Goal frustration, coping and well-being in the context of adolescent headache: A self-regulation approach.

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Emma K. Massey *, Nadia Garnefski, Winifred A. Gebhardt

Leiden University Institute for Psychological Research, Leiden University, Postbus 9555, 2300 RB, Leiden, The Netherlands

ABSTRACT

The aim of this study was to investigate the relationships between goal frustration, coping and well-being in the context of adolescent headache. Firstly, we investigated whether adolescents with weekly, monthly or no headache complaints differed with regard to the importance assigned to their personal goals, experience of goal frustration, coping with goal frustration and well-being. Secondly, the extent to which goal and coping factors contributed to well-being and whether this relationship differed according to the frequency of headache complaints was examined. For this purpose, 1202 adolescents aged 12–18 completed self-report questionnaires in schools. Adolescents were divided into three groups based on their experience of headache: no headache reported (38%); monthly headache (40%); weekly headache (18%). Results show that these groups did not differ with respect to the importance they attach to goals. They did, however, differ according to experience of goal frustration, use of strategies to cope with goal frustration and well-being, although effect sizes were small. After controlling for individual and headache characteristics, frustration of self acceptance and health goals, and the use of self blame, rumination and other blame were consistently related to lower well-being. Moreover, interactions with headache group indicated that for adolescents with weekly headache, greater frustration of school and self acceptance goals and a lower importance assigned to health goals was more detrimental to well-being than for those with no headache complaints. We conclude that frustration to goal pursuit and strategies for coping with this frustration are important factors in adolescent well-being and may offer important targets for intervention.

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1. Introduction

Headache is one of the most commonly reported physical complaints in adolescence (e.g. Hunfeld et al., 2001; Perquin et al., 2000), reported weekly by over 15% of adolescents (Bandell-Hoekstra et al., 2000). More severe headache characteristics have been associated with lower quality of life (Bandell-Hoekstra et al., 2002; Langeveld et al., 1997) and higher depressive symptoms (e.g. Egger et al., 1998; Pine et al., 1996; Powers et al., 2006).

All adolescents face an array of age and culture-specific normative goals which need to be successfully negotiated for optimal adjustment (Cantor et al., 1991; Havighurst, 1953; Nurmi, 1991). Evidence suggests that adolescents with a chronic illness endorse the same goals as their healthy peers (Seiffge-Krenke, 1998). However, greater experience of pain has been associated with greater impediment to goal pursuit among adults (Karoly and Ruehlman, 1996). Being unable to attain personal goals, defined here as goal frustration (Boekaerts, 1999) has been related to lower well-being

in adolescents (Massey et al., in press), healthy young adults (e.g. Emmons, 1986; Schroevers et al., 2007) and patients with a chronic illness (Boersma et al., 2005; Echteld et al., 2001; van der Veek et al., 2007). Questions remain, however, as to whether adolescents with varying headache differ in their experience of goal frustration and whether the relationship between goal frustration and well-being differs according to the frequency of headache?

When goals are frustrated, the ability to cope may have important implications for adolescent psychological health (Cicchetti et al., 1995). Results from different studies on whether headache is related to the use of particular coping strategies are inconsistent. Chronic (headache) pain in adolescence has been linked to greater catastrophizing, externalizing, and social support seeking (van den Bree et al., 1990; Bandell-Hoekstra et al., 2002; Merlijn et al., 2003). However, some studies have failed to find a relationship between headache and coping strategies (Buenaver et al., 2008; Frare et al., 2002). Pain catastrophizing (Buenaver et al., 2008; Eccleston etal., 2004) and rumination (e.g. Abela et al., 2002; Broderick and Korteland, 2004; Garnefski et al., 2003; Papadakis et al., 2006) have been linked to greater depressive symptoms in adolescence. However, whereas these earlier studies have focused on coping *with*

* Corresponding author. Tel.: +31 71 527 3737; fax: +31 71 527 4678.
E-mail address: e.massey@erasmusmc.nl (E.K. Massey).

headache, we investigated how adolescents with varying headache frequency cope *with frustration to goal pursuit*. In short, we suggest that frustration to pursuit of personal goals and means of coping with this may be a potential route to reduced well-being, and that this is possibly exacerbated by the experience of pain.

The following research questions were formulated: Firstly, to what extent do adolescents with weekly, monthly or no headache complaints differ on goal importance, goal frustration, cognitive coping strategies in response to goal frustration and well-being indicators? Secondly, to what extent can goal and coping variables explain well-being and does this relationship differ according to headache frequency?

