

Research paper

Latent classes of trait affect and cognitive affective regulation strategies are associated with depression, non-suicidal self-injury, and well-being



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ARTICLE INFO

Keywords:

Latent class analysis
Late adolescence
Cognitive affective regulation
Non-suicidal self-injury
Depression
Well-being

ABSTRACT

Background: The present study sought to better understand the unique profiles of late adolescents' affective functioning by exploring patterns of trait affect and cognitive affective regulation strategies. The study also examined whether these unique profiles significantly predicted depressive symptoms, non-suicidal self-injury (NSSI), and well-being outcomes.

Methods: Data from a sample of 590 late adolescents were examined ($M = 19.14$ years, $SD = 1.41$, 63% Female, 62% Caucasian, 38% African American/Biracial). Participants were followed for an average of 14 months ($SD = 2.53$) and completed measures of trait affect, cognitive affective regulation, depression, NSSI, and well-being. Data were examined using latent class analysis.

Results: Five subgroups with unique patterns of affective functioning were identified. Late adolescents who reported above average levels of negative affect, dampening of positive affect, brooding, and reflection, coupled with below average levels of positive affect and positive rumination, were more likely to report having higher levels of depressive symptoms and greater engagement in NSSI during the one-year period prior to baseline. Similarly, the late adolescents fitting this profile also reported lower levels of well-being and were more likely to report engaging in NSSI at the follow-up.

Limitations: Limitations include a narrow exploration of affective regulation strategies and the addition of key variables after the initiation of the larger study.

Conclusions: These findings shed light on affective regulation factors relevant to the experience of depressive symptoms and NSSI, and the promotion of well-being.

1. Introduction

It is broadly accepted that the way people respond to affective experiences is related to outcomes of psychopathology and well-being (Dixon-Gordon et al., 2015; Gross and Thompson, 2007; Tugade and Fredrickson, 2004). Specifically, substantial evidence suggests that individuals are able to exert control over their affective responses by utilizing cognitive affective regulation strategies (Gross, 1998; Gross and John, 2003; Gross and Thompson, 2007), and that these strategies serve to increase and/or decrease outcomes of pathology and well-being. Whereas much research has focused on negative affect and cognitive affective regulation strategies for negative affect to better understand psychopathology and well-being, few studies have explored positive affect and affective regulation strategies for positive affect to develop a more inclusive understanding of late adolescents' mental health. To better understand the unique profiles of late adolescents' affective functioning, the current study explored patterns of positive

and negative trait affect, as well as positive and negative cognitive affective regulation strategies. Further, to understand and potentially be able to foster factors that help late adolescents flourish, we examined whether the identified profiles were related to concurrent and prospective depression, non-suicidal self-injury (NSSI), and well-being.

2. Negative and positive affect

Trait negative (NA) and positive (PA) affect refer to the tendency to experience negative and positive emotionality, respectively. Much research has examined the relationship between trait NA and PA and psychological outcomes (e.g., Watson et al., 1988a). Indeed, research suggests that higher NA (experiencing frequent and heightened negative emotions) is associated with depressive symptomatology (Watson and McKee Walker, 1996) and low levels of well-being (Larsen, 2009). Research also suggests that high levels of NA are associated with engagement in NSSI (Victor and Klonsky, 2014). Whereas high levels of

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NA are generally predictive of poor psychological outcomes, research suggests that low levels of NA are associated with increased levels of subjective well-being (Singh and Jha, 2008).

Although once conceptualized as along the same continuum as NA (Ekman, 1992; Watson and Tellegen, 1985; Bradburn, 1969), a large body of research suggests that trait PA is a distinct construct and is independently implicated in psychopathology and well-being outcomes (e.g., Gilbert, 2012; Diener et al., 1991; Fredrickson, 2001; Fredrickson and Levenson, 1998). Indeed, a lack of PA has been demonstrated to predict depressive symptoms (Watson et al., 1988b; Hudson et al., 2015). Moreover, low PA also has been linked to NSSI (Bresin, 2014; Victor and Klonsky, 2014). Although low levels of PA have been found to be related to greater degrees of psychopathology, including depression and NSSI, high levels of PA can buffer against negative emotionality (Fredrickson and Levenson, 1998; Fredrickson et al., 2000) and are associated with beneficial outcomes related to psychological well-being (e.g., Fredrickson, 2001; Tugade et al., 2004).

3. Cognitive affective regulation

Negative and positive affect serve a host of adaptive functions by directing our attention to important stimuli in our environment and preparing us for behavioral responses (Gross, 2014; Lazarus, 1991). Although the experience of affect can be very helpful to our survival in this manner, our responses to our affective experiences may not always be adaptive, which can, in turn, lead to psychopathology (Gross, 2014). Indeed, a growing body of research suggests that individuals exert a significant amount of control over their affective experiences through the use of numerous cognitive affective regulation strategies, which can influence the occurrence, duration, and psychological experience of affect (Gross, 1998).

