the risk of vulnerability following the onset of a CHC.

Sociodemographic factors such as years of education, partnership status, occupation, and age, did not predict trajectory membership, except for sex. This sex effect was not hypothesized, because past studies showed inconsistent findings with some reporting that females have higher

risk of experiencing depressive symptoms following a major health issue (Zhu et al., 2014) and others showing that sex is not associated with trajectory membership following traumatic injury or a heart disease (Ginzburg & Ein-Dor, 2011; Moergeli et al., 2012). Further studies and meta-analysis are needed to clarify the role of sex in psychological adaptation following CHC.

Surprisingly, health-related factors are not significantly related to resilient trajectory membership. This could be due to the fact that our CHC sample has, on average, a rather good state of health with few daily health impediment, high satisfaction with health, high health status, and more health improvement than worsening. Individuals with high self-reported physical impairment due to a CHC might be living in institutions and are thus not part of the household panel.

Results showed that the type of CHC presented by the participants is not related to trajectory membership. This finding is in line with a study about multiple health events who showed that type of health event (i.e. cancer, heart disease, lung disease, and stroke) is not related to trajectory membership (Morin, Galatzer-Levy, Maccallum, & Bonanno, 2017). Hence, these findings strengthen the assumption of a common experience of psychological adaptation across different CHCs, but replication studies are needed to confirm it.

Strengths and Limitations

The main strength of the present project lies in its prospective study design, the use of state-of-the-art statistical techniques, and the inclusion of a matched comparison sample. Indeed, this project is one of the exceedingly rare studies investigating psychological adaptation with pre-event data. Moreover, going one step further than the constrained variance approach applied by default in past studies, the present project followed current methodological guidelines for LGMM (Infurna & Luthar, 2016, 2018). Finally, the inclusion of a comparison sample enables to

examine whether psychological distress trajectories characteristics are specific to the onset of a CHC.

Nevertheless, several limitations of the present project need to be acknowledged. First, researcher using the SHP should be aware that such general population datasets underestimate the degree of vulnerability in the general population, because individuals living in institution are excluded from the survey (Voorpostel et al., 2018) and more physically impaired individuals generally participate less to cohort studies (Rothenbühler & Voorpostel, 2016). Thus, the prevalence of vulnerable trajectories in the present study might have been under-estimated and generalizability to more physically impaired individuals should be done with cautious.

Second, the longitudinal data used only provides yearly measurements. Thus, psychological adaption changes in the early phase after the CHC onset (months following the onset) cannot be observed. As already mentioned, this implies that the minimal short-term impairment expected for the resilient individuals (Bonanno & Diminich, 2013) could not be observed in the present study, because it commonly occurs in the first months following the onset of an adverse life event. Moreover, the measurement approach captures the yearly general recurrence (how often) of psychological distress. Thus, brief distress episodes might not be well assessed in this study. Future longitudinal studies would benefit from incorporating more frequent assessment intervals to detect acute fluctuations in psychological distress, especially in the early phase after the onset.

A third methodological limitation is the use of a single psychological adaptation indicator (psychological distress). The present project cannot account for outcomes of positively oriented indicators of psychological adaptation such as life satisfaction or positive emotions. Future investigation of multiple psychological adaptation indicators (i.e., life satisfaction, negative and

positive affect) would lead to a more multifaceted investigation of psychological adaptation following the onset of a CHC (Infurna & Luthar, 2018).

Conclusion

Individuals living with a CHC have a higher risk of vulnerability compared to the general population. The study results demonstrate that nearly half of the individuals with a CHC showing elevated levels of psychological distress at least over two years. By contrast, only one-tenth of the comparison sample present elevated levels of psychological distress. Health professionals caring for individuals with a CHC might want to be attentive to potential comorbid depressive symptoms (Maurer et al., 2008). The present project identified higher emotional stability, male gender, and higher relationship satisfaction as protective factors related to lower psychological distress. Among these protective factors, relationship satisfaction is the one being modifiable and is therefore a potential target of intervention for the improvement of mental health following the onset of a CHC.

