International Journal of Adolescence and Youth

ISSN: 0267-3843 (Print) 2164-4527 (Online) Journal homepage: www.tandfonline.com/journals/rady20

# Emotion regulation profiles across time: a latent transition analysis

Hedvig Andersson, Berit Gustafsson, Erik Aspeqvist, Reeta Kankaanpää, Laura Korhonen & Maria Zetterqvist

**To cite this article:** Hedvig Andersson, Berit Gustafsson, Erik Aspeqvist, Reeta Kankaanpää, Laura Korhonen & Maria Zetterqvist (2026) Emotion regulation profiles across time: a latent transition analysis, International Journal of Adolescence and Youth, 31:1, 2641579, DOI: 10.1080/02673843.2026.2641579

**To link to this article:** https://doi.org/10.1080/02673843.2026.2641579

INTERNATIONAL JOURNAL OF ADOLESCENCE AND YOUTH
2026, VOL. 31, NO. 1, 2641579
https://doi.org/10.1080/02673843.2026.2641579

Routledge
Taylor & Francis Group

RESEARCH ARTICLE



# Emotion regulation profiles across time: a latent transition analysis

Hedvig Andersson[a], Berit Gustafsson[a,b,c], Erik Aspeqvist[a], Reeta Kankaanpää[d], Laura Korhonen[a,e,f] and Maria Zetterqvist[a,e]

[a]Center for Social and Affective Neuroscience, Department of Biomedical and Clinical Sciences, Linköping University, Linköping, Sweden; [b]Child and Adolescent Psychiatry Clinic, Department of Psychiatry, Rehabilitation and Diagnostics, Region Jönköping County, Jönköping, Sweden; [c]CHILD research environment, Jönköping University, Jönköping, Sweden; [d]INVEST Research Flagship Centre, University of Turku, Turku, Finland; [e]Department of Child and Adolescent Psychiatry, Region Östergötland, Linköping, Sweden; [f]Barnafrid, Swedish National Center on Violence Against Children, Department of Biomedical and Clinical Sciences, Linköping University, Linköping, Sweden

**ABSTRACT**

Difficulties in emotion regulation are associated with mental health problems during adolescence. This study aimed to identify distinct emotion regulation profiles in adolescents, examine potential differences between profiles, and examine transitions between profiles over time using a person-centered approach with Latent Profile Analysis and Latent Transition Analysis on longitudinal data from two time points in 198 adolescents (M age 14.20 at T1 and 15.43 at T2). Five emotion regulation profiles that significantly differed in psychological well-being, social support, nonsuicidal self-injury, gender, and stability were identified: No Difficulties, Low Difficulties, Impulsive, Moderate and in Control, and Severe Difficulties. The No Difficulties profile was the most stable. Adolescents in the other profiles most often transitioned to improved profiles. The Impulsive profile represented a unique and unstable pattern. These findings highlight variability in adolescent emotion regulation abilities and the importance of a person-centered approach for understanding emotion regulation development.

**ARTICLE HISTORY**
Received 4 November 2025
Accepted 2 March 2026

**KEYWORDS**
Adolescence; development; emotion regulation; Latent Transition Analysis; nonsuicidal self-injury; parents

## Introduction

Adolescence is a sensitive period for the development of mental health problems (Caspi et al., 2020; Kessler et al., 2007; Yoon et al., 2023), as brain regions involved in emotional and cognitive processes continue to undergo important changes (Steinberg, 2005) while social and academic demands increase. Emotion regulation is a central construct and plays an important role in the development and maintenance of mental health problems (Aldao et al., 2010; Cavicchioli et al., 2023). However, the developmental trajectory differs among individuals, shaped by different contextual factors (see, for instance, Fombouchet et al., 2023). Person-centred approaches provide useful methods to capture this variation. To address this gap, the current study employed Latent Transition Analysis (LTA) to identify different profiles of emotion regulation difficulties in a community sample of adolescents and examined transitions between profiles over time (14–16 months later).

There are several definitions of emotion regulation, and they can be summarised as processes that influence or modulate the emotional occurrence, experience, intensity, duration, and expression (Gross & Jazaieri, 2014; Morris et al., 2017). Fombouchet et al. (2023) stressed the need to clarify the emotion regulation construct, in which emotion regulation can be categorised into strategies (specific behaviours used to regulate emotions, such as suppression or cognitive reappraisal) and abilities (how individuals understand, regard, and respond to emotional experiences). A further specification of emotion regulation abilities is effectiveness abilities, which are defined as the perceived or observable outcome of emotion regulation attempts (Fombouchet et al., 2023). Aligning with this concept is Gratz and Roemer (2004) multidimensional definition of emotion regulation, which divides emotion regulation into different abilities

**CONTACT** Hedvig Andersson hedvig.andersson@liu.se

Supplemental data for this article can be accessed online at https://doi.org/10.1080/02673843.2026.2641579.

such as awareness, understanding, and acceptance of emotional responses, the ability to engage in goal-directed behaviours while inhibiting impulsive behaviours, using appropriate behaviours to modulate emotional responses, and willingness to experience negative emotions to pursue meaningful activities. These emotion regulation abilities are measured by the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004).

Certain emotion regulation skills, such as emotion differentiation, may temporarily decrease during adolescence (Nook et al., 2018), thereby becoming one of several factors placing adolescents at risk for mental health problems. Mental disorders during adolescence are linked to adverse long-term consequences, including suicidal ideation and attempts (Orri et al., 2020), poor health (Caspi et al., 2020), poor academic performance (von Simson et al., 2021), and later unemployment (Mousteri et al., 2019). One common transdiagnostic expression of mental health problems during adolescence is nonsuicidal self-injury (NSSI) (Cipriano et al., 2017; Plener et al., 2015), defined as directly and deliberately injuring oneself without suicidal intent, for example, by cutting or severely scratching the skin (International Society for the Study of Self-Injury, 2025). Given the potential impact of emotion regulation difficulties, a more nuanced understanding of how emotion regulation and emotion regulation difficulties develop across adolescence is essential.

Emotion regulation development during adolescence is highly variable, shaped by factors such as cognitive maturity, environmental context (Fombouchet et al., 2023), types of emotions (e.g. anger, fear, sadness) (Zimmermann & Iwanski, 2014), gender (Sanchis-Sanchis et al., 2020), and social support (Thompson et al., 2015). This variability is important to consider, as NSSI primarily serves emotion regulatory functions (Chapman et al., 2006; Hasking et al., 2017; Hooley & Franklin, 2018; Nock, 2010). Studies have shown that difficulties in emotion regulation are associated with increased risk for NSSI (Wolff et al., 2019) and that emotion regulation is the most common reason for an individual to engage in NSSI (Taylor et al., 2018). Difficulties in specific emotion regulation abilities, such as emotional acceptance, access to strategies, and impulse control, have also been shown to distinguish individuals with a history of NSSI from those without (Chen & Chun, 2019). Given the heterogeneous nature of emotion regulation development, a person-centred approach is essential to capture the variability in emotion regulation difficulties and emotion regulation development during adolescence. Furthermore, it has been emphasised that conceptual clarity is crucial when studying emotion regulation development during adolescence, advocating for a distinction between emotion regulation abilities and strategies, while stressing a person-centred, contextually grounded approach (Fombouchet et al., 2023). However, only a few studies have explored distinct profiles of emotion regulation difficulties during adolescence or examined transitions between these profiles over time. Understanding these transitions could offer valuable insights into the developmental pathways of emotion regulation in adolescents, as well as their links to mental health issues and NSSI. Building on this person-centred perspective, the current study examines profiles and transitions in emotion regulation difficulties during adolescence.

### *Emotion regulation profiles and transitions*

While many studies have examined the relationship between emotion regulation, mental health problems, and NSSI, most relied on cross-sectional data and variable-centred approaches, which may not fully capture the complexity of mental health problems in adolescents (Lanza et al., 2010). A person-centred approach helps address this complexity by recognising that a sample may contain multiple subpopulations, each defined by distinct sets of parameters. These subpopulations can be classified into qualitatively and quantitatively distinct profiles (Morin et al., 2018). Previous research using person-centred methods has identified three to five distinct emotion regulation profiles in adults from community samples (e.g. Chesney et al., 2019; Dixon-Gordon et al., 2015; Liu et al., 2024; Van Eck et al., 2017). Liu et al., 2024, for example, identified three distinct profiles of difficulties in emotion regulation (functional, at-risk, and challenged), which differed significantly on measures of generalised anxiety, depression, psychological distress, and psychological well-being, underscoring the potential of emotion regulation profiling in understanding mental health.

Studies also reveal heterogeneity in emotion regulation profiles across clinical (Aleva et al., 2023; Thomassin et al., 2017) and community-based adolescent samples (Lougheed & Hollenstein, 2012; Price et al., 2023), identifying between three and six profiles. However, these studies differ in their emotion

regulation measures. Some focus on emotion regulation abilities (e.g. Aleva et al., 2023), while others assess strategies, such as suppression and coping (e.g. Lougheed & Hollenstein, 2012), and some combine both abilities and strategies (Thomassin et al., 2017). In a community sample of adolescents aged 12 to 19 years (Price et al., 2023), three emotion regulation profiles were identified. The largest group, called 'the Inhibited Coping group', consisted of adolescents who effectively managed their emotions while suppressing negative emotions, regardless of the emotion type. A smaller group, called 'the Dysregulated Anger group', was characterised by difficulties in coping with anger. In a clinical sample, Aleva et al. (2023) identified three emotion regulation profiles that differed qualitatively across the DERS subscales. Beyond these findings, most adolescent studies assess emotion regulation strategies rather than emotion regulation abilities (emotion regulation difficulties). Moreover, there is a need to examine how emotion regulation difficulties develop over time during adolescence, specifically identifying profiles of emotion regulation difficulties in community samples and examining profiles linked to a greater risk of mental health problems, such as NSSI. Examining these profiles longitudinally can provide insight into the stability/instability of emotion regulation during adolescence. Accordingly, it is important to examine transitions between emotion regulation profiles over time, as well as their stability across adolescence.

