Well-being and headache in adolescence : A self-regulation perspective

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Chapter Five

Headache, daily frustration and cognitive coping in adolescent affect: A daily diary study

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Abstract

Objective: To investigate the contribution of headache, daily frustration, cognitive coping and coping efficacy to daily positive and negative affect among adolescents. Relationships were investigated both concurrently and prospectively employing a daily diary method.

Methods: Eighty-nine adolescents aged 13-21 completed an online daily diary for 3 weeks. Data were analyzed using multilevel modelling.

Results: Negative affect was related to same day headache occurrence, high daily frustration, rumination, catastrophizing and other blame, and low coping efficacy beliefs. Negative affect on the next day was predicted by high daily frustration, rumination, catastrophizing and low coping efficacy. In contrast, positive affect was related to low same day headache, low daily frustration, high acceptance, positive refocusing and coping efficacy. Positive affect on the following day was related to low daily frustration and rumination, and high positive refocusing.

Conclusions: Daily frustration and cognitive coping strategies may provide important targets for interventions aimed at adolescents with headache.

Introduction

Headache is one of the most common physical complaints of adolescence (Hunfeld et al., 2001). Youths who report frequent headache complaints often report reduced well-being (e.g. Bandell-Hoekstra et al., 2002; Fichtel & Larsson, 2002; Powers et al., 2003). Therefore, an understanding of individual factors which may make adolescents vulnerable to lowered well-being and possibly exacerbate the impact of headache on well-being is essential.

The subjective experience of stress and the way in which the individual copes with such stressors are important determinants of well-being (Maes et al., 1996). Stress is defined here as frustration to successful pursuit of personal goals (Carver & Scheier, 1999). Cross-sectional studies on adolescents have demonstrated that stress in the form of frustration to goal pursuit is associated with greater depressive symptoms and lower quality of life (Massey et al., in press-b; Massey et al., in press-a). Moreover, the relationship between goal frustration and well-being has been suggested to be stronger among adolescents with headache than for those without (Massey et al., in press-b). However, these relationships have yet to be investigated prospectively.

Strategies used to cope with stressors, such as setbacks to goal pursuit, are also suggested to play an important role in well-being (Boekaerts, 1999; Carver & Scheier, 1999). Specific cognitive coping strategies associated with lowered well-being in adolescence include catastrophizing, self-blame, and rumination (Broderick & Korteland, 2004; Garnefski et al., 2003; Garnefski et al., 2001). Furthermore, these strategies have been shown to be used to a greater extent by adolescents with weekly headache than those with less frequent or no headache (Massey et al., in press-b). In contrast, strategies such as positive reappraisal (Garnefski et al., 2003; Garnefski et al., 2001) and positive refocusing (Garnefski et al., 2001) have been suggested to be protective against symptoms of anxiety and depression.

In sum, headache is typically associated with lowered well-being. Individual factors such as the experience of daily frustration and ways of coping with these stressors are also suggested to be important determinants of affect. To date, however, few studies have investigated the temporal and interactive relations between headache, daily frustration and cognitive coping among

adolescents. In this study a prospective daily dairy approach was employed. This approach has many benefits such as capturing daily fluctuations in pain, stress and mood, and reducing error associated with retrospective methods (Tennen & Affleck, 1996). The aim of the present study therefore was to investigate the extent to which headache, daily frustration and cognitive coping contributed to concurrent and prospective affect in the general population of adolescents. We also explored the extent to which goal frustration and cognitive coping moderate the impact of headache on affect. We expected that headache, daily frustration, strategies such as catastrophizing, self blame and rumination and lower coping efficacy would be related to greater negative affect and lower positive affect. Conversely, strategies such as positive refocus and positive reappraisal were expected to be related to lower negative affect and higher positive affect.

Methods

Participants

In total 93 adolescents participated in the daily diary study, of whom four were excluded from the analyses as they reported neurological illnesses (epilepsy and brain damage). Of the 89 participants included in the analyses, 66 (74%) were girls, and the age range was 13 to 21 years (M = 15.8, SD = 1.3).