2. Method

2.1. Participants

A total of 1210 secondary-school students aged 12–18 (M = 15.0, SD = 1.2) participated in the study. Eight participants were deleted from the sample due to incomplete or unusable questionnaires (N = 1202, 47% girls). Eighteen percent of these adolescents followed a vocational education, 44% followed a general secondary education and 38% a pre-university education. Eighty-three percent of the sample was Dutch, 5% Surinamese, 2% Indonesian and 10% Other. In order to compare adolescents with varying degrees of headache, the sample was divided into three groups according to headache frequency: no headache (38%); monthly headache (40%); and weekly headache (18%). Data on headache frequency were missing for 5% of the sample.

2.2. Procedure

Of the 28 secondary-schools in the Western part of the Netherlands (Randstad) that were approached for this study, eight urban/suburban schools agreed to participate (29%). The main reasons for non-participation were lack of time due to exams or participation in other research. Prior to commencing data collection, parents were informed of the study aims and procedures by post. Only 20 parents declined permission for their child's participation. Data was collected by means of a self-report questionnaire, completed in school hours in the presence of the first author and a teacher. Adolescents signed an assent form which explained the voluntary nature of the study, anonymity and confidentiality of their responses with regards to parents and teachers. The questionnaire took on average 45 min to complete and was handed in immediately to the first author (in one exception the school administered the questionnaires themselves which were collected by the researcher at a later date). All procedures were in line with ethical requirements of the Netherlands.

2.3. Measures

2.3.1. Headache
Participants were asked to indicate whether they had experienced headache in the previous three months (yes/no). Those who reported experiencing headache completed additional questions on various headache characteristics including frequency, duration, severity and use of medication. Headache frequency, measured on a scale from 1 'less than once a month' to 6 'every day'. Severity was rated on a scale from 1 'not at all bad' to 5 'very bad'. Use of pain killers was rated on a scale from 1 'never' to 5 'always'. Average duration of headache was indicated in hours. Adolescents were divided into three groups according to headache frequency: in the 'no headache' group were those who reported no headache in the previous three months; in the 'monthly head-

ache' group were those who reported headache less than once a month to a few times a month; and in the 'weekly headache' group were those who reported headache once a week to daily. (Although we recognize that those reporting headache less than once a month do not strictly represent the label of 'monthly headache', we decided to include them in this group as they had chosen to report some form of headache, albeit infrequent, suggesting that they did not belong in the 'no headache' group.) In order to conduct regression analyses, headache group was recoded into dummy variables with no headache taken as the base category. The first dummy contrasted weekly headache with no headache (coded as no = 0; monthly = 0, weekly = 1). The second dummy contrasted monthly headache with no headache (coded as no = 0; monthly = 1; weekly = 0) (Field, 2000).

2.3.2. Goal importance
Forty-nine goal items were rated on personal importance on a 5-point scale ranging from 1 'not at all important' to 5 'very important'. Mean scores were then calculated for six goal domains. The six domains consisted of goals relating to (1) Personal values e.g. 'treat others fairly', 'be a good person', 'have a good relationship with parents' (9-items, α = .81), (2) Social acceptance e.g. 'be popular', 'feel that you belong' (13-items, α = .85), (3) Self acceptance e.g. 'stand up for myself', 'be happy', 'accept myself as I am' (8-items, α = .79), (4) School e.g. 'get good grades', 'do my best at school' (7-items, α = .81), (5) Health e.g. 'avoid bad/unhealthy habits', 'eat healthily', 'be fit' (7-items, α = .78) and (6) Self development e.g. 'do something creative', 'experience new things' (5 items, α = .62). This factor structure was supported by a Principle Components Analysis (details are available from the first author upon request). Items for the goal checklist were taken from an earlier study on self-generated adolescent goals (see Massey et al., in press).

2.3.3. Goal frustration
Participants also rated the same 49 goal items (as described under 'Goal importance') on the extent to which they had been successful in attaining the goal. This was done on a 5-point scale ranging from 1 'not at all successful' to 5 'completely successful' which was subsequently reverse scored. The goal frustration scale was generated by taking a mean score of goal attainment per domain only for those goals which were reported to be important (a score of three or above) (for similar weighted calculations see Boersma et al., 2005). This generated scales whereby a high goal frustration score indicated low goal attainment on important goals for that domain. The α coefficients indicate acceptable internal-consistency reliability, with the exception of the Self development sub-scale: Personal values, α = .71; Social acceptance, α = .71; Self acceptance, α = .77; School, α = .67; Health, α = .69; Self development, α = .48. As the internal reliability of the self-development goal importance and frustration scales could not be improved by deleting items, both these scales were omitted from further analyses.