### *Predictors of transitions between emotion regulation profiles*

Social support, including emotional encouragement, advice, and information, is a key protective factor against mental health issues (Thompson et al., 2015). It can buffer the impact of stress (Forster et al., 2020) and reduce the likelihood of NSSI (Yuan et al., 2023). Further, parental support plays an important role in the socialisation of emotion regulation among children and adolescents (Morris et al., 2017). According to the Tripartite Model of the Impact of the Family on Children's Emotion Regulation and Adjustment (hereafter referred to as the tripartite model; Morris et al., 2007), the socialisation of emotion regulation occurs through three key mechanisms: observation and modelling, parenting practices, and the emotional climate of the family. Given the central role of family in emotion regulation development, examining parental support is essential for understanding its influence on this process.

In addition to parental support, gender influences the development of emotion regulation skills (Sanchis-Sanchis et al., 2020) and the prevalence of mental health problems (Racine et al., 2021; Yoon et al., 2023). Research suggests that girls experience a decline in emotion regulation strategies during adolescence compared to boys (Sanchis-Sanchis et al., 2020). Adolescent girls report greater difficulties in emotion regulation both in community and clinical samples (Holmqvist Larsson et al., 2025). Additionally, girls report heightened emotional difficulties and a decline in subjective well-being, while boys show stability from ages 11–12 to 13–14 (Yoon et al., 2023). These findings highlight distinct developmental trajectories based on gender. Understanding how both gender and social support contribute to emotion regulation development is important for identifying factors that underlie mental health problems and NSSI during adolescence.

### *The current study*

Emotion regulation is a key factor in adolescent mental health problems, yet its developmental trajectory varies across individuals. To address this heterogeneity, person-centred approaches are needed. This study had four aims: First, to identify profiles of emotion regulation difficulties among adolescents at two time points. Second, to examine differences in psychological well-being, NSSI, and demographic characteristics between potential profiles. Third, to explore transitions between emotion regulation profiles over time and assess the profiles' stability, and last, to exploratively investigate whether gender and social support variables predict specific profile transitions.

## Methods

### *Participants and procedure*

Data was collected as part of a larger study on the effects of a whole-school prevention intervention targeting NSSI and mental health in Sweden (see Aspeqvist et al., 2024). Schools in Östergötland County

were recruited by inviting lower secondary school principals to participate. Initially, seven schools (1,204 eligible adolescents) agreed to join; however, due to a low participation rate (~5%) at one school, data collection at that school was discontinued. The final sample included six schools with 1,054 eligible adolescents. Caregivers received written information about the project and consent forms. Of the 1,054 eligible adolescents, 267 provided informed consent, which included written informed consent from both caregivers and adolescents. A total of 266 adolescents participated in the first measurement (i.e. the full sample). See Table 1 for demographic details of the full sample.

Data were collected at five time points, with the current study focusing on time points 1 (baseline, January- March 2022, participants in 7th or 8th grade) and 5 (14–16 months later, May-June 2023, participants in 8th or 9th grade), hereafter referred to as T1 and T2. By T2, both the intervention and the control groups (all included participants) had received the whole school intervention, including the universal student programmes Youth Aware of Mental Health (YAM; Wasserman et al., 2012) and a session of psychoeducation on NSSI (Baetens et al., 2020). However, neither intervention specifically targeted emotion regulation skills, and the interventions did not affect self-reported difficulties in emotion regulation among adolescents. The study and procedures were approved by the Swedish Ethical Review Board (2021–01699, 2021–05049).

## Measures

Participants completed self-report measures assessing demographic variables, emotion regulation difficulties, NSSI, mental health symptoms (e.g. psychological well-being), social support, self-criticism, stigma, NSSI-specific cognitions, quality of life, help-seeking, and demographic variables. Of these measures, demographic variables, emotion regulation difficulties, NSSI, psychological well-being, and social support were included in the current study.

### Demographics

Participants reported their gender (girl, boy, or non-binary), age, and other demographic information at T1. See Table 1. Due to the small size of the non-binary subsample, participants identifying as non-binary were excluded from the gender-based analyses.

### Emotion regulation indicators

Difficulties in emotion regulation were assessed using the 16-item Brief Version of the DERS (Bjureberg et al., 2016). The five subscales (Clarity, Goals, Impulse, Strategies, and Non-Acceptance) served as indicators in the LTA. These subscales contain two to five items, and all items are rated on 5-point Likert scales. Scores range from 16 to 80, and higher scores indicate more emotion regulation difficulties. A bifactor model including the five emotion regulation subscales has demonstrated acceptable to excellent fit in various adolescent psychiatric samples (Charak et al., 2019; Lawlor et al., 2021; Monell et al., 2022), also in an adolescent psychiatric outpatient sample after removing items 14 and 16 (Holmqvist Larsson et al., 2025), supporting the use of the subscales as distinct dimensions of ER.

**Table 1.** Participant demographics.

| Characteristics | Full sample ($N$ = 266) $n$ (%) | Study sample ($n$ = 198) $n$ (%) |
|---|---|---|
| Age ($M$, $SD$) | 14.21 (0.56) | 14.20 (0.58) |
| **Gender** | | |
| Boy | 105 (39.47) | 81 (40.91) |
| Girl | 155 (58.27) | 112 (56.57) |
| Non-binary | 6 (2.26) | 5 (2.53) |
| Lifetime NSSI* | 55 (20.68) | 40 (20.20) |
| **Region of origin** | | |
| Sweden | 253 (95.11) | 193 (97.47) |
| Other European country | 7 (2.63) | 4 (2.02) |
| Outside Europe | 6 (2.26) | 1 (0.51) |
| **Living with both parents** | 191 (71.80) | 140 (70.71) |

Note: *NSSI = Nonsuicidal Self-Injury.*

* *Lifetime NSSI was assessed using a single-item question from the Self-Injurious Thoughts and Behaviours Interview-Short Form-Self-Report (Nock et al., 2007).*

In the study sample, the DERS-16 subscales demonstrated good internal consistency, with Cronbach's alpha values of .84 for Clarity, .86 for Goals, .87 for Impulse, .87 for Strategies, and .81 for Non-Acceptance. The total scale showed excellent internal consistency, with a Cronbach's alpha value of .95. Additionally, a confirmatory factor analysis (CFA) and longitudinal CFA were conducted to assess the validity and reliability of the DERS-16 subscale items, ensuring they represented the intended constructs and functioned consistently across time points, as recommended by Johnson (2021). The results from the CFA and the longitudinal CFA of the DERS subscales confirmed that the subscales could be used as indicators for the LPA and functioned consistently across time points, enabling comparisons between mean differences (Meredith, 1993). See Supplementary (Table S1) for details on the CFA and longitudinal CFA.

### *NSSI*

NSSI was measured with the single-item question 'Have you ever intentionally hurt yourself without wanting to die? For example, cutting or burning yourself,' from the Self-Injurious Thoughts and Behaviours Interview-Short Form-Self-Report (SITBI-SF-SR) developed from the Self-Injurious Thoughts and Behaviours Interview (SITBI; Nock et al., 2007). Participants reported NSSI history at T1 and T2. If the participants answered the NSSI-question affirmatively at T2, they were further asked if they had engaged in NSSI during the last six months (current NSSI).

### *Psychological well-being*

Psychological well-being was evaluated using the Psychological Well-Being subscale of KIDSCREEN-52 (Ravens-Sieberer et al., 2008). This subscale comprises six items rated on 5-point Likert scales, ranging from 6 to 30, with higher scores indicating greater well-being. In this sample, the Psychological Well-Being subscale of KIDSCREEN had a Cronbach's alpha of .93, indicating excellent internal consistency.

### *Social support*

Social support from friends was measured using the Peers and Social Support subscale of KIDSCREEN-52, while support from parents was assessed with the Parent Relations and Home Life subscale (Ravens-Sieberer et al., 2008). Both subscales include six items rated on 5-point Likert scales, with total scores ranging from 6 to 30, and higher scores reflecting greater social support. In this sample, Cronbach's alpha was .90 for the Parent Relations and Home Life subscale and .86 for the Peers and Social Support subscale, indicating excellent and good internal consistency, respectively, for these subscales.

## *Data analysis*

Data analysis was conducted using Mplus (Version 8.11; Muthén & Muthén, 2017) and IBM SPSS Statistics, Version 29.0.

### *Latent transition analysis (LTA) steps*

LTA is a mixture modelling technique used to examine relationships between multiple latent classes or profiles (often) within a longitudinal framework (Nylund-Gibson et al., 2023). Mixture models assume that the joint distribution of continuous indicators may be better represented by multiple latent subgroups, but non-normality alone does not confirm the presence of such subgroups (Johnson, 2021). LTA consists of two main components: Latent Profile Analysis (LPA) and a transition component (Johnson, 2021). The LPA component identifies subgroups of participants with similar response patterns, while the transition component tracks changes in profile membership over time, linking profiles across multiple waves in a single analysis (Johnson, 2021). The LTA was guided by the modelling framework outlined by Nylund-Gibson et al. (2023), where the first step is class enumeration (class will hereafter be referred to as profile, as continuous indicator variables were used), the second to test for measurement invariance (also referred to as checking for similarity), the third LTA estimation, and lastly to incorporate covariates and distal outcomes. Descriptive statistics of all variables included in the LTA were examined for coding errors and general trends (Nylund, 2007).