The Response Styles Theory (Nolen-Hoeksema, 1991) was proposed to identify consequences of the way in which individuals respond to NA. This theory posits that when individuals engage in rumination (i.e., repetitive focusing on the causes, meanings, and consequences of negative moods), they exacerbate and prolong experiences of NA, and increase the likelihood that NA will evolve into psychopathology. Treynor et al. (2003) proposed a two-factor model of rumination including *reflection* (i.e., engaging in cognitive problem solving to alleviate one's NA) and *brooding* (i.e., passively dwelling on negative feelings). Whereas brooding is consistently related to outcomes of depression (Treynor et al., 2003; Burwell and Shirk, 2007), NSSI (e.g., Hoff and Muehlenkamp, 2009), and low levels of well-being (O'Connor and Williams, 2014; Harrington and Loffredo, 2011), the relationship between reflection and these outcomes has been mixed (Burwell and Shirk, 2007; Harrington and Loffredo, 2011; Hoff and Muehlenkamp, 2009; Treynor et al., 2003).

Building on research suggesting that psychopathology, such as depression, results not only from rumination on NA but also from responding less to PA (Rottenberg et al., 2002; Hayes and Feldman, 2004), Feldman et al. (2008) developed the Responses to Positive Affect Scale (RPAS). The RPAS was designed to measure *positive rumination* (i.e., the tendency to experience recurrent thoughts about positive self-qualities and experiences) and *dampening* (i.e., the tendency to experience thoughts that reduce the intensity and duration of positive mood states). Indeed, these PA regulation strategies have been related to outcomes of depression (Fussner et al., 2015; Kovacs et al., 2016), NSSI (Bijttebier et al., 2012; Burke et al., 2015a, 2015b) and well-being (Fredrickson et al., 2000; Tugade and Fredrickson, 2004; Quoidbach et al., 2010), such that higher levels of positive rumination are associated with adaptive outcomes and higher levels of dampening of PA are associated with maladaptive outcomes.

4. Current study

Although research has examined the independent relationships

between trait affect or cognitive affective regulation strategies and psychological outcomes, little research has examined the nuances of how trait affect and cognitive affective regulation styles coincide within individuals and may work together. This is a major gap in the literature, given that these constructs are inherently intersecting and do not operate in isolation. Indeed, although research suggests that negative affect is a distinct entity from positive affect, positive affect may buffer the effects of negative affect (Fredrickson and Levenson, 1998; Fredrickson et al., 2000). Moreover, research indicates that the employment of multiple cognitive regulation strategies, or cognitive flexibility, may be more protective against psychopathology than effectively engaging in only one strategy (Davis and Nolen-Hoeksema, 2000; Fredrickson, 2004; Steffen et al., 2016), suggesting that it is important to understand which strategies co-occur and whether there may be specific combinations of strategies that promote mental health. Thus, examining trait affect and affective regulation styles in concert will allow us to better understand their interplay and how they manifest within individuals. More critically, little research has examined whether certain patterns of affect and cognitive affective regulation strategies may pose greater risk for maladaptive outcomes. As such, the goal of the current study was to employ a person-centered approach, Latent Class Analysis (LCA), to examine whether there are classes of late adolescents with homogenous profiles of trait affect and cognitive affective regulatory strategies. Identifying such subgroups may aid in distinguishing those late adolescents at greatest risk for maladaptive psychological outcomes.

To our knowledge, no study has performed LCA to identify subgroups of individuals based on trait affect and both positive and negative cognitive affective regulation strategies. Thus, we do not offer hypotheses about the number of latent classes that the LCA will identify nor how the levels of trait affect and PA and NA regulation strategies will relate within classes. However, we hypothesize that subgroups characterized by low PA, high NA, high brooding, high dampening, and low positive rumination will be associated with higher depressive symptoms, greater engagement in NSSI, and lower well-being. We further hypothesize that subgroups characterized by high PA, low NA, low brooding, low dampening, and high positive rumination will be associated with lower depressive symptoms, reduced engagement in NSSI, and greater well-being.