2.3.4. Cognitive coping strategies
Cognitive coping was assessed using the Cognitive Emotion Regulation Questionnaire which is a 36-item measure consisting of nine sub-scales with four items per sub-scale (Garnefski et al., 2001). Participants were prompted to think about an important goal that they had not been able to achieve and record how often they used these coping strategies when they encountered difficulties in achieving this goal. The nine scales are as follows: Acceptance, e.g. 'I think that I must accept that I can't (yet) achieve this goal' (α = .68); Catastrophizing, e.g. 'I keep thinking about how terrible the problem is that I have experienced' (α = .73); Other blame, e.g. 'I feel that others are to responsible for the fact

that I have not (yet) been able to achieve this goal' ($\alpha = .76$); Positive reappraisal, e.g. 'I think that I can learn something from this setback' ($\alpha = .73$); Positive refocusing, e.g. 'I think about something nice instead of about the setback' ($\alpha = .82$); Putting into perspective, e.g. 'I think that things could have been much worse' ($\alpha = .76$); Refocus on planning, e.g. 'I think about what I can do best so that I can still achieve my goal' ($\alpha = .73$); Rumination, e.g. 'I am preoccupied with what I think and feel about not being able to achieve my goal' ($\alpha = .78$); and Self blame, e.g. 'I think about the mistakes that I have made' ($\alpha = .76$). Each item was measured on a 5-point Likert type scale and a sum score over the four items per sub-scale was calculated (ranging from 4 to 20). The reliability of the scales in the present study was acceptable. Previous research on adolescents using these scales has also demonstrated acceptable reliability and validity (Garnefski et al., 2001).

2.3.5. Depressive symptoms

Depression symptoms were measured using the Dutch translation of the Symptom Checklist (SCL-90) depression sub-scale (Arrindell and Ettema, 1986; Derogatis et al., 1973). A sum score of the 15 items was calculated with possible scores ranging from 15 to 75. Reliability related to the internal homogeneity of the scale for this study was good ($\alpha = .92$).

2.3.6. Quality of life (QoL)

QoL was measured using the short form of the Pediatric Quality of Life Inventory™ (Chan et al., 2005; Varni et al., 1999, 2001, 2002, 2003). This 15 item measure covers quality of life in the areas of school (3 items), physical functioning (5 items), peer relationships (3 items) and emotions (4 items). Participants were asked to what extent they had experienced problems in these areas in the previous month. Answers were scored on a scale ranging from 1 'never' to 5 'almost always'. Scores were recoded so that a high score indicated good quality of life (range 0–100). A total score was calculated as the mean of all items. Reliability in this study ($\alpha = .85$) was comparable to that of previous studies (Chan et al., 2005).

2.3.7. Negative life events

Negative life events were measured by summing the number of events experienced in the prior 12 months. Scores ranged from 0 to 12 ($M = 1.69$, SD = 1.63). Items were selected from the Life Events Checklist (Johnson and McCutcheon, 1980) and the Life Events and Coping Inventory (Dise-Lewis, 1988). The number of negative life events was controlled for in the regression analyses.

2.4. Statistical analyses

Chi-squared, t-tests, and one-way analyses of variance were used to examine differences between headache groups on demographic and headache variables. Multivariate analyses of variance (MANOVA) were conducted to test the difference between headache groups on goal importance, goal frustration, use of coping strategies and well-being. When univariate ANOVA tests were significant, post hoc Scheffé tests were conducted (Tabachnick and Fidell, 2007). Effect sizes for MANOVA are reported according to Cohen (1977) for the partial eta squared.

Pearson's correlations and hierarchical linear regression analyses were conducted to assess relationships between goal frustration and coping on the one hand and depressive symptoms and quality of life on the other, per headache group. In the first step of the regression analyses, individual and headache characteristics were controlled for. In the second step, goal, coping and the headache group (by means of dummy coding) variables were entered. In order to assess whether relationships between the independent variables and well-being varied according to headache group, interaction terms were entered in the final step. Continuous variables were standardized prior to calculating interaction terms. Effect sizes for multiple regression models are reported according to Cohen (1992) for Cohen's f^2. In Tables 3 and 4, final models with significant independent variables only are presented.