***Profile enumeration.*** Separate LPA models were tested at each time point using DERS-16 subscales as indicators. The final decision regarding the number of profiles was guided by a combination of fit indices, theoretical considerations, and interpretability, consistent with recommendations by Edelsbrunner et al., (2023) and Nylund et al. (2007). Given the relatively small sample size, particular emphasis was placed on the AIC and aBIC as recommended by Edelsbrunner et al. (2023). For a detailed description of the analysis, see Supplementary.

***Measurement invariance (similarity) and model selection.*** Longitudinal measurement invariance was evaluated by comparing two models using fit indices to determine whether the profile structure remained consistent across time points. Measurement invariance of the profile means (constrained to be equal across time) and measurement non-invariance of the profile means (freely estimated over time) were compared. Profile size and transition probabilities were left unconstrained. The final profiles were then compared across psychological well-being, social support, gender, NSSI, and age. One-way ANOVA was used for continuous variables, while chi-square test was used for categorical variables. Post-hoc analyses with Bonferroni adjustments were conducted for significant results. For chi-square tests, post-hoc comparisons were performed using adjusted residuals (Beasley & Schumacker, 1995).

***LTA specification/estimation.*** In the third step, the transitions between profiles were examined in Mplus. Transition probabilities were analysed to assess profile stability and membership changes over time.

***Exploratory analyses: incorporating covariates and distal outcomes.*** Due to the small profile sizes and the complexity of the model, covariates were not added to the model. Instead, predictors of the most common transitions of interest were tested separately. Exploratively, two types of transitions were analysed: 1) mover/stayer status and 2) transitions between specific profiles. Participants with the same profile across time were defined as 'stayers', while participants changing profiles across time were defined as 'movers'. Gender was tested as a predictor of mover/stayer status using binary logistic regression. Specific transitions of interest were derived from common transitions, see Supplementary (Table S13). Transitions to a profile with improved emotion regulation difficulties compared to remaining in the same profile, as well as transitions to a profile with increased emotion regulation difficulties compared to remaining in the same profile, were of special interest. Binary logistic regression was performed in SPSS (version 29.0) to analyse predictors of specific transitions between profiles from T1 to T2.

### *Missing data*

In the current study, missing data resulted from participants being absent during measurement, leading to missing values across all variables for that time point. To assign profile membership, participants must have data for at least some indicator variables (Collins & Lanza, 2010; Muthén & Muthén, 2017). Therefore, only participants with complete data at both time points ($n$ = 198) were included in the LTA. Differences in DERS-16 scores at T1 were examined between participants with complete data ($n$ = 198) and participants with missing data at T2 ($n$ = 68). Participants with missing data did not differ significantly from participants with complete data on any of the mean scores of the DERS-16 subscales; see Supplementary (Table S3) for comparison. With the relatively small sample size in mind, a confirmatory LPA was conducted on the full sample ($n$ = 266) at T1 to validate the structure of the profiles in the full sample. The fit statistics from this model were compared to the best-fitting model for participants with complete data, and the distribution of participants with missing data across profiles was analysed relative to those with complete data. See Supplementary (Table S4 and Table S5) for details on the fit statistics and class proportions on the full sample. The fit indices supported the best-fitting model, indicating that including the full sample did not alter the structure of the profiles.

## Results

### *Descriptive statistics*

Significant differences were found between T1 and T2 mean scores on all DERS-16 subscales and the total scale ($p$ < 0.01). The results showed a general improvement in perceived emotion regulation difficulties

between T1 and T2. No significant differences were found in the KIDSCREEN Peers and Social Support ($p$ = 0.207), Parent Relations and Home Life ($p$ = 0.168), and Psychological Well-Being ($p$ = 0.133). Descriptive statistics of the total sample can be found in the Supplementary (Table S2).

## Latent profile and latent transition analysis

### Profile enumeration

Following a series of LPAs conducted for each time point (T1 and T2), a five-profile solution emerged as the best fit for T1. See Supplementary (figure S1 and figure S2) for elbow plots over the information criterion (AIC, BIC, and aBIC) from LPAs at T1 and T2, and Supplementary (Table S6) for details on fit statistics, entropy, Bootstrap Likelihood Ratio Test (BLRT), and profile proportions. At T2, a three-profile solution was identified to be optimal as profiles became too small when additional profiles were added thereafter (below 5%). Nonetheless, the potential value of including three to five profiles was considered during subsequent testing for measurement invariance across time, as these additional profiles could improve the overall model fit and the interpretability of the LTA.

### Measurement invariance (similarity) and model selection

Fit statistics were compared between various models to identify the optimal structure. Based on the earlier step, the initial model included five profiles at T1 and three at T2; longitudinal configural similarity was thereby not supported as the profiles at T1 and T2 varied in structure and number (Morin et al., 2016). However, to enhance the interpretation of potential transitions between profiles, a constrained model was tested. This approach aimed to determine whether it would yield a better fit by utilising data from both time points, in line with recommendations for incorporating data from all time points (Collins & Lanza, 2010). Specifically, constraining means to be equal across time points would enable evaluation of specific profiles across time. The measurement invariant model with five profiles at both time points and constrained means demonstrated a superior fit (AIC = 8541.802; BIC = 8735.810; aBIC = 8548.898) compared to the unconstrained model with five profiles at T1 and three at T2 (AIC = 8659.255; BIC = 8869.704; aBIC = 8666.952). The measurement invariant model (with five profiles across both time points) was chosen, meaning that the structure of emotion regulation profiles was consistent across time, although participant proportions within profiles varied. Although two profiles at T2 were small (<5%; 4.0% and 4.5%), they had larger sizes at T1, supporting the decision to retain the model (Baldwin, 2015). See Supplementary (Table S7) for the fit statistics of the models.

***Characteristics and comparisons of emotion regulation profiles.*** Figure 1 displays the profile plot of conditional means, with the vertical axis showing z-scores for the means; see Supplementary (Table S8) for each profile's DERS-16 subscale scores. The profiles were labelled as follows: *No Difficulties,* with subscale means near the lower threshold; *Low Difficulties,* with means around the overall mean and generally low difficulties in emotion regulation; *Impulsive,* with overall average difficulties but particularly high in difficulties in impulsive and goal-directed behaviours; *Moderate and in Control,* showing moderate difficulties across all emotion regulation abilities but slightly lower difficulties in impulsivity-related difficulties in emotion regulation; and *Severe Difficulties,* marked by large difficulties across all emotion regulation abilities with subscale means 1.5–2.5 SD above the overall mean.

Table 2 presents comparisons of demographic, social support, psychological well-being, and NSSI variables between the identified profiles. Ever having engaged in NSSI was present in all groups, however, with a higher prevalence in the Severe Difficulties profile. The profiles displayed significant differences ($p$<0.001) in psychological well-being and social support variables at both time points. There were also significantly different gender distributions in the profiles at both T1 and T2. For post hoc tests, see Supplementary (Table S11).

### LTA specification/estimation

Figure 2 illustrates the frequency of participants in each profile and transitions between the profiles from T1 to T2 in the current sample; see Supplementary (Table S12) for latent transition probabilities based on the estimated model. The largest profile at both time points was the No Difficulties profile, which increased

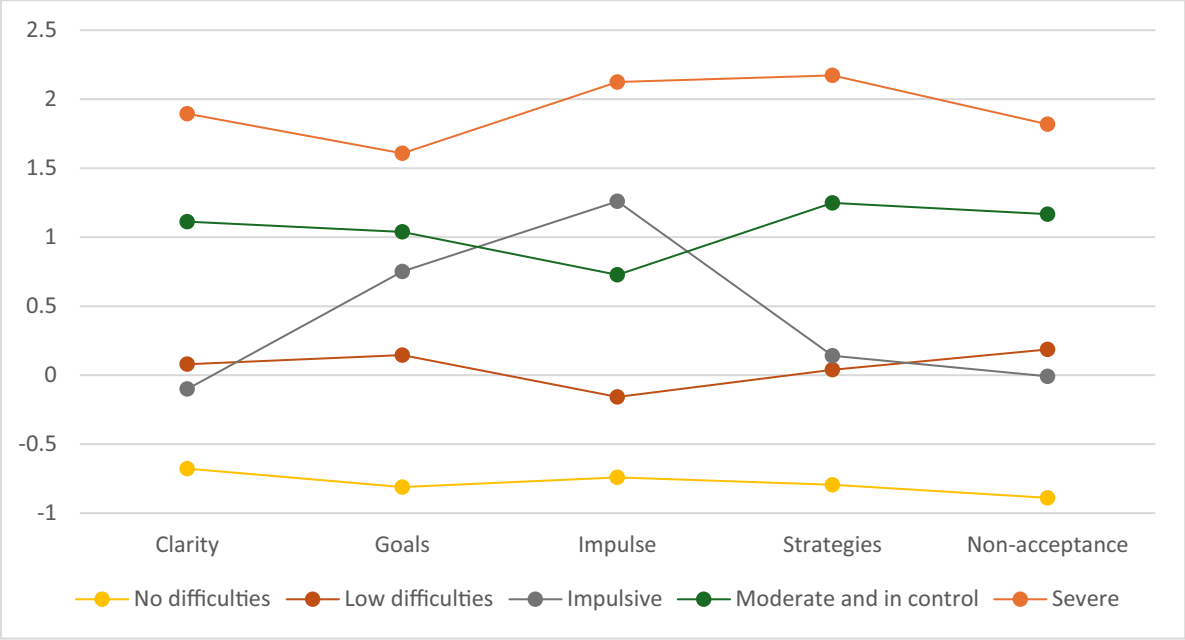


**Figure 1.** Profile plot displaying Z-Scores of the conditional means for each profile of emotion regulation difficulties in a model with assumed measurement invariance. Note. Measured with Difficulties in Emotion Regulation Scale, 16-item version.