5. Methods

5.1. Participants

Adolescent participants were recruited for Project TEAM, a longitudinal, multiwave, behavioral high-risk study that investigates vulnerability for bipolar spectrum disorder (BSD) onset (see Alloy et al., 2012). Participants were recruited from Philadelphia-area high schools and universities and participated in a two-phase screening process. In Phase 1, adolescent participants ($N = 9991$) were administered two measures assessing behavioral approach system (BAS) sensitivity, with students scoring in the upper 15th percentile on both measures categorized as High BAS (HBAS), and students scoring between the 40th and 60th percentiles categorized as Moderate BAS (MBAS). Students who were included in the HBAS and MBAS ($n = 1180$) groups were invited for Phase II screening, where they were administered self-report questionnaires and a diagnostic interview to assess mood and psychotic disorders. Participants were excluded from the study if they met *DSM-IV-TR* (American Psychiatric Association, 2000) criteria for a BSD or a psychotic disorder, or if they were not sufficiently fluent in English.

A total of 590 participants ($M = 18.73$ years, $SD = 1.40$; 62% Caucasian; 63% Female; 65% high BAS group) completed the baseline measures necessary to be included in the LCA. The current study is still underway and retention rates are likely to change. To date, 75% of participants completed at least one follow-up visit and are continuing in the study. However, for the purpose of this study, only participants who

had completed the one-year follow-up ($M = 14$ months; $SD = 2.53$) were included in the follow-up analyses ($N = 251$). Based on independent samples t -tests, the late adolescents who completed the one-year follow-up visit were not significantly different from those that completed only the baseline visit on any demographic or key study variables.

5.2. Measures

5.2.1. Indicators of latent class membership

Seven indicators comprised of the two subscales from the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988b), three subscales from the RPAS, and two subscales from the Ruminative Response Scale (RRS; Treynor et al., 2003) were used to form the latent classes. All indicators were measured at baseline.

5.2.2. Positive and negative affect

The Positive and Negative Affect Schedule (PANAS; Watson et al., 1988b) is a self-report questionnaire that measures the experience of positive and negative feelings over the past thirty days. Whereas PA reflects the extent to which an individual feels content and active, NA reflects the extent to which an individual feels distressed and unsatisfied. The positive and negative affect subscales have both demonstrated good internal consistency and convergent validity (Watson et al., 1988b). In the current study, the internal consistencies for the PA subscale ($\alpha = 0.88$) and the NA subscale ($\alpha = 0.85$) were good. Although we only utilized the NA and PA subscales at baseline in the current study, we measured NA and PA at follow-up as well. The correlation between baseline PA and NA and follow-up PA and NA was moderate to strong ($r = 0.50$ and $r = 0.61$, respectively), providing evidence of the trait-like nature of our positive and negative affect measures.

5.2.3. Positive emotion regulation

The Response to Positive Affect Scale (RPAS; Feldman et al., 2008) is a self-report questionnaire used to assess how an individual responds to positive moods. Three subscales were used: dampening, emotion-focused rumination, and self-focused rumination. Dampening refers to an individual's attempts to mitigate positive moods. Emotion-focused rumination refers to an individual's focus on the intensity and quality of positive emotions. Self-focused rumination refers to an individual's reflections on his/her self and life circumstances. Participants were asked to complete the questionnaire based on how they generally respond to experiencing pleasant moods. The RPAS has demonstrated good internal consistency and construct validity (Feldman et al., 2008). In the current study, the internal consistencies of all three subscales were good (dampening = 0.85, emotion-focused = 0.76, self-focused = 0.76).

5.2.4. Negative emotion regulation

The Ruminative Response Scale (RRS; Treynor et al., 2003) is a 10-item, self-report questionnaire used to assess ruminative reflection and brooding. Ruminative reflection refers to the extent to which an individual engages in cognitive problem solving to ameliorate his/her dysphoric mood. Ruminative brooding refers to the amount of focus given to comparing one's current situation to an unachieved standard. Participants were asked to complete the questionnaire based on how they generally respond to experiencing sadness. The RRS has demonstrated good internal consistency and reliability (Treynor et al., 2003). Internal consistency was good ($\alpha = 0.79$ and 0.73 , for brooding and reflection, respectively) in the current study.

5.2.5. Correlates of class membership

We examined group differences in class membership across participant sex (male, female) and race using demographic information drawn from the baseline data. Of note, we only compared White participants to Black participants on class membership, given the small

proportion of participants identifying as Asian, Native American, Native Hawaiian, Biracial, and other.

5.2.6. Prospective outcomes

We assessed associations between class membership and measures of depression, NSSI,¹ and well-being at baseline and a one-year follow-up.

5.2.7. Depressive symptoms

The Beck Depression Inventory (BDI; Beck et al., 1979) is a widely-used 21-item, self-report questionnaire that assesses the severity of depressive symptoms over the past two weeks. We utilized a total score for all analyses, with higher scores reflecting more severe and frequent depressive symptoms. The BDI has demonstrated good internal consistency and construct validity in nonclinical samples (Beck et al., 1988). Internal consistency was good ($\alpha = 0.88$ and 0.86 , for baseline BDI and follow-up BDI, respectively) in the current study.