3. Results

There were no significant differences between the headache groups on age, $F(2, 1136) = 2.97$, $p > .05$, educational track, $\chi^2(4, n = 1137) = 2.71$, $p > .05$, or ethnicity, $\chi^2(14, n = 1141) = 12.65$, $p > .05$. The three groups did differ on gender, $\chi^2(2, n = 1138) = 87.0$, $p < .001$; there were more girls in the weekly (73%) and monthly headache (48%) groups than in the no headache group (34%). Adolescents with weekly headache ($M = 2.7$, SD = 0.8) reported greater severity of pain than adolescents with monthly headache ($M = 2.3$, SD = 0.8), $t(681) = -6.94$, $p < .001$. Similarly, adolescents with weekly headache ($M = 2.9$, SD = 1.3) reported greater medication use than adolescents with monthly headache ($M = 2.7$, SD = 1.2), $t(677) = -2.28$, $p < .05$. There was no significant difference between groups on headache duration, $t(632) = 0.39$, $p > .05$.

3.1. Differences in goal importance, goal frustration, coping and well-being according to headache frequency

Table 1 presents the means, standard deviations and univariate tests for difference in goal importance, goal frustration, coping and well-being according to headache frequency. In the first MANOVA, the multivariate test indicated an overall significant difference between headache groups on goal importance [Wilks' $\lambda = .98$, $F(10, 2272) = 2.43$, $p < .01$, $\eta_p^2 = .01$]. The univariate tests indicated that the groups differed significantly on the importance of personal values goals, however, the size of this effect is small. Post hoc Scheffé tests revealed that adolescents with weekly headache scored significantly higher on the importance of personal values goals than adolescents with no headache complaints. There were no differences in importance of the other goal domains.

In the second MANOVA, the multivariate test indicated an overall significant difference between headache groups on goal frustration [Wilks' $\lambda = .94$, $F(10, 2264) = 7.77$, $p < .001$, $\eta_p^2 = .03$]. Univariate tests indicated significant group differences on all goal domains except for personal values goals (see Table 1). Headache explains the greatest amount of variance in self acceptance and health goal frustration (although these effect sizes are small). Post hoc Scheffé tests show that adolescents with weekly headache reported higher frustration than adolescents with no headache on social acceptance, self acceptance, school, and health goals. Adolescents reporting monthly headache reported significantly higher frustration than adolescents with no headache on self acceptance goals. Adolescents with weekly headache reported higher frustration than adolescents with monthly headache on self acceptance, school and health goals. It should be noted that, in general, the level of goal frustration was low with average scores lower than three (on a scale of 1–5).

In the third MANOVA, the multivariate test indicated an overall significant difference between headache groups on use of coping strategies to deal with goal frustration [Wilks' $\lambda = .92$, $F(18, 2128) = 5.08$, $p < .001$, $\eta_p^2 = .04$]. Univariate tests indicated that headache groups differed on use of self blame, acceptance, rumination, catastrophizing, putting into perspective and other blame (see Table 1). The largest differences between the groups were on self blame, acceptance and rumination, although it is noted that these effect sizes are relatively small. Post hoc Scheffé tests revealed that adolescents with weekly headache scored significantly higher than both other groups on acceptance, catastrophizing, rumination and

Table 1
Differences in goal importance, goal frustration, coping and well-being according to headache frequency: means, standard deviations and univariate tests.