**Table 2.** Comparisons of Demographic, Behavioural, and Psychosocial Variables Across Emotion Regulation Profiles at T1 and T2 in an Adolescent Sample, $N = 198$, Frequencies and Percentages, Means and Standard Deviations.

| | 1. No difficulties *n* (%) | 2. Low difficulties *n* (%) | 3. Impulsive *n* (%) | 4. Moderate and in control *n* (%) | 5. Severe difficulties *n* (%) | *p*-value | Effect Size |
|---|---|---|---|---|---|---|---|
| **T1** | | | | | | | |
| Number of Participants | 83 (41.92) | 39 (19.70) | 30 (15.15) | 25 (12.63) | 21 (10.61) | | |
| **Gender*** | | | | | | <.001 | .29 |
| Boy | 46 (55.42) | 14 (35.90) | 13 (43.33) | 6 (24.00) | 2 (9.52) | | |
| Girl | 37 (44.58) | 25 (64.10) | 17 (56.67) | 16 (64.00) | 17 (80.95) | | |
| Age (*M, SD*) | 14.23 (0.61) | 14.27 (0.53) | 14.16 (0.55) | 14.02 (0.63) | 14.21 (0.54) | .503 | |
| Life-time NSSI (at T1)** | 2 (2.41) | 8 (20.51) | 7 (23.33) | 10 (40.00) | 13 (61.90) | <.001 | .48 |
| Psychological well-being (*M, SD*) | 25.77 (3.71) | 22.95 (3.89) | 23.47 (4.40) | 18.48 (4.74) | 17.43 (4.24) | <.001 | .36 |
| Social Support & Peers (*M, SD*) | 25.08 (3.85) | 23.41 (4.72) | 23.87 (4.29) | 19.08 (5.42) | 22.95 (4.39) | <.001 | .16 |
| Parent Relation & Home Life (*M, SD*) | 27.64 (3.50) | 25.41 (3.85) | 26.13 (3.55) | 22.72 (5.76) | 23.24 (5.34) | <.001 | .17 |
| **T2** | | | | | | | |
| Number of Participants | 96 (48.48) | 61 (30.81) | 8 (4.04) | 24 (12.12) | 9 (4.55) | | |
| **Gender*** | | | | | | <.001 | .29 |
| Boy | 54 (56.25) | 18 (29.51) | 1 (12.50) | 6 (2.50) | 2 (22.22) | | |
| Girl | 42 (43.75) | 42 (68.85) | 7 (87.50) | 15 (62.50) | 6 (66.67) | | |
| Age M (*M, SD*) | 15.50 (.58) | 15.39 (.60) | 15.33 (.53) | 15.41 (.56) | 15.10 (.47) | .288 | |
| Lifetime NSSI (at T1)** | 4 (4.17) | 15 (24.59) | 3 (37.50) | 13 (54.17) | 5 (55.56) | <.001 | .46 |
| Lifetime NSSI (at T2)*** | 2 (2.08) | 10 (16.39) | 3 (37.50) | 9 (37.50) | 5 (55.56) | <.001 | .44 |
| Current NSSI | 2 (2.08) | 4 (6.56) | 0 (0.00) | 6 (25) | 4 (44.4) | <.001 | .39 |
| Psychological well-being (*M, SD*)*** | 26.31 (3.33) | 21.92 (4.18) | 21.5 (3.67) | 20.48 (5.12) | 17.78 (3.93) | <.001 | .33 |
| Social Support & Peers (*M, SD*)*** | 25.57 (4.66) | 22.44 (3.99) | 20.0 (6.59) | 20.09 (4.74) | 19.89 (4.70) | <.001 | .19 |
| Parent Relation & Home Life (*M, SD*)*** | 27.24 (3.85) | 23.7 (4.77) | 25.38 (4.63) | 21.09 (4.26) | 20.33 (5.70) | <.001 | .24 |

Note: NSSI = Nonsuicidal self-injury. Current NSSI = last six months. Chi-square was used for group comparisons for categorical data, one-way ANOVA was used for comparisons for continuous data. Cramér's v is used for the effect size for categorical variables. $\eta^2$ is used as the effect size for continuous variables. Bonferroni was used for Post Hoc Tests, see Supplementary (Table S11).

*All non-binary ($n \leq 5$) belonged to profiles 4 or 5 at T1 and 2, 4, or 5 at T2.

**proportion within each profile.

***$n = 197$

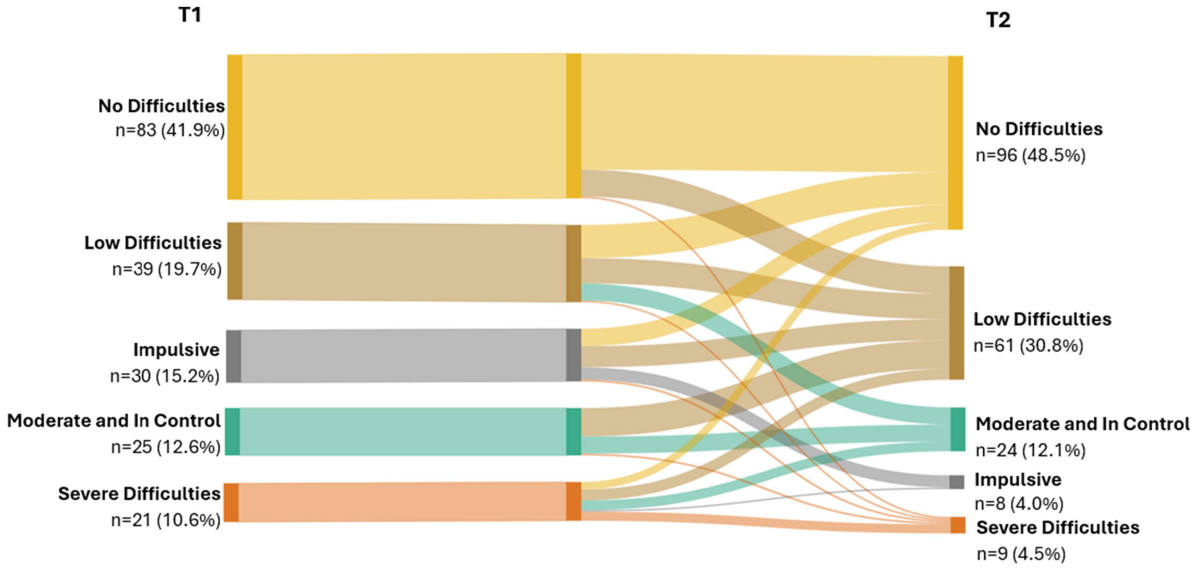


**Figure 2.** Sankey diagram illustrating transitions between emotion regulation profiles from T1 to T2 in the current adolescent sample ($N$ = 198), with frequencies and percentages displayed.

from 41.9% to 48.5%. The Low Difficulties profile grew from 20.1% at T1 to 30.8% at T2. The Impulsive profile decreased sharply in size from 15.2% at T1 to 4% at T2. The Moderate and In Control profile consisted mostly of girls and remained stable at around 12% across both time points. Finally, the Severe Difficulties profile decreased from 10.6% at T1 to 4.5% at T2.

The No Difficulties profile was the most stable across time, with 79.9% of individuals remaining in this profile 1.5 years later. A smaller portion (18.9%) transitioned to the Low Difficulties profile. In contrast, the Low Difficulties profile was more fluid: 42.9% moved to No Difficulties, 32.8% remained in the same profile, and 22.2% shifted to the Moderate and In Control profile.

Participants in the Impulsive profile primarily transitioned to Low Difficulties (40%) or No Difficulties (33.1%), while only 23.3% stayed in the same profile. Those in the Moderate and In Control profile mostly moved to Low Difficulties (60.2%), with 35.8% remaining stable. The Severe Difficulties profile was the most unstable, with participants dispersing across all other profiles. Additionally, few participants moved to the Impulsive or Severe Difficulties profiles at T2.

### *Exploratory analyses: incorporating covariates or distal outcomes*

When examining movers versus stayers, girls were significantly more likely to be movers than boys (OR = 1.94, CI [1.086–3.464], $p$ = 0.025). The only transitions that could be predicted based on gender and social support variables were improvement from the Impulsive profile (i.e. transitioning to the No Difficulties profile compared to staying Impulsive). Entered separately, gender was a significant predictor of improvement from the Impulsive to the No Difficulties profile, with boys showing greater movement than girls (OR = 21, CI [1.5–293.25], $p$ = 0.024). Parent Relations and Home Life also separately predicted improvement from the Impulsive profile (OR = 1.715, CI [1.04–2.82], $p$ = 0.035). When entered together, none of the predictors remained significant in predicting transition status. No other significant predictors related to gender or social support were found for the specific transitions; see Supplementary (Table S13).