References

- Biesecker, B., & Erby, L. (2008). Adaptation to living with a genetic condition or risk: Mini-review. *Clinical Genetics*, 74(5), 401-407. doi: 10.1111/j.1399-0004.2008.01088.x
- Bonanno, G., & Diminich, E. (2013). Annual Research Review: Positive adjustment to adversity - Trajectories of minimal-impact resilience and emergent resilience. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 54(4), 378-401. doi: 10.1111/jcpp.12021
- Bonanno, G., Kennedy, P., Galatzer, I., Lude, P., & Elfstrom, M. (2012). Trajectories of resilience, depression, and anxiety following spinal cord injury. *Rehabilitation Psychology* 57(3), 236-247. doi: 10.1037/a0029256
- Bonanno, G., Westphal, M., & Mancini, A. (2011). Resilience to loss and potential trauma. *Annual Review of Clinical Psychology*, 7, 511-535. doi: 10.1146/annurev-clinpsy-032210-104526
- Brewin, C., Andrews, B., & Valentine, J. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology*, 68(5), 748-766. doi: 10.1037//0022-006X.68.5.748
- Brown, R., Daly, B., & Rickel, A. (2007). *Chronic illness in children and adolescents* (Vol. 9). Cambridge, UK: Hogrefe & Huber.
- Burton, C., Galatzer-Levy, I., & Bonanno, G. (2015). Treatment type and demographic characteristics as predictors for cancer adjustment: Prospective trajectories of depressive symptoms in a population sample. *Health Psychology*, 34(6), 602-609. doi: 10.1037/hea0000145

- Butler, L., Koopman, C., Classen, C., & Spiegel, D. (1999). Traumatic stress, life events, and emotional support in women with metastatic breast cancer: Cancer-related traumatic stress symptoms associated with past and current stressors. *Health Psychology, 18*(6), 555-560. doi: 10.1037/0278-6133.18.6.555
- Chilcot, J., Norton, S., Wellsted, D., Davenport, A., Firth, J., & Farrington, K. (2013). Distinct depression symptom trajectories over the first year of dialysis: Associations with illness perceptions. *Annals of Behavioral Medicine, 45*(1), 78-88. doi: 10.1007/s12160-012-9410-5
- Chiu, W., Huang, S., Hwang, H., Tsauo, J., Chen, C., Tsai, S., & Lin, M. (2006). Use of the WHOQOL-BREF for evaluating persons with traumatic brain injury. *Journal of Neurotrauma, 23*(11), 1609-1620. doi: 10.1089/neu.2006.23.1609
- Costanzo, E., Ryff, C., & Singer, B. (2009). Psychosocial adjustment among cancer survivors: Findings from a national survey of health and well-being. *Health Psychology, 28*(2), 147-156. doi: 10.1037/a0013221
- De Ridder, D., Geenen, R., Kuijer, R., & van Middendorp, H. (2008). Psychological adjustment to chronic disease. *The Lancet, 372*(9634), 246-255. doi: 10.1016/S0140-6736(08)61078-8
- Dunn, J., Ng, S., Breitbart, W., Aitken, J., Youl, P., Baade, P., & Chambers, S. (2013). Health-related quality of life and life satisfaction in colorectal cancer survivors: Trajectories of adjustment. *Health and Quality of Life Outcomes, 11*(1), 46-54. doi: 10.1186/1477-7525-11-46

- Galatzer-Levy, I., & Bonanno, G. (2014). Optimism and death: Predicting the course and consequences of depression trajectories in response to heart attack. *Psychological Science*, 25(12), 2177-2188. doi: 10.1177/0956797614551750
- Galatzer-Levy, I., Huang, S., & Bonanno, G. (2018). Trajectories of resilience and dysfunction following potential trauma: A review and statistical evaluation. *Clinical Psychology Review*, 63, 41-55. doi: 10.1016/j.cpr.2018.05.008
- Ginzburg, K., & Ein-Dor, T. (2011). Posttraumatic stress syndromes and health-related quality of life following myocardial infarction: 8-year follow-up. *General Hospital Psychiatry*, 33(6), 565-571. doi: 10.1016/j.genhosppsy.2011.08.015
- Graf, E. (2009). *Weightings of the Swiss Household Panel: SHP_I wave 9, SHP_II wave 4, SHP_I and SHP_II combined*. Neuchâtel, Switzerland: Swiss Federal Statistical Office.
- Hampson, S., & Friedman, H. (2008). Personality and Health: A lifespan perspective. In O. John & L. Pervin (Eds.), *Handbook of personality: Theory and research* (pp. 770-794). New York, NY: The Guilford Press.
- Harris, B., Berger, A., Mitchell, S., Steinberg, S., Baker, K., Handel, D., . . . Pavletic, S. (2010). Spiritual well-being in long-term survivors with chronic graft versus host disease after Hematopoietic Stem Cell Transplant (HSCT). *The Journal of Supportive Oncology*, 8(3), 119-125.
- Havik, O. (1990). Patterns of emotional reactions after a myocardial infarction. *Journal of Psychosomatic Research*, 34(3), 271-285. doi: 10.1016/0022-3999(90)90083-G
- Hogan, B., Linden, W., & Najarian, B. (2002). Social support interventions: Do they work? *Clinical Psychology Review*, 22(3), 381-440. doi: 10.1016/S0272-7358(01)00102-7