5.2.8. Non-suicidal self-injury

The Form and Function Self-Injury Scale (FAFSI; Jenkins and Schmitz, 2012) was used to measure engagement in NSSI. Participants are asked, "Have you ever, intentionally or on purpose, hurt yourself in the following ways, without the intention of killing yourself?" They are subsequently presented with 13 different methods of NSSI (e.g., biting, cutting, burning); if endorsed, participants are asked how often they have engaged in this act over their lifetime and past year. At baseline, frequency of engagement in NSSI over the previous one year was used to categorize participants into categories of NSSI engagement (0, 1, 2–5, 6–20, and 20+ NSSI acts; Burke et al., 2015a, 2015b; Whitlock et al., 2013). At the follow-up, we measured whether or not participants engaged in NSSI over the prior one year, using a dummy coded dichotomous variable.

5.2.9. Well-being

The Internal State Scale (ISS; Bauer et al., 1991) is a self-report measure of depressive and manic symptom severity. In the current study, we utilized the well-being subscale, which measures the extent to which a participant feels competent, energized, and experiences pleasant mood states. We utilized a Likert-scale (Glick et al., 2003), with higher scores indicating a greater sense of personal well-being. The ISS-well-being subscale has demonstrated good internal consistency and construct validity, with well-being scores significantly lower for individuals with clinical levels of depression (Bauer et al., 1991). Internal consistency was good ($\alpha = 0.72$) for the current study. The ISS was administered only at the follow-up assessment.

5.3. Data analysis

Preliminary analyses, including descriptive statistics and bivariate analyses, were conducted using SPSS 24 (IBM Corp, 2016). LCA was conducted using Mplus 7.11 (Muthén and Muthén, 1998–2015). We modeled classes based on seven indicators (PA, NA, brooding, reflection, dampening of PA, emotion focused- and self-focused rumination on PA), which we standardized prior to analysis. The model with the optimal number of classes based on the Bayesian information criteria (BIC), the parametric bootstrapped likelihood ratio test (BLRT), entropy, and interpretability was selected (Nylund et al., 2007).

After identification of the class solution that best fit the data, sex and race were examined as correlates of class membership and chi-square difference tests were used to determine significant differences between groups. Finally, we exported class membership from Mplus

¹ The FAFSI measure was introduced in the current study approximately 1.5 years after the study's initiation. Therefore, fewer participants completed this measure at baseline and at follow-up.

into SPSS, allowing us to examine whether class membership differentially predicted cross-sectional and prospective depression, NSSI, and well-being. We employed a series of ANCOVAs and post-hoc analyses to compare classes on our outcome measures: depressive symptoms and NSSI frequency measured at baseline, and depressive symptoms and well-being measured at follow-up. We employed multinomial logistic regression to determine whether there was a significant main effect of classes on engagement in NSSI over the follow-up period. Binary logistic regressions were used to conduct post-hoc analyses. For our prospective analyses, we covaried the levels of the outcome variable at baseline where available.² If BAS-Group status, sex, or race was significantly correlated with the outcome variable, it was controlled in the ANCOVA or multinomial logistic regression.

6. Results

LCA was performed on all participants who had completed at least one of the indicators of latent class membership ($N = 590$), estimating models with one through seven classes. The best fitting model as indicated by the BIC and the BLRT was the 5-class model (Table 1). The BIC and BLRT indices provide the most reliable indicators of the true number of classes (Nylund et al., 2007).

6.1. Class composition

In Fig. 1, the class profiles can be observed. The first class, Moderate Negative Coping Class (24.8% of the total sample), reported high levels of NA and reduced PA and engaged in cognitive affective regulation strategies that down-regulate PA experiences through dampening and increase NA through brooding and reflection. This group may be regarded as a “Moderate Negative Coping Class”.

The second class, comprising 26.3% of the total sample, reported few affective experiences and did not readily engage in cognitive affective regulation strategies. Given this class’ lack of engagement in the cognitive affective regulation strategies measured, this group may be regarded as a “Disengaged Class”.

The third class (14.8% of the sample) included participants who reported having high levels of both PA and NA and often engaged in a variety of up-regulating and down-regulating cognitive affective regulation strategies. This group may be regarded as a “Reactive Coping Class”.

The fourth class (29.7% of the total sample) included participants who reported high levels of PA and reduced NA and engaged in cognitive affective regulation strategies that up-regulate PA through high levels of positive rumination. This group may be regarded as a “Positive Coping Class”.