## Discussion

Emotion regulation is a central construct in adolescent mental health problems, yet its developmental trajectory varies across individuals. To better capture this variability, person-centred approaches are essential. Addressing this gap, the present study used LTA to identify distinct profiles based on DERS-16 subscales in a community sample of adolescents and examined transitions between profiles over time. Five distinct profiles emerged: No Difficulties, Low Difficulties, Impulsive, Moderate and in Control, and Severe

Difficulties. Four of the five profiles showed an overall quantitative difference in emotion regulation difficulties, indicating level effects of emotion regulation difficulties (i.e. low, medium, high). However, the Impulsive profile was qualitatively unique in shape, with particularly high difficulties in impulsive and goal-directed behaviours. Most of the adolescents were in the Low or No Difficulties profiles, and a majority of adolescents in the profiles with greater emotion regulation difficulties improved over time. Mean scores differed significantly between participants belonging to the five profiles in psychological well-being, social support, gender, and NSSI.

### *Profiles of emotion regulation difficulties*

The No Difficulties profile was the most prevalent at both T1 (41.9%) and T2 (48.5%), suggesting that a majority of adolescents did not experience significant emotion regulation difficulties. By T2, a majority of participants (80%) reported low or no difficulties, indicating that many adolescents navigate adolescence without experiencing substantial emotion regulation difficulties. This aligns with prior findings in adult samples, where large, stable groups exhibited low emotion regulation difficulties (Liu et al., 2024). Similarly, Price et al. (2023) identified a large group of adolescents managing emotions adaptively, measured by the use of different emotion regulation strategies.

Four of the five profiles primarily exhibited level effects, meaning that all indicators within a profile were (more or less) consistently on the same level (e.g. uniformly high across all DERS subscales) rather than showing shape effects (i.e. variability across indicators). This suggests that emotion regulation difficulties in these profiles could be best understood as a broad, generalised difficulty rather than distinct patterns of strengths and weaknesses (Morin & Marsh, 2014). This also aligns with previous research identifying a severity dimension of low, medium, and high levels of emotion regulation difficulties (Holmqvist Larsson et al., 2025; Liu et al., 2024). In contrast, the Impulsive profile reflected distinct difficulties in impulsive behaviours during emotional distress. This finding may suggest specific difficulties in impulsivity related to emotion regulation (e.g. affective control; Schweizer, Gotlib et al., 2020), potentially reflecting a distinct pattern of difficulties in adolescents related to cognitive and emotional development during this period.

### *Associations with psychological well-being, gender, NSSI, and social support*

The five profiles differed significantly in psychological well-being, social support, gender, and NSSI. Adolescents in the Moderate and in Control and Severe Difficulties profiles reported the lowest level of psychological well-being by T1, with the Moderate and in Control profile also reporting the lowest level of peer support. By T2, the No Difficulties profile exhibited better psychological well-being and peer and family support compared to other profiles. Notably, girls were overrepresented in profiles with greater emotion regulation difficulties, confirming gender effects on emotion regulation development in both community (Zimmermann & Iwanski, 2014) and clinical samples of adolescents (Holmqvist Larsson et al., 2025), suggesting that perceived emotion regulation difficulties are more prevalent among girls. These differences may, however, reflect varying response styles related to gender norms of emotion regulation, developmental maturity, gender-related external stressors, or a combination of these factors. Future research is needed to better understand the underlying mechanisms influencing self-reported difficulties in emotion regulation.

Although most adolescents experienced low or no emotion regulation difficulties by T2, NSSI (both lifetime and current) was still reported within these groups. This suggests that contextual factors, such as environments that reinforce NSSI, a lack of parental support (Andersson et al., 2024), or peer influences (Hooley & Franklin, 2018), contribute to its presence. Research has consistently linked NSSI to emotion regulation difficulties, particularly recent NSSI compared to lifetime, and specifically limited access to emotion regulation strategies (Wolff et al., 2019). However, it is important to consider individual differences among those who engage in NSSI. Although NSSI can provide temporary relief through emotion regulation (Taylor et al., 2018), it is not necessarily tied to perceived general emotion regulation difficulties, as the current findings suggest. Instead, reported emotion regulation difficulties may reflect contextual adversities rather than inherent traits, emphasising the importance of assessing emotion regulation difficulties more broadly by considering contextual factors and implementing interventions to address these external

influences. Furthermore, future research should incorporate frequency-based measures of NSSI to capture meaningful individual differences that may not be detected by single-item assessments.

### *Transitions between emotion regulation profiles in adolescence*

LTA revealed that the No Difficulties profile was the most stable, with 80% of adolescents remaining in this profile from T1 to T2. That the group experiencing low levels of difficulties in general showed stability across time, compared to groups with larger levels of difficulties, echoes previous research examining adolescent adjustment (Wang et al., 2023), and extends these findings to involve emotion regulation in adolescents as well. Other emotion regulation profiles in the current study demonstrated greater instability, with most adolescents transitioning to profiles indicative of improved emotion regulation difficulties. This reflects adolescence as a period of significant development of emotion regulation difficulties, often marked by improvement (Fombouchet et al., 2023).

Adolescents in profiles with higher emotion regulation difficulties often transitioned to profiles with lower emotion regulation difficulties, suggesting a developmental trajectory of perceived emotion regulation improvement over time. Significant improvements were observed across all DERS-16 dimensions from ages 14 to 15 in the current sample, underscoring the potential importance of cognitive and emotional maturation during this period. Future studies should explore whether these improvements follow a linear pattern or fluctuate during specific stages of adolescence, as has been reported in previous research. For example, a decrease in emotion regulation strategies repertoire use from 11 years to 15 years, followed by an increase from 15 years onwards (Zimmermann & Iwanski, 2014), has been shown. Additionally, girls report increased emotional difficulties between ages 11–12 to 13–14 (Yoon et al., 2023), indicating that early adolescence (ages 13–14) may be a peak period for emotional and, perhaps, emotion regulation difficulties. However, since Yoon et al., (2023) measured emotional difficulties rather than emotion regulation specifically, further research is needed, particularly focusing on emotion regulation during earlier stages of adolescence.

The Impulsive profile was qualitatively unique in shape and unstable across time, with most participants transitioning to the No Difficulties or Low Difficulties profile by T2. The instability of this profile may suggest that the difficulties associated with this profile are more characteristic of early or middle adolescence. One possible interpretation is that this profile reflects transient challenges related to impulsivity in emotion regulation. Difficulties in affective control have been linked to mental health problems, particularly in early adolescence (Schweizer, Parker et al., 2020). In this context, findings from the current study suggest that difficulties related to impulsivity in emotion regulation may be more pronounced in certain subgroups of adolescents and more prevalent in earlier adolescence, highlighting heterogeneity in developmental trajectories within this group. A strength of the current study is the person-centred approach and the longitudinal design; however, the results are limited by the time frame and sample size. Further research is needed to validate the profiles in larger samples, examine them across different developmental time points in adolescence, and investigate the potential emergence and resolution of the Impulsive profile.

### *Exploratory analyses: predictors of transitions between profiles*

Girls were more likely to transition between profiles compared to boys, suggesting that girls perceived emotion regulation difficulties as more transient than boys. This might reflect the larger prevalence of girls in the profiles with more severe emotion regulation difficulties at T1. These findings, and that girls report increased difficulties from early to mid-adolescence (Yoon et al., 2023), may also reflect a more general movement in girls' perceived emotion regulation, perhaps influenced by gender norms of emotion regulation.

Gender and parental support significantly predicted transitions from the Impulsive profile to the No Difficulties profile compared to staying in the same profile. Boys were more likely to transition to the No Difficulties profile, indicating that difficulties in impulsive behaviours during emotional distress may be more transient for boys compared to girls during this period. Other studies have also reported gender effects on emotion regulation development (Sanchis-Sanchis et al., 2020; Zimmermann & Iwanski, 2014). Sanchis-Sanchis et al. (2020), for instance, noted a decline in the use of emotion regulation strategies

among girls compared to boys. The current study adds to these findings by showing preliminary results of gender effects on emotion regulation in certain emotion regulation groups, specifically that boys' difficulties in impulsivity may be more transient compared to girls.

Higher perceived parental support also increased the likelihood of improvement from the Impulsive profile. These findings are consistent with the Tripartite Model, which highlights the role of family dynamics in adolescents' emotion regulation development (Morris et al., 2007). Parental support, measured through the KIDSCREEN Parent Relations and Home Life subscale, reflects family atmosphere and parent-adolescent relationships, underscoring its importance in fostering emotion regulation skills during adolescence. Observation learning, parenting practices and behaviours, and the family's emotional climate are important factors for emotion regulation development (Morris et al., 2007), and parents' own emotion regulation has also been found to affect adolescent emotion regulation (Zimmer-Gembeck et al., 2022). Unlike parental support, peer social support did not predict transitions, emphasising the potentially unique role of parents during this developmental stage and in this group (Morris et al., 2017; Waller et al., 2014). While social support and gender did not predict transitions in other profiles, the small sample (and profile) size warrants cautious interpretation. Further research should examine whether specific forms of parental support are particularly influential for adolescents with varying emotion regulation difficulties, especially among emotionally reactive youth (Morris et al., 2002, 2017).