- Infurna, F., & Luthar, S. (2016). Resilience to major life stressors is not as common as thought. *Perspectives on Psychological Science, 11*(2), 175-194. doi: 10.1177/1745691615621271
- Infurna, F., & Luthar, S. (2018). Re-evaluating the notion that resilience is commonplace: A review and distillation of directions for future research, practice, and policy. *Clinical Psychology Review, 65*, 43-56. doi: 10.1016/j.cpr.2018.07.003
- Li, X., Wang, B., Tan, D., Li, M., Zhang, D., Tang, C., . . . Jin, B. (2018). Effectiveness of comprehensive social support interventions among elderly patients with tuberculosis in communities in China: A community-based trial. *Epidemiol Community Health, 72*(5), 369-375. doi: 10.1136/jech-2017-209458
- Lyons, A., Heywood, W., & Rozbroj, T. (2016). Psychosocial factors associated with resilience in a national community-based cohort of Australian gay men living with HIV. *AIDS and Behavior, 20*(8), 1658-1666. doi: 10.1007/s10461-016-1338-5
- Magidson, J., & Vermunt, J. (2002). Latent class models for clustering: A comparison with K-means. *Canadian Journal of Marketing Research, 20*(1), 36-43.
- Maurer, J., Rebbapragada, V., Borson, S., Goldstein, R., Kunik, M., Yohannes, A., & Hanania, N. (2008). Anxiety and depression in COPD: Current understanding, unanswered questions, and research needs. *Chest, 134*(4), 43-56. doi: 10.1378/chest.08-0342
- Moergeli, H., Wittmann, L., & Schnyder, U. (2012). Quality of life after traumatic injury: A latent trajectory modeling approach. *Psychotherapy and Psychosomatics, 81*(5), 305-311. doi: 10.1159/000330887
- Morin, R., Galatzer-Levy, I., Maccallum, F., & Bonanno, G. (2017). Do multiple health events reduce resilience when compared with single events? *Health Psychology, 36*(8), 721-728. doi: 10.1037/hea0000481

- Morris, A., Yelin, E., Panopalis, P., Julian, L., & Katz, P. (2011). Long-term patterns of depression and associations with health and function in a panel study of rheumatoid arthritis. *Journal of Health Psychology, 16*(4), 667-677. doi: 10.1177/1359105310386635
- Morselli, D. (2017). Contextual determinants of hopelessness: Investigating socioeconomic factors and emotional climates. *Social Indicators Research, 133*(1), 373-393. doi: 10.1007/s11205-016-1346-x
- Muthén, B. (2004). Latent Variable Analysis: Growth Mixture Modeling and Related Techniques for Longitudinal Data. In D. Kaplan (Ed.), *The Sage handbook of quantitative methodology for the social sciences* (pp. 345-368). Thousand Oaks, CA: Sage Publications.
- Muthén, L., & Muthén, B. (2010). *Mplus User's Guide*. Los Angeles, CA: Muthén & Muthén.
- Nash, W., Boasso, A., Steenkamp, M., Larson, J., Lubin, R., & Litz, B. (2015). Posttraumatic stress in deployed Marines: Prospective trajectories of early adaptation. *Journal of Abnormal Psychology, 124*(1), 155-172. doi: 10.1037/abn0000020
- Ram, N., & Grimm, K. (2009). Growth mixture modeling: A method for identifying differences in longitudinal change among unobserved groups. *International Journal of Behavioral Development, 33*(6), 565-576. doi: 10.1177/0165025409343765
- Rammstedt, B., & John, O. (2007). Measuring personality in one minute or less: A 10-item short version of the Big Five Inventory in English and German. *Journal of research in Personality, 41*(1), 203-212. doi: 10.1016/j.jrp.2006.02.001
- Rothenbühler, M., & Voorpostel, M. (2016). Attrition in the Swiss Household Panel: Are Vulnerable Groups more Affected than Others? In R. C. Oris M., Joye D., Ernst Stähli M.