	1 No headache M (SD) n = 454	2 Monthly headache M (SD) n = 479	3 Weekly headache M (SD) n = 211	F	df	η_p^2	Post hoc Scheffé
Goal importance							
Personal values goals[†]	4.0 (0.6)	4.0 (0.6)	4.1 (0.6)	4.21[*]	2, 1140	.007	1 < 3
Social acceptance goals[†]	3.3 (0.6)	3.3 (0.6)	3.3 (0.7)	0.01	2, 1140	.000	
Self acceptance goals[†]	4.2 (0.5)	4.2 (0.5)	4.3 (0.6)	1.00	2, 1140	.002	
School goals[†]	3.8 (0.6)	3.8 (0.6)	3.9 (0.6)	2.61	2, 1140	.005	
Health goals[†]	3.8 (0.6)	3.7 (0.6)	3.8 (0.7)	0.25	2, 1140	.000	
Goal frustration							
Personal values goals[†]	2.0 (0.4)	1.9 (0.4)	2.0 (0.5)	0.18	2, 1136	.000	
Social acceptance goals[†]	1.9 (0.4)	2.0 (0.4)	2.0 (0.5)	4.68[**]	2, 1136	.008	1 < 3
Self acceptance goal frustration[†]	1.9 (0.5)	2.1 (0.5)	2.2 (0.6)	22.83[***]	2, 1136	.039	1 < 2 < 3
School goals[†]	2.2 (0.5)	2.3 (0.5)	2.4 (0.5)	4.90[**]	2, 1136	.009	1, 2 < 3
Health goals[†]	2.1 (0.5)	2.2 (0.5)	2.3 (0.6)	14.27[***]	2, 1136	.025	1, 2 < 3
Cognitive coping strategies							
Acceptance[‡]	8.4 (3.1)	8.9 (3.3)	9.9 (3.3)	14.78[***]	2, 1072	.027	1, 2 < 3
Catastrophizing[‡]	6.7 (3.1)	6.3 (2.5)	7.3 (3.2)	8.45[***]	2, 1072	.016	1, 2 < 3
Focus on planning[‡]	10.5 (3.4)	10.8 (3.3)	11.1 (3.2)	2.83	2, 1072	.005	
Other blame[‡]	6.4 (2.8)	6.0 (2.4)	6.6 (3.0)	3.57[*]	2, 1072	.007	2 < 3
Positive reappraisal[‡]	10.6 (3.7)	10.4 (3.5)	10.6 (3.7)	0.50	2, 1072	.001	
Positive refocus[‡]	12.7 (4.0)	13.1 (3.8)	13.1 (3.7)	1.20	2, 1072	.002	
Putting into perspective[‡]	11.6 (3.9)	12.0 (4.1)	12.5 (3.6)	3.77[*]	2, 1072	.007	1 < 3
Rumination[‡]	7.9 (3.2)	8.1 (3.2)	9.3 (3.6)	13.33[***]	2, 1072	.024	1, 2 < 3
Self blame[‡]	9.4 (3.5)	9.9 (3.4)	11.2 (3.6)	19.65[***]	2, 1072	.035	1, 2 < 3
Well-being indicators							
Depressive symptoms[§]	22.3 (8.9)	24.77 (9.0)	31.1 (12.2)	60.48[***]	2, 1134	.096	1 < 2 < 3
Quality of Life[⁺]	81.9 (11.7)	78.24 (11.8)	71.7 (13.5)	50.69[***]	2, 1134	.082	1 > 2 > 3

η_p^2 = partial eta squared. [†]Scores ranged from 1 to 5. [‡]Scores ranged from 4 to 20. [§]Scores ranged from 15 to 75. [⁺]Scores ranged from 0 to 100.
[*] p < .05.
[**] p < .01.
[***] p < .001.

self blame. Adolescents with weekly headache scored higher on other blame than adolescents with monthly headache, and higher on putting into perspective than those with no headache complaints. There were no differences between the groups on focusing on planning, positive reappraisal, and positive refocus.

Finally in the fourth MANOVA, the multivariate test indicated an overall significant difference between headache groups on well-being indicators, [Wilks' λ = .89, $F(4, 2266)$ = 33.41, $p < .001$, $\eta_p^2 = .06$]. Univariate tests showed that headache groups differed on both depressive symptoms and quality of life. Headache accounts for 10% and 8% of the variance in depressive symptoms and quality of life, respectively (a medium effect size). Post hoc Scheffé tests demonstrated a progressive significant increase in depressive symptoms between no, monthly and weekly headache groups and a similar significant decrease in quality of life as headache frequency increases.

3.2. Relationships between goal frustration, coping and well-being in adolescents and interactions with headache frequency

Pearson's correlations between headache, goal and coping variables on the one hand and well-being indicators on the other per headache group are presented in Table 2. Based on these correlations age, gender, negative life events, headache severity and medication use were controlled for in the analyses. Very few of the goal importance domains were related to the well-being indicators. Conversely, frustration of goals in all domains was positively related to depressive symptoms and negatively related to QoL, for all three groups. Similarly, self-blame, acceptance, rumination, catastrophizing and other-blame were significantly related to both well-being indicators in all three groups. Focus on planning was also related to depressive symptoms for all groups and to QoL for the no headache and monthly headache groups.

Following inspection of the correlations, regression analyses were conducted. Firstly, gender, negative life events and headache severity were related to higher depressive symptoms. After controlling for individual and headache characteristics, frustration of self acceptance and health goals, use of self blame, rumination, catastrophizing and other blame were significantly related to higher depressive symptoms (see Table 3). Conversely, positive refocus was related to lower depressive symptoms. Adolescents with weekly headache reported significantly greater depressive symptoms compared those reporting no headache. Finally, interactions between weekly headache and self acceptance and school frustration were significantly related to depressive symptoms. At low levels of goal frustration there was no difference between the headache groups on depressive symptoms. However, when goal frustration was high, depressive symptoms were higher for the weekly headache group compared to the no headache group. It should be noted that the effect size for this step is small (Cohen, 1992).