### *Strengths and limitations*

This study focuses on emotion regulation, a construct central to the development and maintenance of mental health problems and NSSI. Study strengths include its person-centred, longitudinal design, which captured the heterogeneity of emotion regulation development over time. Specifically, the findings support a qualitatively unique emotion regulation profile for early to mid-adolescence and potential predictors of improved emotion regulation, which have not previously been examined longitudinally in an adolescent community sample. Further, the use of well-established and validated measures is a strength. However, certain limitations must be acknowledged. Most notably, the sample size requires attention. Although no universal guidelines exist for determining appropriate sample sizes in LPAs or LTAs, prior research has identified key factors that influence the detection of 'true' profiles and the accuracy of transition estimates, such as the number of time points, profiles (Nylund-Gibson et al., 2023), class separation (Tein et al., 2013), and indicator quality (Wurpts & Geiser, 2014). While commonly used fit indices appear to work adequately with at least 300 participants (Nylund-Gibson & Choi, 2018), recent LTA simulation studies indicate that AIC and aBIC perform reliably with moderate sample sizes (100–200) (Edelsbrunner et al., 2023). Given these findings, the sample size in the present study ($n$ = 198) is within a justifiable range. Although data from more time points were collected, data from additional time points were not included, as this would increase model complexity in relation to the small sample size. However, the analysis was strengthened by conducting a confirmatory LPA on the full sample ($n$ = 266), confirming the profile structure in the full sample. Nonetheless, the results of the current study should be interpreted with caution, and replication is needed to confirm the profile structure in larger samples and across different time points. In particular, the small sizes of some profiles in the prediction models warrant careful interpretation. Future research should aim to replicate these findings with larger samples to increase power and incorporate additional contextual variables, such as specific emotion types and environmental influences (Fombouchet et al., 2023), to deepen understanding of the development of emotion regulation difficulties in adolescents.

Additionally, post hoc comparisons between profiles must be interpreted with some caution, as they assume fixed profile membership and do not account for classification uncertainty (Masyn, 2013). However, the consistently high classification probabilities (above .90 across all profiles and time points) lend confidence to the robustness of the observed group differences (see Supplementary Table S9 and Table S10).

The representativeness of this sample also warrants mention. Only 267 out of 1,054 adolescents provided written informed consent and were thus considered in the current study, and 266 participated in the baseline measurement. Of these 266, 198 students with complete DERS data at T1 and T2 were included in the analysis. Written informed consent from both caregivers and adolescents, in combination with recruitment during the covid-19 pandemic, likely contributed to recruitment challenges, introducing potential

sample bias. For example, parents' interest in prevention interventions and mental health may have influenced the sample. However, the sample displayed variability in emotion regulation difficulties and other variables, with mean total score on DERS-16 corresponding to reports from slightly older adolescents aged 16–19 years from a large community sample (Holmqvist Larsson et al., 2025).

Self-reported measures also come with limitations. They may be subject to biases such as social desirability and response biases, such as response styles rather than emotion regulation difficulties. Self-reported measures of NSSI have shown variability depending on the type of assessment being used (e.g. single-item question vs. behavioural checklist; Aspeqvist et al., 2024). In this study, the consistency or stability of the lifetime NSSI measurement needs to be addressed. A decrease in self-reported lifetime NSSI prevalence was observed, from 20.2% at T1 to 14.6% at T2. Of the 40 participants who reported lifetime NSSI at T1, only 21 (52.5%) confirmed it at T2. The accuracy of frequency measures of NSSI in clinical samples has been questioned (Daukantaitė et al., 2020), and the results of the current study indicate that the reliability of the single-item lifetime measurement of NSSI in community samples also needs to be critically examined. Future research should compare single-item measures and behavioural checklists of NSSI, incorporate frequency-based assessments, and examine how different measurement approaches relate to emotion regulation profiles. A lack of awareness or knowledge of emotion regulation in this age group may also contribute to potential floor effects for some participants. Incorporating alternative approaches, such as behavioural assessments of emotion regulation (e.g. measuring specific behaviours), parent reports of adolescent emotion regulation, and/or measuring strengths instead of difficulties, may help to complement these findings and enhance their validity.

### *Implications and future directions*

For adolescents experiencing emotion regulation difficulties, this study highlights the fluctuating nature of these difficulties, suggesting that supportive environments fostering adaptive emotion regulation may be important for many during the course of typical adolescent development. The Impulsive profile, however, emphasises the potential need for interventions targeting impulsivity for some, particularly during adolescence, when cognitive development may mitigate these behaviours. Encouragingly, some adolescents improved spontaneously over time, with gender and parental support predicting this progress. This underscores the importance of preventive interventions that engage parents, particularly through emotion regulation modelling, emotion-focused parenting practices, and fostering a supportive emotional climate, all of which have shown promise in promoting emotion regulation (Morris et al., 2017).

The results of the current study also have several implications for community health and clinical practice. First, the observation that a substantial proportion of adolescents do not perceive emotion regulation difficulties during adolescence underscores the importance of recognising this diversity when addressing mental health concerns. Professionals should consider this when navigating the current discourse around adolescent mental health crises. Moreover, the higher prevalence of current NSSI in profiles with more severe emotion regulation difficulties highlights the need for professionals to screen for NSSI in adolescents with more pronounced emotion regulation difficulties and also target emotion regulation difficulties in the treatment of NSSI for adolescents (Bjureberg et al., 2023). Future research should replicate these profiles in larger samples, also focus on predictors of a perceived decrease in emotion regulation abilities, and explore earlier developmental stages to inform prevention strategies.

Further research should examine how different forms of parental support uniquely influence emotion regulation profiles. Additionally, studies with larger samples and earlier developmental assessments are needed to clarify emotion regulation trajectories, identify peak periods of difficulty, and explore potential gender differences. The findings of this study indicate that profile structures, particularly the Impulsive profile, may shift over time, potentially reflecting a developmental stage unique to early adolescence. This warrants further investigation with larger samples.

## Conclusion

Despite the central role of emotion regulation in the development of adolescent mental health problems, its diverse developmental patterns remain understudied. To address this gap, the current study used a person-

centred approach to identify profiles of difficulties in emotion regulation and transitions between profiles over time during adolescence. Five distinct emotion regulation profiles were identified in early to mid-adolescence (13–16 years). Most participants reported low or no emotion regulation difficulties, remaining in these profiles over time. A majority of the adolescents who initially experienced higher levels of ER difficulties improved, transitioning to profiles with fewer emotion regulation difficulties between T1 and T2. A unique profile characterised by specifically high difficulties in impulsive behaviours during emotional distress was identified. This profile was unstable, with decreased prevalence at T2, potentially reflecting a temporary developmental phase linked to cognitive growth. Gender and parental support were key factors in predicting improvements from the Impulsive profile, highlighting the influences of these factors in emotion regulation development. These findings underscore the diversity of emotion regulation development during adolescence and the potential importance of gender and parental support in shaping individual trajectories.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

## Funding

This article was supported by Vetenskapsrådet (2018–05820).

## ORCID

Hedvig Andersson 0009-0005-6416-5335
Berit Gustafsson 0000-0003-1209-1475
Erik Aspeqvist 0000-0001-8365-3936
Reeta Kankaanpää 0000-0001-9111-7076
Laura Korhonen 0000-0002-1837-5930
Maria Zetterqvist 0000-0003-2465-8029

## References

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clin Psychol Rev*, *30*(2), 217–237. https://doi.org/10.1016/j.cpr.2009.11.004

Aleva, A., Betts, J. K., Cotton, S. M., Laceulle, O. M., Hessels, C. J., van Aken, M. A. G., Nicol, K., & Chanen, A. M. (2023). Emotion dysregulation in young people with borderline personality disorder: One pattern or distinct subgroups? *Personality Disorders: Theory, Research, and Treatment*, *14*, 567–578. https://doi.org/10.1037/per0000617

Andersson, H., Korhonen, L., Holmqvist Larsson, K., Gustafsson, B., & Zetterqvist, M. (2024). Exploring the cessation process from adolescence to young adulthood in individuals with lived experience of nonsuicidal self-injury: A qualitative study. *Journal of Adolescence*, *97*(1), 263–277.

Aspeqvist, E., Andersson, H., Korhonen, L., Dahlström, Ö., & Zetterqvist, M. (2024a). Measurement and stratification of nonsuicidal self-injury in adolescents. *BMC Psychiatry*, *24*(1), 107. https://doi.org/10.1186/s12888-024-05535-3

Aspeqvist, E., Münger, A.-C., Andersson, H., Korhonen, L., Baetens, I., Dahlström, [., & Zetterqvist, M. (2024b). Adolescents' experiences of a whole-school preventive intervention addressing mental health and nonsuicidal self-injury: A qualitative study. *BMC Public Health*, *24*(1), 1–11. https://doi.org/10.1186/s12889-024-20832-y

Baetens, I., Decruy, C., Vatandoost, S., Vanderhaegen, B., & Kiekens, G. (2020). School-based prevention targeting non-suicidal self-injury: A pilot study. *Front Psychiatry*, *11*, 437. https://doi.org/10.3389/fpsyt.2020.00437

Beasley, T. M., & Schumacker, R. E. (1995). Multiple regression approach to analyzing contingency tables: Post hoc and planned comparison procedures. *The Journal of Experimental Education*, *64*(1), 79–93. https://doi.org/10.1080/00220973.1995.9943797

Baldwin, E. E. (2015). A Monte Carlo simulation study examining statistical power in latent transition analysis (Doctoral dissertation, University of California, Santa Barbara).