- (Ed.), *Surveying human vulnerabilities across the life course. Life Course Research and Social Policies* (Vol. 3, pp. 221-242). Cham: Springer.
- Scharn, M., Hengel, K., Boot, C., Burdorf, A., Schuring, M., van der Beek, A., & Robroek, S. (2019). Influence of chronic diseases on societal participation in paid work, volunteering and informal caregiving in Europe: A 12-year follow-up study. *Journal of Epidemiology and Community Health* 73(2), 136-141. doi: 10.1136/jech-2018-211107
- Smith, L. (2011). *The Effects of Causal Attribution, Religiosity and Shared Beliefs On the Management of Type 2 Diabetes*. PhD, Loma Linda University, Loma Linda, CA.
- Retrieved from
<https://scholarsrepository.llu.edu/cgi/viewcontent.cgi?referer=http://scholar.google.ch/&httpsredir=1&article=1061&context=etd>
- Strickhouser, J., Zell, E., & Krizan, Z. (2017). Does personality predict health and well-being? A metasynthesis. *Health Psychology*, 36(8), 797-810. doi: 10.1037/hea0000475
- The WHOQOL Group, (1998). The World Health Organization quality of life assessment (WHOQOL): Development and general psychometric properties. *Social Science & Medicine* 46(12), 1569-1585. doi: 10.1016/S0277-9536(98)00009-4
- Van De Schoot, R., Sijbrandij, M., Winter, S., Depaoli, S., & Vermunt, J. (2017). The GRoLTS-checklist: Guidelines for reporting on latent trajectory studies. *Structural equation modeling: A multidisciplinary journal*, 24(3), 451-467. doi: 10.1080/10705511.2016.1247646
- Van Leeuwen, C., Hoekstra, T., van Koppenhagen, C., de Groot, S., & Post, M. (2012). Trajectories and predictors of the course of mental health after spinal cord injury.

- Archives of Physical Medicine and Rehabilitation*, 93(12), 2170-2176. doi:
10.1016/j.apmr.2012.07.006
- Verbrugge, L., & Jette, A. (1994). The disablement process. *Social Science & Medicine*, 38(1), 1-14. doi: 10.1016/0277-9536(94)90294-1
- Vermunt, J. (2010). Latent class modeling with covariates: Two improved three-step approaches. *Political Analysis*, 18(4), 450-469. doi: 10.1093/pan/mpq025
- Voorpostel, M., Tillmann, R., Lebert, F., Kuhn, U., Lipps, O., Ryser, V., . . . Wernli, B. (2018). *Swiss Household Panel User Guide (1999-2017)*, (Vol.). Lausanne: FORS.
- WHO. (2019). Integrated chronic disease prevention and control Retrieved 15.04, 2019, from https://www.who.int/chp/about/integrated_cd/en/
- Wickrama, K., Lee, T., O'Neal, C., & Lorenz, F. (2016). *Higher-order growth curves and mixture modeling with Mplus: A practical guide* (Vol. 1). New York, NY: Routledge.
- Wickrama, K., Mancini, J., Kwag, J., & Kwon, J. (2012). Heterogeneity in multidimensional health trajectories of late old years and socioeconomic stratification: A latent trajectory class analysis. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 68(2), 290-297. doi: 10.1093/geronb/gbs111
- Yao, G., Wu, C., & Yang, C. (2008). Examining the content validity of the WHOQOL-BREF from respondents' perspective by quantitative methods. *Social Indicators Research*, 85(3), 483-498. doi: 10.1007/s11205-007-9112-8
- Zhu, Z., Galatzer-Levy, I., & Bonanno, G. (2014). Heterogeneous depression responses to chronic pain onset among middle-aged adults: A prospective study. *Psychiatry Research*, 217(1-2), 60-66. doi: 10.1016/j.psychres.2014.03.004