In order to make the analyses comparable, the same control variables were entered into the QoL regression (see Table 4). Firstly, gender and negative life events were negatively related to QoL. Age, headache medication and severity were unrelated to QoL. Secondly, frustration of self acceptance, school (trend) and health goals, self blame, rumination, other blame and experience of weekly headaches were significantly related to lower QoL. Although health goal importance was related to QoL when initially entered, in the final model this became non-significant. Finally, interactions between weekly headache and health importance and school frustration were found to be significant. Again the effect size for this step is small (Cohen, 1992). When school goal frustration was low there was no difference between the headache groups. However, when school frustration was high a greater reduction in QoL was found for weekly adolescents with weekly

Table 2
Pearson's correlations according to headache frequency.

	No headache		Monthly headache		Weekly headache	
	Depressive symptoms	QoL	Depressive symptoms	QoL	Depressive symptoms	QoL
QoL	−.63***	–	−.64***	–	−.67***	–
Individual characteristics						
Age	.04	−.02	.07	−.15***	.04	−.01
Gender	.15***	−.14**	.31***	−.26***	.12	−.23***
Negative life events	.19***	−.27***	.16***	−.22***	.34***	−.34***
Headache characteristics						
Headache severity	–	–	.12**	−.08	.07	−.05
Headache duration	–	–	.08	−.01	.07	−.02
Headache medication use	–	–	.05	−.07	−.17*	.10
Goal importance						
Personal values goals	.07	−.02	.11*	−.01	.04	.03
Social acceptance goals	.09	−.03	−.06	.09	.09	−.04
Self acceptance goals	.01	−.04	.01	.00	−.04	.06
School goals	.03	−.01	.13**	.06	.01	.12
Health goals	−.01	.05	.05	.04	−.03	.15*
Goal frustration						
Personal values goals	.29***	−.25***	.16***	−.27***	.27***	−.33***
Social acceptance goals	.23***	−.23***	.18***	−.20***	.25***	−.25***
Self acceptance goals	.32***	−.27***	.41***	−.40***	.50***	−.42***
School goals	.17***	−.22***	.24***	−.34***	.35***	−.44***
Health goals	.30***	−.28***	.27***	−.30***	.32***	−.30***
Cognitive coping strategies						
Acceptance	.25***	−.24***	.25***	−.23***	.31***	−.22**
Catastrophizing	.35***	−.21***	.34***	−.26***	.46***	−.32***
Focus on planning	.24***	−.15**	.26***	−.18***	.16*	−.11
Other blame	.32***	−.27***	.20***	−.16***	.26***	−.22**
Positive reappraisal	.11*	−.11*	.12**	−.03	−.02	.02
Positive refocus	−.06	−.07	−.04	−.01	−.21**	.10
Putting into perspective	.09	−.09	−.00	−.01	−.09	.09
Rumination	.43***	−.35***	.44***	−.32***	.47***	−.34***
Self blame	.41***	−.31***	.35***	−.28***	.37***	−.23***

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

Table 3
Depressive symptoms regressed on goal frustration and coping controlling for background and headache variables ($n = 1202$).

Block	Independent variables	β	t	R^2	ΔF	Cohen's f^2
1	Age	.02	0.64			
	Gender	.16	6.43***			
	Negative life events	.13	5.68***			
	Headache medication	−.06	−1.76			
	Headache severity	.10	2.68**	.17	42.95***	.20
2	Self acceptance frustration	.18	4.07***			
	Health frustration	.07	2.79**			
	School frustration	−.01	−0.21			
	Self blame	.15	5.35***			
	Rumination	.16	5.28***			
	Positive refocus	−.07	−2.88**			
	Catastrophizing	.07	2.29*			
	Other blame	.10	3.58***			
	Dummy 1: no headache versus weekly	.09	2.25*			
	Dummy 2: no headache versus monthly	.03	0.80	.45	53.97***	.51
3	Dummy 1 × self acceptance frustration	.09	2.82**			
	Dummy 2 × self acceptance frustration	.03	0.70			
	Dummy 1 × school frustration	.07	2.31*			
	Dummy 2 × school frustration	.01	0.39	.46	4.89***	.02

Model $F(19, 1051) = 47.03$, $p < .001$.
* $p < .05$
** $p < .01$,
*** $p < .001$.

headache compared to adolescents with no headache. There was no difference in QoL between headache groups when health importance was high. However, when health importance was low a greater reduction in QoL was found for adolescents with weekly headache compared to adolescents with no headache.