Bjureberg, J., Ljótsson, B., Tull, M. T., Hedman, E., Sahlin, H., Lundh, L.-G., Bjärehed, J., DiLillo, D., Messman-Moore, T., & Gumpert, C. H. (2016). Development and validation of a brief version of the difficulties in emotion regulation scale: The DERS-16. *Journal of Psychopathology and Behavioral Assessment*, *38*, 284–296. https://doi.org/10.1007/s10862-015-9514-x

Bjureberg, J., Ojala, O., Hesser, H., Häbel, H., Sahlin, H., Gratz, K. L., Tull, M. T., Knutsson, E. C., Hedman-Lagerlöf, E., & Ljótsson, B. (2023). Effect of Internet-delivered emotion regulation individual therapy for adolescents with non-suicidal self-injury disorder: A randomized clinical trial. *JAMA Network Open*, *6*(7), e2322069–e2322069. https://doi.org/10.1001/jamanetworkopen.2023.22069

Caspi, A., Houts, R. M., Ambler, A., Danese, A., Elliott, M. L., Hariri, A., Harrington, H., Hogan, S., Poulton, R., Ramrakha, S., Rasmussen, L. J. H., Reuben, A., Richmond-Rakerd, L., Sugden, K., Wertz, J., Williams, B. S., & Moffitt, T. E. (2020). Longitudinal assessment of mental health disorders and comorbidities across 4 decades among participants in the dunedin birth cohort study. *JAMA Netw Open*, *3*(4), e203221. https://doi.org/10.1001/jamanetworkopen.2020.3221

Cavicchioli, M., Tobia, V., & Ogliari, A. (2023). Emotion regulation strategies as risk factors for developmental psychopathology: A meta-analytic review of longitudinal studies based on cross-lagged correlations and panel models. *Research on Child and Adolescent Psychopathology*, *51*(3), 295–315. https://doi.org/10.1007/s10802-022-00980-8

Chapman, A. L., Gratz, K. L., & Brown, M. Z. (2006). Solving the puzzle of deliberate self-harm: The experiential avoidance model. *Behaviour Research and Therapy*, *44*(3), 371–394. https://doi.org/10.1016/j.brat.2005.03.005

Charak, R., Byllesby, B. M., Fowler, J. C., Sharp, C., Elhai, J. D., & Frueh, B. C. (2019). Assessment of the revised difficulties in emotion regulation scales among adolescents and adults with severe mental illness. *Psychiatry Research*, *279*, 278–283. https://doi.org/10.1016/j.psychres.2019.04.010

Chen, W.-L., & Chun, C.-C. (2019). Association between emotion dysregulation and distinct groups of non-suicidal self-injury in Taiwanese female adolescents. *International Journal of Environmental Research and Public Health*, *16*(18), 3361. https://doi.org/10.3390/ijerph16183361

Chesney, S. A., Timmer-Murillo, S. C., & Gordon, N. S. (2019). Establishment and replication of emotion regulation profiles: Implications for psychological health. *Anxiety, Stress, & Coping*, *32*(3), 329–345. https://doi.org/10.1080/10615806.2019.1573990

Cipriano, A., Cella, S., & Cotrufo, P. (2017). Nonsuicidal self-injury: A systematic review. *Frontiers in Psychology*, *8*, 282818. https://doi.org/10.3389/fpsyg.2017.01946

Collins, L. M., & Lanza, S. T. (2010). *Latent class and latent transition analysis: With applications in the social, behavioral, and health sciences* (*Vol. 718*). John Wiley & Sons.

Daukantaitė, D., Lantto, R., Liljedahl, S. I., Helleman, M., & Westling, S. (2020). One-year consistency in lifetime frequency estimates and functions of non-suicidal self-injury in a clinical sample. *Frontiers in Psychiatry*, *11*, 538. https://doi.org/10.3389/fpsyt.2020.00538

Dixon-Gordon, K. L., Aldao, A., & De Los Reyes, A. (2015). Repertoires of emotion regulation: A person-centered approach to assessing emotion regulation strategies and links to psychopathology. *Cognition and Emotion*, *29*(7), 1314–1325. https://doi.org/10.1080/02699931.2014.983046

Edelsbrunner, P. A., Flaig, M., & Schneider, M. (2023). A simulation study on latent transition analysis for examining profiles and trajectories in education: Recommendations for fit statistics. *Journal of Research on Educational Effectiveness*, *16*(2), 350–375. https://doi.org/10.1080/19345747.2022.2118197

Fombouchet, Y., Pineau, S., Perchec, C., Lucenet, J., & Lannegrand, L. (2023). The development of emotion regulation in adolescence: What do we know and where to go next?*Social Development*, *32*(4), 1227–1242. https://doi.org/10.1111/sode.12684

Forster, M., Grigsby, T. J., Gower, A. L., Mehus, C. J., & McMorris, B. J. (2020). The role of social support in the association between childhood adversity and adolescent self-injury and suicide: Findings from a statewide sample of high school students. *J Youth Adolesc*, *49*(6), 1195–1208. https://doi.org/10.1007/s10964-020-01235-9

Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment*, *26*, 41–54. https://doi.org/10.1023/B:JOBA.0000007455.08539.94

Gross, J. J., & Jazaieri, H. (2014). Emotion, emotion regulation, and psychopathology. *Clinical Psychological Science*, *2*(4), 387–401. https://doi.org/10.1177/2167702614536164

Hasking, P., Whitlock, J., Voon, D., & Rose, A. (2017). A cognitive-emotional model of NSSI: Using emotion regulation and cognitive processes to explain why people self-injure. *Cognition and Emotion*, *31*(8), 1543–1556. https://doi.org/10.1080/02699931.2016.1241219

Holmqvist Larsson, k., Aspeqvist, E., Falkenstrom, F., Andersson, G., Svedin, C. G., & Zetterqvist, M. (2025). Assessing emotion regulation difficulties in adolescents: Validation and clinical utility of the difficulties in emotion regulation scale, 16-item. *BMC Psychol*, *13*(1), 237. https://doi.org/10.1186/s40359-025-02540-3

Hooley, J. M., & Franklin, J. C. (2018). Why do people hurt themselves? A new conceptual model of nonsuicidal self-injury. *Clinical Psychological Science*, *6*(3), 428–451. https://doi.org/10.1177/2167702617745641

International Society for the Study of Self-Injury. (2025). What is self-injury? Retrieved 7 February from: https://www.itriples.org/aboutnssi/what-is-self-injury

Johnson, S. K. (2021). Latent profile transition analyses and growth mixture models: A very non-technical guide for researchers in child and adolescent development. *New Directions for Child and Adolescent Development*, *2021*(175), 111–139. https://doi.org/10.1002/cad.20398

Kessler, R. C., Angermeyer, M., Anthony, J. C., De Graaf, R., Demyttenaere, K., Gasquet, I., De Girolamo, G., Gluzman, S., Gureje, O., & Haro, J. M. (2007). Lifetime prevalence and age-of-onset distributions of mental disorders in the world health Organization's world mental health survey initiative. *World Psychiatry*, *6*(3), 168.

Lanza, S. T., Rhoades, B. L., Nix, R. L., Greenberg, M. T., & Group, C. P. P. R. (2010). Modeling the interplay of multilevel risk factors for future academic and behavior problems: A person-centered approach. *Development and Psychopathology*, *22*(2), 313–335. https://doi.org/10.1017/S0954579410000088

Lawlor, C., Vitoratou, S., Hepworth, C., & Jolley, S. (2021). Self-reported emotion regulation difficulties in psychosis: Psychometric properties of the difficulties in emotion regulation scale (DERS-16). *Journal of Clinical Psychology*, *77*(10), 2323–2340. https://doi.org/10.1002/jclp.23164

Liu, S., Arterberry, B. J., Wei, M., Tittler, M. V., Wang, C., Klesel, B., & Tsai, P.-C. (2024). Exploration and cross-validation for the latent profiles of emotion regulation difficulties among college students. *Motivation and Emotion*, *48*(4), 652–672.

Lougheed, J. P., & Hollenstein, T. (2012). A Limited Repertoire of Emotion Regulation Strategies is Associated with Internalizing Problems in Adolescence. *Social Development*, *21*, 704–721, 704-721. https://doi.org/10.1111/j.1467-9507.2012.00663.x

Masyn, K. E. (2013). Latent class analysis and finite mixture modeling. In T. D. Little (Ed.), *The Oxford handbook of quantitative methods in psychology* (Vol. *2*). Oxford University Press Statistical analysis (Vol. 2).

Meredith, W. (1993). Measurement invariance, factor analysis and factorial invariance. *Psychometrika*, *58*, 525–543. https://doi.org/10.1007/BF02294825

Monell, E., Birgegård, A., Nordgren, L., Hesser, H., & Bjureberg, J. (2022). Factor structure and clinical correlates of the original and 16-item version of the difficulties in emotion regulation scale in adolescent girls with eating disorders. *Journal of Clinical Psychology*, *78*(6), 1201–1219. https://doi.org/10.1002/jclp.23286

Morin, A. J., Meyer, J. P., Creusier, J., & Biétry, F. (2016). Multiple-group analysis of similarity in latent profile solutions. *Organizational Research Methods*, *19*(2), 231–254. https://doi.org/10.1177/1094428115621148

Morin, A. J. S., Bujacz, A., & Gagné, M. (2018). Person-Centered Methodologies in the Organizational Sciences. *Organizational Research Methods*, *21*, 803–813. https://doi.org/10.1177/1094428118773856

Morin, A. J. S., & Marsh, H. W. (2014). Disentangling Shape from Level Effects in Person-Centered Analyses: An Illustration Based on University Teachers' Multidimensional Profiles of Effectiveness. *Structural Equation Modeling: A Multidisciplinary Journal*, *22*, 39–59. https://doi.org/10.1080/10705511.2014.919825

Morris, A. S., Criss, M. M., Silk, J. S., & Houltberg, B. J. (2017). The impact of parenting on emotion regulation during childhood and adolescence. *Child Development Perspectives*, *11*(4), 233–238. https://doi.org/10.1111/cdep.12238

Morris, A. S., Silk, J. S., Steinberg, L., Myers, S. S., & Robinson, L. R. (2007). The role of the family context in the development of emotion regulation. *Social Development*, *16*(2), 361–388. https://doi.org/10.1111/j.1467-9507.2007.00389.x

Morris, A. S., Silk, J. S., Steinberg, L., Sessa, F. M., Avenevoli, S., & Essex, M. J. (2002). Temperamental vulnerability and negative parenting as interacting predictors of child adjustment. *Journal of Marriage and Family*, *64*(2), 461–471. https://doi.org/10.1111/j.1741-3737.2002.00461.x

Mousteri, V., Daly, M., Delaney, L., Tynelius, P., & Rasmussen, F. (2019). Adolescent mental health and unemployment over the lifespan: Population evidence from Sweden. *Soc Sci Med*, *222*, 305–314. https://doi.org/10.1016/j.socscimed.2018.12.030

Muthén, L. K., & Muthén, B. O. (2017). *Mplus user's guide*, (8th ed.). Los Angeles: CA: Muthén & Muthén.