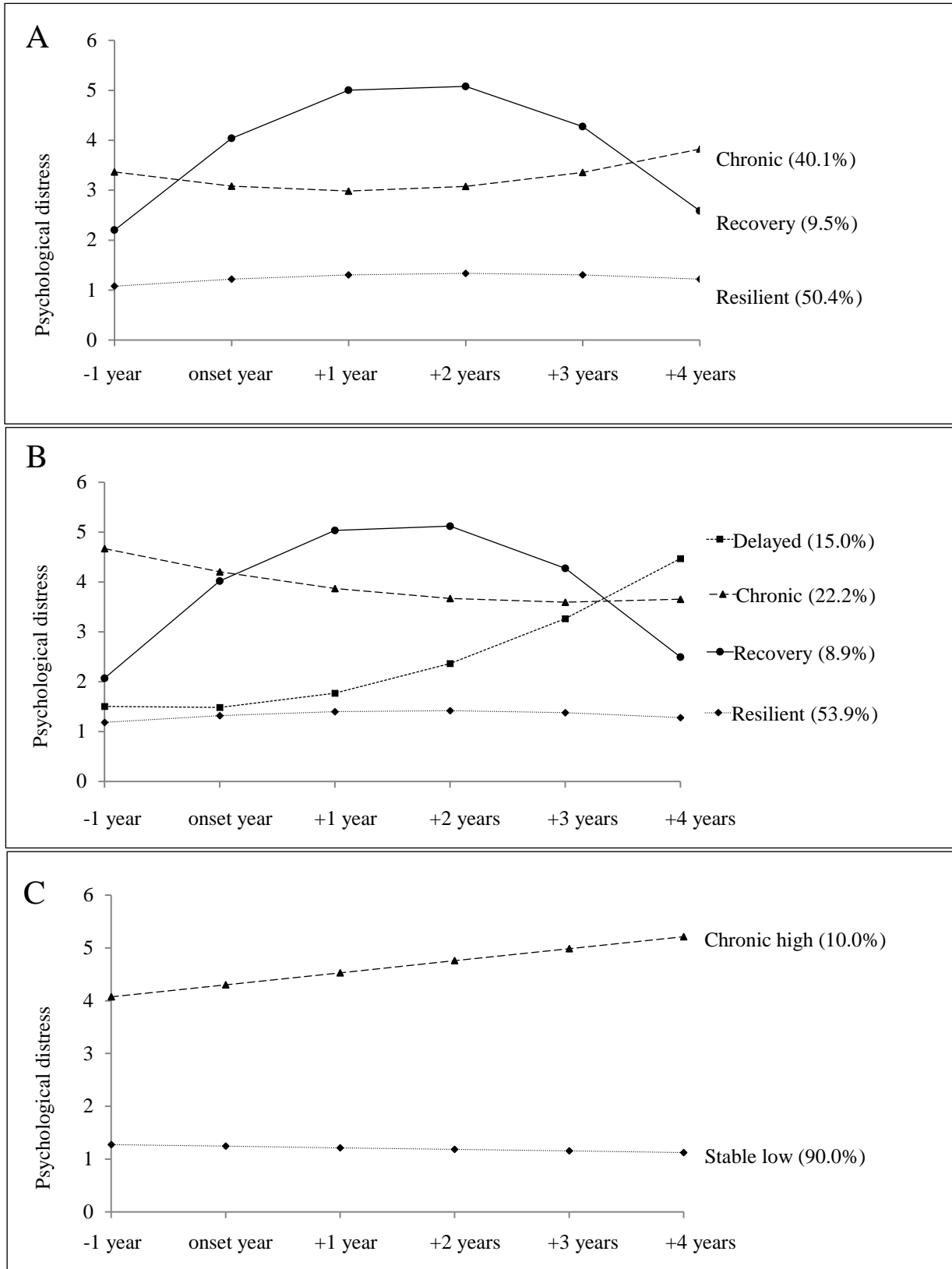


Figure 1. A: Estimated means of the 3-trajectory solution in the CHC sample. B: Estimated means of the final 4-trajectory solution in the CHC sample. C: Estimated means of the 2-trajectory solution in the comparison sample.