Procedure

Participants of a previous general population study among secondary school students who had given permission to be approached for a related study (n = 542) were invited to participate via post. Interested parties were directed to the study website for more information on the aims and procedures and registration for the study. Adolescents were requested to complete an informed consent form as part of online registration, and parents/guardians of those under the age of 16 were also required to complete a separate consent form before their child commenced participation. Registered participants chose a log-in name and received a password in order to access the online diary. Before commencing the main study, the diary was piloted among eight adolescents for ease of use, acceptability by the target population, and to iron-out any technical

difficulties. Refinements of the measures, structure, and procedures were made based on the feedback from the pilot participants.

Participation in the main study entailed completing a brief diary entry at the end of every day for three weeks. This took no longer than ten minutes to complete. It was possible to complete diary entries retrospectively, however, this occurred in only 4.5% of the cases and all data were used in the analyses. Reminder emails were sent to participants who missed an entry on the previous day(s).

As in other studies (e.g. Keefe et al., 1997), incentives were offered in form of a weekly raffle of a 25 Euro gift voucher (participants were required to complete a minimum of 6 days per week to be entered into the raffle), plus a final prize draw (for participants who completed a minimum of 15 days diary). After completion of the study, participants were sent a brief report documenting the general findings of the study. The study was approved by the university faculty of social sciences ethics committee. In another publication, the influence of daily frustration and cognitive coping on headache is explored (Massey et al., accepted for publication pending minor revisions).

Measures

Headache. Participants indicated presence or absence of headache occurrence each day (no = 0; yes = 1).

Well-being. Well-being was operationalized by measuring daily positive and negative affect. A brief measure of daily affect was used, consisting of four positive and five negative adjectives based on the Positive and Negative Affectivity Scale (Watson et al., 1988). The Positive Affect scale consisted of the following four items: satisfied, active/energetic, happy/cheerful, and proud. The Negative Affect scale consisted of the following five items: sad/sombre, angry/aggressive, scare/anxious, tired, and irritable. Respondents were required to rate the extent to which they had experienced this mood that day, on a scale ranging from 1 (not at all) to 5 (a lot). Total positive (α = .90) and negative affect (α = .88) scores were calculated by summing the responses over these items.

Daily frustration. Participants were asked to what extent things had gone the way they wanted them to go that day in four goal areas: school, at home, social life, and leisure. Answers ranged from 1 (went completely the way I wanted) to 7 (didn't go at all the way I wanted). Due to the similarity in findings across the goal domains, scores were averaged over the four domains to give a global indicator of goal frustration for that day (α = .73). Adolescents who indicated that they had experienced high frustration on any one goal domains (a score of ≥ 5) were directed to questions on cognitive coping strategies and coping efficacy. If no daily frustration was experienced on a given day (a score of ≤ 4), these questions were not presented.

Cognitive coping strategies. Cognitive coping strategies used in response to high daily frustration were measured using the Cognitive Emotion Regulation Questionnaire (Garnefski et al., 2002b) (CERQ, see also www.cerq.leidenuniv.nl). The original questionnaire consisted of 9 subscales comprised of 4 items each. As 36 items would be too lengthy to complete on a daily basis, one item per sub-scale was selected based on a high factor loading or conceptual representativeness of the item. The items used per subscale were as follows: acceptance: "I think that I can't do anything about it"; catastrophizing: "Again and again, I think about how terrible it all is"; other blame: "I think that others are to blame"; positive reappraisal: "I think that I can learn from it"; positive refocus: "I think about nicer things that have nothing to do with it"; putting into perspective: "I think that worse things can happen"; refocus on planning: "I think of how I can best cope with it"; rumination: "Again and again, I think about how I feel about it"; and self blame: "I think that it's my own fault" (Garnefski et al., 2007). Participants were required to indicate to what extent they had used this strategy in response to the experience of goal frustration that day, ranging from 1 (not at all) to 5 (a lot). Acceptable reliability and validity of the CERQ have previously been demonstrated (Garnefski et al., 2002b).

Coping efficacy. Based on Aldwin and Revenson (1987), two items were developed to assess coping efficacy: 'I feel that I dealt well with what happened today' and 'I feel that I dealt well with my emotions today'. The response scale ranged from 1 (completely disagree) to 5 (completely agree). Cronbach's alpha was .82.