The fifth class (4.5% of the total sample) included participants who reported extremely elevated levels of NA and reduced PA and engaged in cognitive affective regulation strategies that down-regulate PA experiences through dampening and increase NA through engaging in brooding and reflection. This group may be regarded as a “Severe Negative Coping Class”.

6.2. Sex and race

Chi-square tests demonstrated that there were no significant differences in sex ($\chi^2(4, N = 590) = 8.58, p = 0.07$) or in race ($\chi^2(4, N = 478) = 8.69, p = 0.07$), based on class membership.

² The ISS well-being subscale was not included in the baseline battery and could not be controlled.

Table 1
Fit indices for class model solutions.

Class ($N = 590$)	Log Likelihood	BIC	BLRT	Entropy
1	-11468.48	23026.29	N/A ^a	1
2	-11208.55	22557.46	0.000	0.71
3	-11063.27	22317.94	0.000	0.75
4	-10990.85	22224.15	0.000	0.76
5	-10961.51	22216.5	0.000	0.77
6	-10937.21	22218.95	0.000	0.76
7	-10913.17	22221.9	0.000	0.75

Note. BIC = Bayesian Information Criterion; BLRT = Bootstrap Likelihood Ratio Test.

^a BLRT is not available for the one-class model.

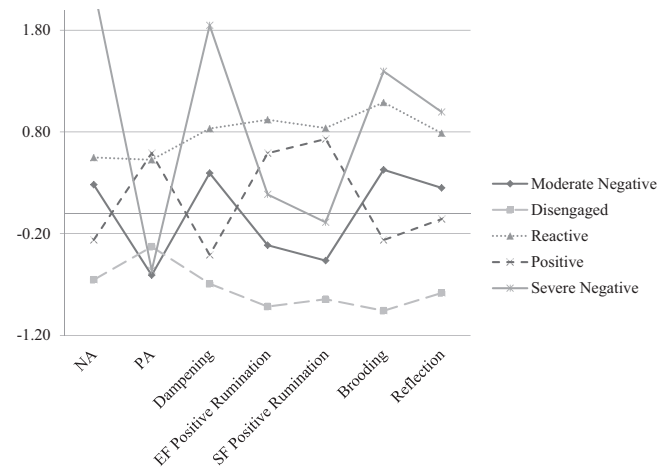


Fig. 1. Class profiles for the 5-class model. The Moderate Negative Coping Class includes 24.8% ($n = 150$) of the sample; the Disengaged Class includes 26.3% ($n = 156$) of the sample; the Reactive Coping Class includes 14.8% ($n = 84$) of the sample; the Positive Coping Class includes 29.7% ($n = 175$) of the sample; and the Severe Negative Coping Class includes 4.5% ($n = 25$) of the sample. Note. NA = Negative Affect; PA = Positive Affect; EF = Emotion Focused; SF = Self-focused.

6.3. Class membership and psychological outcomes

6.3.1. Depression

Class membership had a significant main effect on depressive symptoms at baseline (see Table 3). Post-hoc analyses indicated that the Moderate Negative Coping Class evidenced greater depressive symptoms than the Disengaged and Positive Coping classes. The Reactive Coping Class evidenced greater depressive symptoms than the Disengaged and Positive Coping classes. The Severe Negative Coping Class evidenced greater depressive symptoms than all other classes. There was no main effect of class on prospectively measured depressive symptoms at follow-up, after controlling for baseline depressive symptoms. (Table 2)

6.3.2. Non-suicidal self-injury

Class membership had a significant main effect on last year frequency of NSSI (see Table 3) at baseline.³ Post-hoc analyses indicated that the Moderate Negative Coping and the Severe Negative Coping classes evidenced greater last year frequency of NSSI than the Disengaged and Positive Coping classes. Additionally, The Severe Negative Coping Class evidenced greater last year frequency of NSSI than the Reactive Coping Class.

There was a significant main effect of class on prospective NSSI. Over the follow-up period, 46.7% ($n = 14/30$) of the Moderate

³ Class membership had a significant main effect on last year presence versus absence of NSSI as well ($\chi^2(4, N = 394) = 14.85, p = 0.005$).

Table 2
Correlations between LCA indicators and outcome variables.