Table 1
Descriptive Statistics

	Time points	CHC Sample			Comparison Sample		t-test
		<i>n</i> missing	<i>M</i>	(<i>SD</i>)	<i>M</i>	(<i>SD</i>)	<i>t</i>
Psychological distress							
at 1 year before onset	-1 year	85	2.03	(1.90)	1.56	(1.68)	3.35***
at onset year	onset year	56	2.19	(2.09)	1.52	(1.73)	4.49***
at 1 year after onset	+1 year	36	2.34	(2.01)	1.56	(1.60)	5.64***
at 2 years after onset	+2 years	18	2.27	(2.10)	1.52	(1.61)	5.30***
at 3 years after onset	+3 years	18	2.38	(2.04)	1.60	(1.70)	5.55***
at 4 years after onset	+4 years	27	2.37	(1.94)	1.50	(1.71)	6.32***
Health related factors							
Daily health impediment	+1 year	37	2.90	(2.61)	0.75	(1.47)	13.55***
Improvement in health	+1 year	36	5.00	(1.56)	5.19	(0.89)	-1.09
Health status	+1 year	36	2.23	(0.66)	1.74	(0.50)	10.94***
Satisfaction with health status	+1 year	37	6.92	(1.84)	8.69	(1.11)	-15.41
Psychological factors							
Personality: Extraversion	onset year	65	6.80	(1.71)	6.65	(1.75)	1.14
Personality: Emotional stability	onset year	66	6.42	(1.69)	6.78	(1.60)	-2.80
Personality: Conscientiousness	onset year	65	7.41	(1.45)	7.47	(1.47)	-0.41
Personality: Agreeableness	onset year	66	6.88	(1.29)	6.98	(1.33)	-0.96
Personality: Openness	onset year	65	6.23	(1.81)	6.30	(1.65)	-0.36
No of past negative life events	until +4 years	0	3.49	(3.25)	3.40	(2.78)	9.44***
Praying	-2 years	106	3.09	(1.58)	2.86	(1.68)	1.75*
Social factors							
Relationship satisfaction	-1 year	85	8.05	(1.27)	8.27	(1.35)	-2.05
Social contact	-1 year	93	5.52	(5.94)	5.50	(2.99)	1.12
Sociodemographic factors							
Years of education	-1 year	50	13.24	(3.32)	13.88	(3.09)	-2.55
Having a partner [n (%)]	-1 year	85	224	(81.16)	295	(81.94)	0.25
Occupation: Paid work [n (%)]	-1 year	50	185	(59.49)	260	(72.02)	-3.45
Financial scarcity: Yes [n (%)]	-1 year	56	24	(7.87)	21	(5.82)	0.46
Control Variables							
Female gender [n (%)]	onset year	0	204	(64.56)	203	(56.23)	1.18*
Age	onset year	0	51.18	(18.01)	51.97	(14.46)	0.07
CHC typology [n (%)]							
Accident moderate functioning	+1 year	23	19	(5.62)	-	-	-
Illness low functioning	+1 year	23	32	(9.47)	-	-	-
Illness moderate functioning	+1 year	23	54	(15.98)	-	-	-
Illness good functioning	+1 year	23	24	(7.10)	-	-	-
Low functioning not worsening	+1 year	23	61	(18.05)	-	-	-
Good functioning with pain	+1 year	23	32	(9.47)	-	-	-
Good functioning	+1 year	23	116	(34.32)	-	-	-

* $p < .05$. ** $p < .01$. *** $p < .001$.

Note. CHC typology's *n* and percentages are based on the most likely membership.

Table 2
Fit Indices of Latent Growth Mixture Models (n = 361)