Statistical analysis

To take into consideration the dependence of the nested observations (daily entries nested within persons), multilevel linear analyses using maximum likelihood estimation were conducted with program MlwiN version 2.02 (Rasbash et al., 2004). Fixed effects of predictor variables were tested by comparing t-values (estimate/SE). Variance components were tested using likelihood-ratio tests. Differences in deviance between these two models were tested against a chi-squared distribution with degrees of freedom equal to the number of parameters added to the model. All independent variables were grand mean centred to reduce problems of multicollinearity. In order to assess the time-lagged associations, we regressed the next day outcome(s) on present day independent variable(s). Firstly, positive and negative affect were regressed on headache and daily frustration, controlling for age and gender. Secondly, on days when frustration was high, positive and negative affect were regressed on cognitive coping strategies and coping efficacy, controlling for age, gender, headache and variability in daily frustration. Final models are presented with control variables and all significant predictors.

Results

Descriptive statistics

A total of 1062 diary entries were completed out of a possible 1869, representing a completion rate of 57%. Headache was recorded on 250 of the 1062 entries (23.5%). High daily frustration (≥5) was reported on 175 of the 1062 entries (16.9%). Therefore, data on cognitive coping and coping efficacy is available for 175 days.

Multilevel analyses

For negative affect the intraclass correlation was $\rho = 0.41$, therefore 41% of the variability is associated with differences between individuals. For positive affect the intraclass correlation was $\rho = 0.43$, therefore 43% of the variability is associated with differences between individuals. The use of multilevel analysis is

therefore preferable as the data can be said to be clustered (Schwartz & Stone, 1998).

Same-day analyses. Firstly, same day negative affect was regressed on headache occurrence and daily frustration, controlling for age and gender (see Table 1: same day negative affect). Both headache occurrence and daily frustration were significantly positively related to same-day negative affect. In other words, experience of headache and high frustration was associated with elevated negative affect. Addition of headache and daily frustration significantly improved the model (χ^2 = 453.65, *df* = 2, *p* < .001). None of the interaction terms explained significant additional variance in negative affect.

Secondly, on days when frustration was high, same day negative affect was regressed on cognitive coping strategies and coping efficacy, controlling for age, gender, headache and variability in daily frustration (see Table 2: same day negative affect). In response to high frustration, greater use of catastrophizing, other blame, and rumination were significantly related to higher negative affect. Conversely, high coping efficacy beliefs were related to lower negative affect. Addition of cognitive coping strategies and coping efficacy significantly improved the model (χ^2 = 3940.95, *df* = 4, *p* < .001). None of the interaction terms explained significant additional variance in negative affect.

Thirdly, positive affect was regressed on headache occurrence and daily frustration, controlling for age and gender (see Table 3: same day positive affect). Age was negatively related to positive affect indicating that positive affect was higher in younger adolescents. Both headache occurrence and daily frustration were negatively related to positive affect. In other words, occurrence of headache and high frustration were related to lower positive affect on the same day. Addition of headache and daily frustration significantly improved the model (χ^2 = 576.68, *df* = 2, *p* < .001). None of the interaction terms were significantly related to positive affect.

Fourthly, for days when frustration was high, positive affect was regressed on cognitive coping and coping efficacy, controlling for age, gender, headache and variability in daily frustration (see Table 4: same day positive affect). In response to high frustration, greater use of acceptance, positive refocus and greater coping efficacy beliefs were related to higher same day

positive affect. Addition of cognitive coping strategies and coping efficacy significantly improved the model (χ^2 = 3979.20, *df* = 3, *p* < .001). None of the interaction terms were significantly related to positive affect.

Time-lagged analyses. Firstly, next day negative affect was regressed on headache occurrence and daily frustration, controlling for age and gender (see Table 1: next day negative affect). Headache occurrence was unrelated to next day negative affect. Conversely, daily frustration was significantly related to higher next day negative affect. Addition of headache and daily frustration significantly improved the model (χ^2 = 1632.53, *df* = 2, *p* < .001).

Secondly, on days when high daily frustration was experienced, next day negative affect was regressed cognitive coping and coping efficacy, controlling for age, gender, headache and variability in daily frustration (see Table 2: next day negative affect). In response to high frustration, greater use of rumination and catastrophizing were related to greater next day negative affect. Conversely, greater coping efficacy was related to lower next day negative affect. Addition of cognitive coping strategies and coping efficacy significantly improved the model (χ^2 = 2961.47, *df* = 3, *p* < .001).