	1	2	3	4	5	6	7	8	9	10	11
1. PA	–										
2. NA	0.02	–									
3. Damp	–0.11*	0.46***	–								
4. Self-Foc	0.44***	0.08	0.15***	–							
5. Em-Foc	0.34***	0.17***	0.20***	0.66***	–						
6. Brood	–0.01	0.46***	0.51***	0.23***	0.31***	–					
7. Reflect	0.07	0.36***	0.30***	0.18***	0.32***	0.50***	–				
8. T1 NSSI	–0.04	0.30***	0.13**	–0.03	0.04	0.20***	0.13*	–			
9. T2 NSSI	–0.17*	0.32***	0.15*	–0.10	0.06	0.14	0.25**	0.51***	–		
10. T1 Dep	–0.25***	0.58***	0.54***	–0.04	0.07	0.43***	0.28***	0.36***	0.28***	–	
11. T2 Dep	–0.08	0.45***	0.34***	0.01	0.03	0.29***	0.22**	0.21*	0.39***	0.58***	–
12. T2 WB	0.41***	–0.18**	–0.18**	0.19**	0.07	–0.20**	–0.12	–0.18*	–0.17*	–0.30***	–0.43**

Note. PA = Positive Affect; NA = Negative Affect; Damp = Dampening; Self-Foc = Self-Focused Rumination; Em-Foc = Emotion-Focused Rumination; Brood = Brooding; Reflect = Reflection; T1 NSSI = Time 1 Last-Year NSSI Frequency; T2 = Time 2 NSSI Presence; T1 Dep = Time 1 Beck Depression Inventory; T2 = Time 2 Beck Depression Inventory; T2 WB = T2 Internal State Scale - Well-Being Subscale.

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

Table 3
Clinical differences among the five latent classes.

	Moderate Negative Coping Class	Disengaged Class	Reactive Coping Class	Positive Coping Class	Severe Negative Coping Class	df	F/ χ^2	Partial η^2
T1 NSSI	1.18 (1.55) ^{ac}	0.45 (1.11) ^b	0.98 (1.34) ^{ab}	0.76 (1.23) ^b	1.83 (1.86) ^c	4	4.43**	0.04
T2 NSSI	0.47 (0.51) ^a	0.11 (0.31) ^b	0.23 (0.43) ^{ab}	0.21 (0.42) ^{ab}	0.67 (0.52) ^{ab}	4	24.02***	
T1 Dep	10.75 (6.36) ^a	4.07 (4.40) ^b	10.97 (6.66) ^a	4.64 (4.46) ^b	21.50 (10.49) ^c	4	68.48***	0.35
T2 Dep	6.33 (5.46) ^a	3.15 (4.36) ^a	8.11 (7.02) ^a	3.67 (4.45) ^a	12.57 (7.85) ^a	4	0.96	0.02
T2 WB	8.73 (2.24) ^a	10.21 (2.05) ^b	10.06 (2.41) ^b	10.54 (2.31) ^b	9.30 (3.16) ^{ab}	4	5.69***	0.09

Note. T1 NSSI = Time 1 Last-Year NSSI Frequency; T2 = Time 2 NSSI Presence; T1 Dep = Time 1 Beck Depression Inventory; T2 = Time 2 Beck Depression Inventory; T2 WB = T2 Internal State Scale - Well-Being Subscale. ANCOVAs and post-hoc analyses were used to compare classes on our outcome measures: depressive symptoms, NSSI frequency measured at baseline, and well-being measured at follow-up. Multinomial logistic regression was used to determine whether there was a significant main effect of classes on engagement in NSSI over the follow-up period; Binary logistic regressions were used to conduct post-hoc analyses.

^{a, b, c} = Results for post-hoc analyses; classes with the same subscript did not significantly differ.

Negative Coping Class, 10.7% (n = 3/28) of the Disengaged Class, 22.7% (n = 5/22) of the Reactive Coping Class, 21.4% (n = 9/42) of the Positive Coping Class, and 66.7% (n = 4/6) of the Severe Negative Coping Class endorsed engaging in NSSI. Post-hoc comparisons indicated that members of the Moderate Negative Coping Class were significantly more likely than members of the Disengaged Class to engage in NSSI over the follow-up period, controlling for baseline NSSI presence. Notably, post-hoc comparisons suggested several marginally significant results: the Moderate Negative Coping Class was marginally more likely to engage in NSSI over the follow-up than the Reactive Coping ($p = 0.088$) and Positive Coping classes ($p = 0.059$). The Severe Negative Coping Class was marginally more likely to engage in NSSI over the follow-up than the Reactive Coping Class ($p = 0.053$).

6.3.3. Well-being

Class membership had a significant main effect on well-being measured at the follow-up (See Table 3).⁴ Post-hoc analyses indicated that the Moderate Negative Coping Class evidenced lower levels of well-being than the Disengaged, Reactive Coping, and Positive Coping classes.