4. Discussion

In this study we firstly aimed to investigate the differences in goal importance, goal frustration, coping, and well-being between adolescents who report weekly, monthly or no headache com-

Table 4
QoL regressed on goal frustration and coping controlling for background and headache variables ($n = 1202$).

Block	Independent variables	β	t	R^2	ΔF	Cohen's f^2
1	Age	−.02	−0.69			
	Gender	−.18	−6.86***			
	Negative life events	−.18	−7.86***			
	Headache medication	.01	0.16			
	Headache severity	−.04	−1.13	.19	48.45***	.23
2	Health goals importance	.06	1.44			
	Self acceptance frustration	−.17	−5.77***			
	School frustration	−.07	−1.72			
	Health frustration	−.10	−3.69***			
	Self blame	−.09	−3.16**			
	Rumination	−.13	−4.27***			
	Other blame	−.12	−4.45***			
	Dummy 1: no headache versus weekly	−.09	−2.10*			
	Dummy 2: no headache versus monthly	−.04	−1.04	.39	39.74***	.33
3	Dummy 1 × health goal importance	.06	2.13*			
	Dummy 2 × health goal importance	.04	1.04			
	Dummy 1 × school goal frustration	−.09	−2.91**			
	Dummy 2 × school goal frustration	−.05	−1.55	.40	3.26*	.02

Model $F(18, 1052) = 38.78$, $p < .001$.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

plaints. Secondly, we aimed to investigate how goal and coping variables are related to well-being and whether this relationship differed according to headache frequency. Our results show that there were significant differences between adolescents with weekly, monthly and no headache complaints on goal frustration, coping with goal frustration and well-being. Frustration of self acceptance and health goals and use of self blame, rumination and other blame appear to be consistently associated with lower well-being. These concepts were not only associated with depressive symptoms but also with healthy functioning as indicated by QoL. Moreover, goal frustration was more strongly related to lower well-being in adolescents with weekly headache compared to those with no headache complaints. We conclude that goal frustration and coping are important factors in adolescent well-being which may offer possible targets for interventions in adolescents with headache complaints.

4.1. Differences in goal importance, goal frustration, coping and well-being according to headache frequency

Adolescents with more frequent headache were found to report significantly more depressive symptoms and a lower QoL. This is in line with numerous previous studies documenting the lower well-being of adolescents with headache complaints (e.g. Bandell-Hoekstra et al., 2002; Egger et al., 1998; Härmä et al., 2002; Langeveld et al., 1997; Martin-Herz et al., 1999; Pine et al., 1996; Powers et al., 2006).

In general, there were few differences between the headache groups on goal importance. This mirrors previous findings (Seiffge-Krenke, 1998) and suggests that adolescents with monthly or weekly headache essentially aspire to the same goals in life as their headache-free counterparts. The importance of personal values goals, however, was found to be higher for those with weekly headache compared to those with no headache. This result is in contrast to earlier findings in which importance of work goals was found to be *lower* in adults with persistent pain compared to those in the no pain group (Karoly and Ruehlman, 1996) although this is admittedly a very different goal domain. Interestingly, personal values were the only goals not frustrated to a greater extent in adolescents with weekly headache. We speculate therefore that adolescents with weekly headache may prioritize these goals in

which they are relatively more successful compared to other more frustrated domains.

In contrast to the findings on goal importance, adolescents with weekly headache reported greater frustration of their personal goals compared to those with less frequent or no headache complaints, particularly in the areas of self acceptance, health, and school. Adolescents reporting monthly headache also reported higher frustration of self acceptance goals than those reporting no headache complaints. These findings are in line with previous evidence of greater goal conflict reported by adults with pain complaints (Karoly and Ruehlman, 1996). A previous study suggested that headache may be linked to difficulties with social acceptance and feelings of insufficiency (Merlijn et al., 2003). Our results support and add to these findings, suggesting that headache may also be related to issues of self acceptance. Although we cannot draw conclusions from these data as to the causality of these relationships, as earlier studies have shown evidence for a reciprocal relationship between headache and stress (Nash and Thebarge, 2006) we speculate that the relationship between headache and goal frustration is likely to be bi-directional (see Hamilton et al., 2004). One possible explanation for the relationship is that headache acts to deplete energy for self-regulatory tasks, thus leading to greater frustration of personal goals (Baumeister et al., 1998; Hamilton et al., 2004). Another explanation could be that interpretation of goal progress is biased due to reduced pleasure experienced during goal pursuit as a result of the headache experience (Hamilton et al., 2004).