Table 1. Same day and next day *negative affect* regressed on *headache* and *daily frustration* controlling for age and gender (n = 1062)

	Same day negative affect			Next day negative affect		
	Estimate	SE	t	Estimate	SE	t
Age	0.01	0.17	0.06	-0.05	0.18	0.30
Gender	0.35	0.49	0.71	0.88	0.53	1.66*
Headache occurrence	0.86	0.20	4.19***	-0.29	0.25	1.16
Daily frustration	1.19	0.10	12.52***	0.24	0.12	1.96*
Deviance			4782.14			3603.26

* *p* < .05, ** *p* < .01, *** *p* < .001

Table 2. Same day and next day *negative affect* regressed on *cognitive coping* and *coping efficacy* controlling for age, gender headache and daily frustration (n = 175)

	Same day negative affect			Next day negative affect		
	Estimate	SE	t	Estimate	SE	t
Age	0.32	0.26	1.22	0.21	0.22	0.96
Gender	-0.50	0.76	0.67	-0.16	0.73	0.22
Headache occurrence	0.35	0.45	0.77	0.09	0.62	0.15
Goal frustration	0.92	0.25	3.62***	0.28	0.35	0.80
Catastrophizing	0.73	0.23	3.23***	0.53	0.28	1.87*
Rumination	0.65	0.22	2.91*	0.65	0.28	2.34*
Coping efficacy	-0.60	0.13	4.64***	-0.34	0.16	2.09*
Other blame	0.59	0.18	3.24***	-	-	
Deviance			841.19			641.79

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

Thirdly, next day positive affect was regressed on headache occurrence and daily frustration, controlling for age and gender (see Table 3: next day positive affect). Headache occurrence was unrelated to next day positive affect. In contrast, daily frustration was significantly related to lower next day positive affect. Addition of headache and daily frustration significantly improved the model ($\chi^2 = 1669.37$, $df = 2$, $p < .001$).

Finally, on days when frustration was high, next day positive affect was regressed on cognitive coping strategies and coping efficacy, controlling for age, gender, headache and variability in daily frustration and headache occurrence (see Table 4: next day positive affect). In response to high frustration, use of positive refocusing was significantly related to higher next day positive affect while rumination was related to lower next day positive affect. Addition of these variables significantly improved the model ($\chi^2 = 2315.08$, $df = 2$, $p < .001$).

Table 3. Same day and next day *positive affect* regressed on *headache* and *daily frustration* controlling for age and gender (n = 1062)

	Same day positive affect			Next day positive affect		
	Estimate	SE	t	Estimate	SE	t
Age	-0.39	0.15	2.54**	-0.48	0.21	2.27*
Gender	-0.42	0.45	0.93	-1.45	0.64	2.28*
Headache occurrence	-0.58	0.21	2.79**	0.35	0.27	1.29
Daily frustration	-1.71	0.10	17.81***	-0.40	0.13	3.08***
Deviance			4801.14			3708.45

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

Table 4. Same day and next day *positive affect* regressed on *cognitive coping* and *coping efficacy* controlling for age, gender, headache and daily frustration (n = 175)

	Same day positive affect			Next day positive affect		
	Estimate	SE	t	Estimate	SE	t
Age	-0.67	0.20	3.26*	-0.65	0.28	2.32*
Gender	-0.42	0.59	0.71	-0.44	0.91	1.10
Headache occurrence	-0.39	0.45	0.87	0.15	0.59	0.25
Goal frustration	-1.17	0.25	4.76***	-0.36	0.33	1.09
Coping efficacy	0.40	0.13	3.23***	-	-	
Acceptance	0.38	0.17	2.27*	-	-	
Positive refocus	0.75	0.18	4.26***	0.49	0.23	2.13*
Rumination	-	-		-0.53	0.56	2.07*
Deviance			821.94			645.72

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

Discussion

This study is one of the first to investigate the concurrent and prospective contribution of headache, frustration to daily goal pursuit, and cognitive coping strategies to affective states in adolescents. In line with previous cross-sectional studies among the general population of adolescents (Bandell-Hoekstra et al., 2002; Fichtel & Larsson, 2002), headache was related to reduced positive affect and elevated negative affect on the same day. There was, however, no evidence for a prospective relationship between headache and subsequent affective states. This finding is in line with evidence from a prospective epidemiological study in which headache was not predictive of subsequent depressive symptoms (Pine et al., 1996).