7. Discussion

The goal of the current study was to provide a more inclusive understanding of the unique profiles of late adolescents' affective functioning. Using a person-centered approach, we identified five subgroups

⁴ Class membership also evidenced a significant main effect on well-being measured at follow-up, even after controlling for baseline depressive symptoms ($(F(4, 211) = 4.55, p = 0.002, \eta_p^2 = 0.08)$).

of late adolescents with unique patterns of trait affect and cognitive affective regulation strategies. These five classes were then used to investigate associations with depressive symptoms, NSSI, and well-being. The results show that late adolescents who reported above average levels of NA, dampening of PA, brooding, and reflection, coupled with below average levels of PA and positive rumination (the “moderate negative coping class”) were more likely to report having high levels of depressive symptoms and having engaged in NSSI over the past year at baseline. Similarly, the late adolescents fitting this profile also reported having lower levels of well-being at a one-year follow-up and were more likely to report engaging in NSSI over the follow-up period.

7.1. Depression

Differences were found across classes on depressive symptoms at baseline. Specifically, the members of the Severe Negative Coping Class had significantly higher levels of depressive symptoms at baseline compared to all other classes. This finding is consistent with past research given that the Severe Negative Coping Class is characterized by high levels of NA, dampening of PA, brooding and reflection, coupled with low levels of PA; all factors that have consistently been related to depression outcomes (Burwell and Shirk, 2007; Fresco et al., 2002; Hudson et al., 2015; Kovacs et al., 2016; Miranda and Nolen-Hoeksema, 2007; Watson and McKee Walker, 1996). Interestingly, the Moderate Negative Coping and the Reactive Coping classes also evidenced greater depressive symptoms at baseline compared to the Disengaged and Positive Coping classes. The Moderate Negative Coping Class shares a similar profile to the Severe Negative Coping Class, and thus, this finding further supports the relation between the factors involved in these composites and the importance of these variables in relation to

depressive symptoms. Elevated NA and brooding have long been accepted as key factors in the development and maintenance of depressive symptoms (Treyner et al., 2003; Joiner et al., 1996); although less studied, the findings from this research suggest that dampening of PA and low PA also may be a key feature in these processes.

It is also of interest that the Reactive Coping Class evidenced higher levels of depressive symptoms than the Disengaged and Positive Coping classes. This comparison reveals that high levels of reactivity, or elevated engagement in a broad range of cognitive affective regulation strategies, may be associated with increased levels of depressive symptoms when compared to classes comprised of late adolescents utilizing few strategies or engaging in primarily adaptive regulation strategies.

After controlling for depressive symptoms at baseline, there were no significant differences between classes when predicting depressive symptoms at the one-year follow-up. Although this is contrary to research supporting that the individual facets of affect and cognitive affective regulation used to create the classes longitudinally predict depression outcomes (Hankin et al., 2004; Robinson and Alloy, 2003), it may suggest that the combination of these features do not.

7.2. Non-suicidal self-injury

We also found that the Moderate Negative Coping and Severe Negative Coping classes evidenced greater last year frequency of NSSI at baseline than the Disengaged and Positive Coping classes. The Severe Negative Coping Class evidenced greater last year frequency of NSSI than the Reactive Coping Class as well. As previously outlined, the Moderate Negative Coping and Severe Negative Coping classes share similar characteristics. The finding that these classes are most associated with frequent NSSI is in line with extant literature suggesting that those engaging in NSSI not only experience heightened NA (e.g., Cohen et al., 2015), but also experience low PA (e.g., Bresin, 2014). These findings are congruent with literature suggesting that NSSI is not only negatively reinforced through the reduction of aversive negative emotionality (Armey et al., 2011), but also is positively reinforced through increasing PA in the context of low PA (Muehlenkamp et al., 2009). Moreover, the Moderate Negative Coping and Severe Negative Coping classes are both characterized by greater than average engagement in brooding, reflection and PA dampening, which have been related to NSSI in previous research (Burke et al., 2015a, 2015b; Hoff and Muehlenkamp, 2009; Polanco-Roman et al., 2015).

Class membership also was associated with prospective engagement in NSSI. Members of the Moderate Negative Coping Class were significantly more likely than members of the Disengaged Class, and marginally significantly more likely than members of the Reactive Coping and Positive Coping classes, to engage in NSSI over the follow-up period. Further, the Severe Negative Coping Class was marginally significantly more likely to engage in NSSI over the follow-up period than the Reactive Coping Class. It is important to note that the prospective NSSI analyses were based on a smaller subset of the sample, given that the NSSI measure was added after the initiation of the ongoing longitudinal study. Thus, group sizes were limited in these prospective analyses, resulting in less power to detect class differences. Although we must be cautious in drawing implications based on the marginally significant results, our prospective results are generally in line with our cross-sectional results. The current study extends prior research by suggesting that dampening of PA not only may be cross-sectionally associated with NSSI (Burke et al., 2015a, 2015b), but also may be associated prospectively with NSSI. Moreover, the current research suggests that dampening often co-occurs with high levels of NA, low levels of PA, and high levels of brooding and rumination, as observed in the Moderate Negative Coping and Severe Negative Coping classes, and that this may be a pernicious combination that puts individuals at high risk for frequent engagement in NSSI, as well as risk for future NSSI.