Trajectories	BIC	AIC	LRT	BLRT	Entropy	Trajectory Counts ^a
GM						
1lin	7404.04	7361.26	-	-	-	361
1quad	7419.46	7361.12	-	-	-	361
LCGA						
2	7570.25	7519.70	$p = 0.00$	$p = 0.00$	0.86	237/124
3	7458.63	7392.52	$p = 0.07$	$p = 0.00$	0.83	199/123/39
4	7431.40	7349.73	$p = 0.21$	$p = 0.00$	0.84	199/113/39/10
5	7398.85	7301.63	$p = 0.18$	$p = 0.00$	0.78	141/99/77/24/20
LGMM						
2 ^b	7379.55	7317.33	$p = 0.10$	$p = 0.00$	0.84	329/32
3 ^b	7357.21	7279.43	$p = 0.11$	$p = 0.00$	0.83	288/47/26
4 ^b	7351.09	7257.75	$p = 0.38$	$p = 0.00$	0.78	239/70/27/25
5 ^{bc}	7346.90	7245.79	$p = 0.39$	$p = 0.00$	0.80	255/36/33/20/17
LGMMvar						
2 ^b	7375.63	7305.63	$p = 0.25$	$p = 0.00$	0.51	229/132
3 ^{bc}	7313.58	7224.13	$p = 0.00$	$p = 0.00$	0.67	135/136/30
4 ^b	7341.85	7225.18	$p = 0.04$	$p = 0.20$	0.71	211/74/49/27
5 ^{bd}	7377.18	7237.18	$p = 0.50$	$p = 1.00$	0.75	211/74/49/27/0
LGMMvarcov						
2 ^{bc}	7332.80	7266.69	$p = 0.00$	$p = 0.00$	0.61	226/135
3 ^b	7326.00	7224.89	$p = 0.03$	$p = 0.00$	0.69	199/131/31
4 ^{bc}	7334.65	7214.10	$p = 0.06$	$p = 0.20$	0.70	186/126/31/18
5 ^b	7373.527	7217.97	$p = 0.54$	$p = 0.30$	0.73	170/131/34/20/6

Note. BIC = Bayesian information criterion; AIC = Akaike information criterion; LRT = Lo- Mendell-Rubin adjusted LRT test; BLRT = bootstrapped likelihood ratio test.

^aTrajectory Counts = Final class counts and proportions for the latent classes based on their most likely latent class membership. ^bVariance of the quadratic term fixed to zero in all trajectories in order to avoid negative variance.

^cThe variance of the linear term fixed to zero in one of the trajectories in order to avoid negative variance. ^dOne or more parameters were fixed to avoid singularity of the information matrix.

Table 3
Multinomial Logistic Regression Estimates for Predictors of Trajectory Membership

Factors	Resilient vs.						Recovery vs.				Delayed vs.	
	Recovery		Delayed		Chronic		Delayed		Chronic		Chronic	
	Estimate	(S.E.)	Estimate	(S.E.)	Estimate	(S.E.)	Estimate	(S.E.)	Estimate	(S.E.)	Estimate	(S.E.)
Sex	0.84	(1.03)	1.17*	(0.57)	0.24	(0.58)	0.33	(1.07)	-0.61	(1.14)	-0.93	(0.67)
Standardized age	-0.06	(0.60)	-0.09	(0.32)	-0.10	(0.32)	-0.03	(0.63)	-0.04	(0.72)	-0.01	(0.39)
Health status	2.05	(1.42)	0.35	(0.60)	0.94	(0.81)	-1.70	(1.35)	-1.11	(1.45)	0.59	(0.69)
Daily health impediment	0.16	(0.26)	-0.24 [†]	(0.15)	0.08	(0.14)	-0.40	(0.29)	-0.08	(0.30)	0.32*	(0.14)
Satisfaction with health status	0.09	(0.35)	-0.33 [†]	(0.18)	-0.21	(0.22)	-0.42	(0.34)	-0.30	(0.31)	0.13	(0.21)
Praying	0.36	(0.33)	0.09	(0.19)	0.35 [†]	(0.18)	-0.27	(0.35)	-0.02	(0.33)	0.26	(0.23)
Number of life events	-0.09	(0.15)	-0.01	(0.07)	0.11 [†]	(0.06)	0.07	(0.16)	0.19	(0.17)	0.12	(0.09)
Extraversion	-0.38 [†]	(0.23)	-0.25	(0.16)	-0.18	(0.16)	0.13	(0.25)	0.20	(0.26)	0.07	(0.19)
Emotional stability	-0.12	(0.28)	-0.12	(0.17)	-0.44*	(0.22)	0.00	(0.30)	-0.32	(0.34)	-0.32	(0.24)
Relationship satisfaction	0.07	(0.36)	-0.49**	(0.20)	-0.43 [†]	(0.25)	-0.57	(0.36)	-0.51	(0.37)	0.06	(0.25)

[†] $p < .10$. * $p < .05$. ** $p < .01$.