Nock, M. K. (2010). Self-injury. *Annual Review of Clinical Psychology*, *6*, 339–363. https://doi.org/10.1146/annurev.clinpsy.121208.131258

Nock, M. K., Holmberg, E. B., Photos, V. I., & Michel, B. D. (2007). Self-injurious thoughts and behaviors interview: Development, reliability, and validity in an adolescent sample. *Psychological Assessment*, *19*(3), 309–317. https://doi.org/10.1037/1040-3590.19.3.309

Nook, E. C., Sasse, S. F., Lambert, H. K., McLaughlin, K. A., & Somerville, L. H. (2018). The nonlinear development of emotion differentiation: Granular emotional experience is low in adolescence. *Psychol Sci*, *29*(8), 1346–1357. https://doi.org/10.1177/0956797618773357

Nylund, K. L. (2007). Latent transition analysis: Modeling extensions and an application to peer victimization University of California, Los Angeles Doctoral dissertation].

Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural Equation Modeling: A multidisciplinary Journal*, *14*(4), 535–569. https://doi.org/10.1080/10705510701575396

Nylund-Gibson, K., & Choi, A. Y. (2018). Ten frequently asked questions about latent class analysis. *Translational Issues in Psychological Science*, *4*(4), 440–461. https://doi.org/10.1037/tps0000176

Nylund-Gibson, K., Garber, A. C., Carter, D. B., Chan, M., Arch, D. A., Simon, O., Whaling, K., Tartt, E., & Lawrie, S. I. (2023). Ten frequently asked questions about latent transition analysis. *Psychological Methods*, *28*(2, 284.

Orri, M., Scardera, S., Perret, L. C., Bolanis, D., Temcheff, C., Séguin, J. R., Boivin, M., Turecki, G., Tremblay, R. E., & Côté, S. M. (2020). Mental health problems and risk of suicidal ideation and attempts in adolescents. *Pediatrics*, *146*(1), e20193823. https://doi.org/10.1542/peds.2019-3823

Plener, P. L., Schumacher, T. S., Munz, L. M., & Groschwitz, R. C. (2015). The longitudinal course of non-suicidal self-injury and deliberate self-harm: A systematic review of the literature. *Borderline Personal Disord Emot Dysregul*, *2*, 2. https://doi.org/10.1186/s40479-014-0024-3

Price, N. N., Scelsa, V. L., Zeman, J. L., & Luebbe, A. M. (2023). Profiles of adolescents' sadness, anger, and worry regulation: Characterization and relations with psychopathology. *Emotion*, *23*(2), 473–485. https://doi.org/10.1037/emo0001084

Racine, N., McArthur, B. A., Cooke, J. E., Eirich, R., Zhu, J., & Madigan, S. (2021). Global prevalence of depressive and anxiety symptoms in children and adolescents during COVID-19: A meta-analysis. *JAMA Pediatrics*, *175*(11), 1142–1150. https://doi.org/10.1001/jamapediatrics.2021.2482

Ravens-Sieberer, U., Gosch, A., Rajmil, L., Erhart, M., Bruil, J., Power, M., Duer, W., Auquier, P., Cloetta, B., & Czemy, L. (2008). The KIDSCREEN-52 quality of life measure for children and adolescents: Psychometric results from a cross-cultural survey in 13 european countries. *Value in Health*, *11*(4), 645–658. https://doi.org/10.1111/j.1524-4733.2007.00291.x

Sanchis-Sanchis, A., Grau, M. D., Moliner, A. R., & Morales-Murillo, C. P. (2020). Effects of age and gender in emotion regulation of children and adolescents. *Front Psychol*, *11*, 946. https://doi.org/10.3389/fpsyg.2020.00946

Schweizer, S., Gotlib, I. H., & Blakemore, S.-J. (2020a). The role of affective control in emotion regulation during adolescence. *Emotion*, *20*(1), 80.

Schweizer, S., Parker, J., Leung, J. T., Griffin, C., & Blakemore, S.-J. (2020b). Age-related differences in affective control and its association with mental health difficulties. *Development and Psychopathology*, *32*(1), 329–341. https://doi.org/10.1017/S0954579419000099

von Simson, K., Brekke, I., & Hardoy, I. (2021). The impact of mental health problems in adolescence on educational attainment. *Scandinavian Journal of Educational Research*, *66*(2), 306–320. https://doi.org/10.1080/00313831.2020.1869077

Steinberg, L. (2005). Cognitive and affective development in adolescence. *Trends Cogn Sci*, *9*(2), 69–74. https://doi.org/10.1016/j.tics.2004.12.005

Taylor, P. J., Jomar, K., Dhingra, K., Forrester, R., Shahmalak, U., & Dickson, J. M. (2018). A meta-analysis of the prevalence of different functions of non-suicidal self-injury. *J Affect Disord*, *227*, 759–769. https://doi.org/10.1016/j.jad.2017.11.073

Tein, J.-Y., Coxe, S., & Cham, H. (2013). Statistical power to detect the correct number of classes in latent profile analysis. *Structural Equation Modeling: A Multidisciplinary Journal*, *20*(4), 640–657. https://doi.org/10.1080/10705511.2013.824781

Thomassin, K., Quint, E., Sezlik, S., & Shaffer, A. (2017). Profiles of Emotion Deficits and Adolescent Nonsuicidal Self-Injury in an Inpatient Sample. *Journal of Research on Adolescence*, *27*, 752–764. https://doi.org/10.1111/jora.12312

Thompson, R. A., Flood, M. F., & Goodvin, R. (2015). Social support and developmental psychopathology, *Developmental Psychopathology:* (Vol. Three: Risk, Disorder, and Adaptation, pp. 1–37). New York, NY, USA: John Wiley & Sons. https://doi.org/10.1002/9780470939406.ch1

Van Eck, K., Warren, P., & Flory, K. (2017). A variable-centered and person-centered evaluation of emotion regulation and distress tolerance: Links to emotional and behavioral concerns. *Journal of Youth and Adolescence*, *46*, 136–150.

Waller, R., Gardner, F., Viding, E., Shaw, D. S., Dishion, T. J., Wilson, M. N., & Hyde, L. W. (2014). Bidirectional associations between parental warmth, callous unemotional behavior, and behavior problems in high-risk preschoolers. *Journal of Abnormal Child Psychology*, *42*, 1275–1285. https://doi.org/10.1007/s10802-014-9871-z

Wang, H., He, Y., Bian, Y., Wang, Y., & Wen, Z. (2023). Longitudinal changes in adolescent adjustment: A latent transition analysis. *Current Psychology*, *42*(12), 9708–9719. https://doi.org/10.1007/s12144-021-02261-x

Wasserman, C., Hoven, C. W., Wasserman, D., Carli, V., Sarchiapone, M., Al-Halabi, S., Apter, A., Balazs, J., Bobes, J., & Cosman, D. (2012). Suicide prevention for youth-a mental health awareness program: Lessons learned from the saving and empowering young lives in Europe (SEYLE) intervention study. *BMC Public Health*, *12*, 1–12.

Wolff, J. C., Thompson, E., Thomas, S. A., Nesi, J., Bettis, A. H., Ransford, B., Scopelliti, K., Frazier, E. A., & Liu, R. T. (2019). Emotion dysregulation and non-suicidal self-injury: A systematic review and meta-analysis. *European Psychiatry*, *59*, 25–36. https://doi.org/10.1016/j.eurpsy.2019.03.004

Wurpts, I. C., & Geiser, C. (2014). Is adding more indicators to a latent class analysis beneficial or detrimental? Results of a monte-carlo study. *Frontiers in Psychology*, *5*, 920. https://doi.org/10.3389/fpsyg.2014.00920

Yoon, Y., Eisenstadt, M., Lereya, S. T., & Deighton, J. (2023). Gender difference in the change of adolescents' mental health and subjective wellbeing trajectories. *Eur Child Adolesc Psychiatry*, *32*(9), 1569–1578. https://doi.org/10.1007/s00787-022-01961-4

Yuan, Z., Li, W., Ding, W., Song, S., Qian, L., & Xie, R. (2023). Your support is my healing: The impact of perceived social support on adolescent NSSI — a sequential mediation analysis. *Current Psychology*, *43*, 261–271. https://doi.org/10.1007/s12144-023-04286-w

Zimmer-Gembeck, M. J., Rudolph, J., Kerin, J., & Bohadana-Brown, G. (2022). Parent emotional regulation: A meta-analytic review of its association with parenting and child adjustment. *International Journal of Behavioral Development*, *46*(1), 63–82. https://doi.org/10.1177/01650254211051086

Zimmermann, P., & Iwanski, A. (2014). Emotion regulation from early adolescence to emerging adulthood and middle adulthood: Age differences, gender differences, and emotion-specific developmental variations. *International Journal of Behavioral Development*, *38*(2), 182–194. https://doi.org/10.1177/0165025413515405