Interestingly, members of the Moderate Negative Coping and Severe Negative Coping classes were more likely to engage in NSSI over the follow-up than members of the Reactive Coping Class, which similarly evidenced well above average levels of NA, but uniquely also reported experiencing high levels of PA. These results suggest that high NA only may be associated with NSSI when levels of PA are low and that there may be a buffering influence of high PA. This postulation is in line with research supporting the “undoing hypothesis,” which asserts that PA may foster individuals’ ability to revert to their emotional baseline after experiencing heightened NA and/or stress (Fredrickson and Levenson, 1998; Fredrickson et al., 2000).

7.3. Well-being

When exploring prospective well-being, the Moderate Negative Coping Class evidenced significantly lower levels of well-being than the Disengaged, Reactive Coping, and Positive Coping classes. This finding is consistent with past research suggesting that PA and the up-regulation of PA are key components in predicting outcomes of well-being (Fredrickson, 2001; Tugade and Fredrickson, 2004; Tugade et al., 2004). Similarly, it has been well established that high levels of NA (Larsen, 2009), engagement in down-regulation of PA (Quoidbach et al., 2010), and in brooding and reflection (O’Conner and Williams, 2014; Harrington and Loffredo, 2011), can lead to lower levels of well-being. It is important to note that we were unable to control for baseline well-being in this study, preventing the examination of how the group profiles relate to concurrent well-being. Moreover, because baseline well-being could not be controlled in the prospective analyses, the directionality of this relationship cannot be determined. However, when we controlled for baseline depressive symptoms (which overlapped to some extent with well-being), class composition still was associated prospectively with well-being at follow-up.

Interestingly, the Severe Negative Coping Class did not significantly differ from the remaining classes with regards to well-being outcomes, yet the profile for late adolescents in this group is similar to the Moderate Negative Coping Class. When examining the mean level of well-being at the follow-up for the Severe Negative Coping Class, we see that this class exhibits well-being levels comparable to the Moderate Negative Coping Class and lower than the Disengaged, Reactive Coping, and Positive Coping classes. Thus, we suspect with a larger sample size, membership in the Severe Negative Coping Class also may predict lower well-being outcomes.

Contradictory to our hypotheses, the Positive Coping Class did not evidence increased levels of well-being compared to the other classes. Although speculative, this finding may suggest that engagement in maladaptive strategies (e.g., brooding, dampening) may be more harmful for prospective well-being than engagement in adaptive strategies is helpful.

7.4. Strengths and limitations

The current findings must be interpreted considering the following limitations. First, we identified a Disengaged Class, which reported below average levels of NA, PA, and all cognitive affective regulation strategies. However, it is possible that this group may engage in a range of affective regulation strategies that were not measured in the current study. Indeed, affective regulation includes a wide array of strategies (Gross, 1998), and thus, the current study is limited by not measuring other important aspects of affective regulation. Despite this limitation, the data suggest that the detection of a Disengaged Class is a robust finding that warrants further research.

Second, the current study is limited by the high-risk sample, which was recruited based on being at high and low risk for developing a BSD. However, we controlled for risk status if it was associated with the outcome of interest, thereby limiting its impact on the current study’s research aims. Nevertheless, results should be replicated among a

community sample to determine its generalizability. Third, given that the NSSI measure was added to the study after its initiation, the NSSI prospective sample was smaller in size, thus, limiting power to detect significant group differences. Finally, our measure of well-being was administered only at the follow-up, precluding our ability to examine whether there is a directional relationship between class membership and well-being and limiting power for group analyses using this measure.

7.5. Conclusion

In the current study, we identified subgroups of late adolescents based on experiences of affect and usage of cognitive affective regulation strategies. Thus, the current study builds on research that has examined each of these trait affects or strategies in isolation by using an approach allowing for the examination of person-centered clusters of affective functioning. This study also sheds light on factors potentially relevant to the reduction of, or protection from, depressive symptoms and NSSI, and the promotion of well-being.

Acknowledgements

This research was supported by National Institute of Mental Health grant MH77908 to Lauren B. Alloy. Taylor A. Burke was supported by a National Science Foundation Graduate Student Research Fellowship. Brae Anne McArthur was supported by a Banting Postdoctoral Fellowship from the Social Sciences and Humanities Research Council.

The funding sources had no role in study design, in the collection, analysis and interpretation of data, in the writing of the report, or in the decision to submit the article for publication.

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