Over and above the impact of headache complaints on affect, daily frustration to pursuit of valued personal goals was both concurrently and prospectively related to positive and negative affect. These results extend the findings from cross-sectional studies which have found a negative relationship between frustration to goal pursuit and well-being in adolescents (Massey et al., in press-a; Massey et al., in press-b). Similarly, these findings support a wider body of literature demonstrating the negative prospective effect of impediment to goal pursuit on quality of life over time in adult patients (Boersma et al., 2005b; Echteld et al., 2003). We also explored whether daily frustration to goal pursuit would exacerbate the impact of headache on affect, but no evidence for this was found.

The way in which an adolescent copes with daily frustration was also found to be a significant predictor of daily affect. Specifically, catastrophizing, rumination and other blame were related to same day negative affect. Moreover, rumination and catastrophizing were significantly related to negative affect on the next day. Furthermore, focusing on alternative positive aspects of life was related to same day positive affect. Curiously, rumination was not related to same day positive affect but to positive affect on the following day. These findings support and extend previous cross-sectional studies which have demonstrated the less adaptive nature of rumination and catastrophizing and more adaptive nature of positive refocusing for psychological well-being in adolescence (e.g., Broderick & Korteland, 2004; Garnefski et al., 2003; Garnefski

& Kraaij, 2006; Garnefski et al., 2001; Massey et al., in press-b). Moreover these findings add that strategies such as rumination and catastrophizing, typically measured in response to pain, are also maladaptive responses to daily stressors. Interestingly, strategies such as positive reappraisal which have previously been found to be important for psychological well-being were not significant here. In addition to this, belief in one's ability to cope was related to lower same and next day negative affect and higher same day positive affect. These findings underscore the importance of efficacy beliefs on the psychological well-being of adolescents (e.g. Sandler et al., 2000).

What then are the practical implications of these findings? These findings presented here may offer important targets for interventions aimed at improving psychological well-being of adolescents with headache. Such programs may benefit from enhancing successful goal pursuit in order to reduce experience of daily frustrations. Skills which could be taught include consideration of alternative routes to goal attainment, re-prioritization of goals and consideration of disengagement when goal attainment is unlikely. Another pertinent target for interventions is rumination as a method of coping with daily frustrations to goal pursuit. We speculate that strategies such as rumination and catastrophizing may inhibit flexible goal pursuit and adaptive disengagement while focusing on other positive aspects of life (positive refocusing) may promote alternative goal pursuits or increase the likelihood of disengagement from the frustrated goal.

The results presented should be interpreted in the light of some limitations of the study. Firstly, headache was measured dichotomously in terms of presence or absence of the complaint. In future, other variables which demonstrate the characteristics of the headache such as severity may give greater insights into the relationships under investigation. Secondly, the reliance on self-report measures may have lead to some reporting bias, for example pain and mood may colour responding (see Affleck et al., 2001). However, as these concepts are particularly subjective it was deemed appropriate to focus here on reports from the individual. Thirdly, all questions were completed simultaneously at the end of the day and thus do not capture fluctuations over the day. In future multiple measurements throughout the day may add further insights into the relationships under investigation, for example using the

experience sampling method. Fourthly, there is limited psychometric data available as to the suitability of these measures for daily use, as these measures were not designed with this purpose in mind. Finally, the low response rate of those invited to participate may limit the generalizability of the findings.

Notwithstanding these limitations, this is the first study to demonstrate the prospective contribution of daily frustration to goal pursuit and associated coping to adolescent affect. In the present study we focused on a sample of adolescents from the general population. An interesting direction for future research would be to investigate the extent to which daily frustrations, cognitive coping and coping efficacy beliefs play a role in the well-being of adolescents with a clinical diagnosis of headache. It may be that more severe headache complaints impact the ability to pursue personal goals to a greater extent. If this were the case then another direction for future research would be to investigate the extent to which interventions promoting effective goal pursuit and coping skills can influence well-being among adolescents with headache.