With regard to the use of cognitive coping strategies in response to goal frustration, adolescents with weekly headache reported greater use of acceptance, catastrophizing, rumination and self blame compared to adolescents with monthly or no headache complaints. The greater use of these strategies could be attributed to their greater experience of situations in which coping skills are necessary (i.e. the experience of pain). This supports earlier studies in which headache in adolescents has been found to be related to use specific types of coping strategies such as greater catastrophizing (Bandell-Hoekstra et al., 2002; Merlijn et al., 2003). Moreover, this study adds that headache is associated with not only pain-coping strategies, but also with coping strategies used to deal other stressors such as goal frustration. So-called adaptive strategies, such as positive reappraisal and positive refocus were unrelated to headache frequency.

4.2. Relationships between goal frustration, coping and well-being in adolescents and interactions with headache frequency

Frustration of self acceptance and health goals was found to be consistently related to lower adolescent well-being, after controlling for individual and headache characteristics. Frustration of self (acceptance) goals may be particularly pertinent for well-being during adolescence when identity development is a key developmental task. These findings replicate and extend previous studies on healthy adults (Emmons, 1986, 1996; Emmons and King, 1988; Schroevers et al., 2007) and patient populations (Boersma et al., 2005; Echteld et al., 2001; van der Veek et al., 2007) demonstrating that frustration of personal goals is important for psychological well-being in adolescents. Moreover, we found that for youths who experience more frequent headache, frustration was more strongly related to lower well-being. Although these findings require replication, we tentatively suggest that disruption to effective goal pursuit, as indicated by goal frustration, may be one of the pathways that link headache to lower well-being.

In addition to this we found that low importance given to health goals was more strongly related to a lower quality of life in adolescents with weekly headache compared to those with no headache complaints. It appears therefore that prioritizing health goals may be beneficial to perceived quality of life in youths with headache. Greater importance given to these goals may result in more health protective behaviors which may be of particular importance when one is vulnerable to headache attacks.

With regards to coping with goal frustration, rumination, self blame and catastrophizing are shown in both this study and in previous studies to be associated with lower adolescent well-being (Abela et al., 2002; Broderick and Korteland, 2004; Garnefski et al., 2003, 2001, 2002; Papadakis et al., 2006). Our findings also suggest that blaming others for goal frustration may be detrimental to well-being. This is in contrast to previous studies wherein other blame has been failed to be predictive of well-being (Garnefski et al., 2002, 2004). Furthermore, it appears that the relationship between coping strategies used to deal with goal frustration and well-being does not differ according to frequency of headache. Regardless of headache experience, ruminating, blaming oneself or others or catastrophizing in response to goal frustration appears less adaptive for adolescent well-being.

4.3. Limitations

Various limitations of this study should be noted. Firstly, we urge caution when interpreting some of these findings in light of the small effect sizes. Secondly, all measures were self-report which could have introduced bias to the data. It is possible that those high in negative affectivity are biased towards negative reporting and thus perceive lower goal progress compared to those with lower negative affectivity. Similarly, headache at time of assessment can color self-reporting of psychological symptoms (Holroyd et al., 1993). Future studies should attempt to employ other methods such as structured interviews or diary measures (e.g. Langeveld et al., 1997) to explore goal pursuit in the context of headache in more depth. Such measures should also take into consideration pain at time of assessment. Thirdly, the cross-sectional nature of this study precludes conclusions regarding directions of influence. Prospective studies are necessary to give insight into the possible bi-directional relationships between self-regulatory processes, well-being and headache. Finally, as this study was conducted on a general population sample of adolescents in a school setting, we cannot generalize these results to, for example, adolescents who may have been absent due to illness or to clinical samples who have sought treatment

for headache. It would be interesting in the future to explore these relationships within a clinical population of adolescents with headache.

Despite these limitations, this study highlights (a) differences in goal frustration, coping and well-being between adolescents with differing experiences of headache and (b) the importance of goal frustration and coping with goal frustration in adolescent well-being. Specifically, youngsters who experience more frequent headache may be at risk of greater difficulties in achieving their important personal goals which may in turn contribute to lowered well-being. Furthermore, ruminating, catastrophizing, or blaming oneself or others for such frustrations appears to be a less adaptive way of dealing with setbacks to goal pursuits. Future research may wish to explore the added value of addressing possible obstacles to successful goal pursuit and (mal)adaptive methods of coping with such frustrations in interventions with adolescents reporting persistent headache complaints.

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