

What can we learn from exploring cognitive appraisal, coping styles and perceived stress in UK undergraduate dissertation students?

Max Korbmacher
Lynn Wright

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What can we learn from Exploring Cognitive Appraisal, Coping Styles and Perceived Stress in UK

Undergraduate Dissertation Students?

Max Korbmacher*

University of Bergen, Faculty of Psychology, Department of Biological and Medical Psychology; +47 45844066;

max.korbmacher@gmail.com

Lynn Wright

Abertay University, School of Applied Sciences, Division of Psychology; +44 1382 308332;

l.wright@abertay.ac.uk

*Corresponding author

Abstract

Undergraduate dissertation students' cognitive appraisal, coping styles and perceived stress were examined at three time points during their undergraduate dissertation projects (UDP), observing whether cognitive appraisal and coping styles predicted perceived stress and their temporal changes. Sixty-four dissertation students completed the Perceived Stress Scale, an adapted Cognitive Appraisal of Health Scale, the Brief COPE and explorative open-ended questions. Linear Regression models for each time-point showed coping styles and cognitive appraisal predicted perceived stress, but single coping styles and primary appraisal harm/loss predicted stress levels inconsistently over time. Analyses indicated significant effects of time-point on primary appraisals benign/irrelevance, harm/loss and challenge but none for secondary appraisal, coping styles or perceived stress. Content Analysis showed perceived stressors and coping styles to be a function of the UDP's stages and their tasks and challenges. Implications and recommendations for students and supervisors are discussed.

Keywords: coping styles, cognitive appraisal, perceived stress, undergraduate dissertation project, undergraduate students

Running head: UK Dissertation Students' Cognitive Appraisal, Coping Styles and Stress

Introduction

A key component of a British Psychological Society accredited degree is the requirement to conduct and write a dissertation – a research project where the student demonstrates academic knowledge and skills. Research suggests that many students find writing a dissertation stressful (Collins & Onwuegbuzie, 2003; Devonport & Lane, 2006; Lane, Devonport, & Horrell, 2004). Students' increased stress levels can lead to a variety of negative emotional, academic and health outcomes (Tosevski, Milovancevic & Gajic, 2010), such as lower productivity and emotional wellbeing (Russell-Pinson & Harris, 2017), altered academic success (Krnjajić, 2006) or mental health problems (Mirbaha-Hashemi & Seward, 2010), for example, expressed in anxiety or depression symptoms (Crockett et al., 2007). Besides university affordances, there are various internal and external factors influencing individual perceptions of stress, such as cognitive appraisal and coping styles.

Cognitive appraisal (CA) describes individuals' interpretations and responses to stress in two steps: primary and secondary appraisal (Devonport & Lane, 2006). Primary appraisal (PA) is an individual's assessment of a situation's relevance or irrelevance to their wellbeing and secondary appraisal (SA) of their own ability to cope with the situation and its stressors (Lazarus, 1966). CA is connected to both individual and environmental factors such as demands, limitations, and opportunities (Devonport & Lane, 2006). The process of stress interpretation and coping is non-linear as different outcomes of appraisal and coping processes may re-initiate previous processes (Carver, Scheier & Weintraub, 1989). A stressor interpreted as unimportant or not dangerous to wellbeing needs no further assessment, however, a stressor thought to challenge wellbeing will require coping mechanisms (Lazarus, 1966). If individuals feel that insufficient resources are available to cope, stressor effects occur (Cohen et al., 1983). Accordingly, not the objective event itself, but both the objective event *and* the subjective, cognitively mediated emotional response to the event, characterise the event as a whole (Cohen et al., 1983). Hence, CA is a useful and repeatedly used tool to observe university students' experiences of stressful situations (e.g., Devonport & Lane, 2006; Hojat, Gonnella, Erdmann & Vogel, 2003).

Moreover, both individual and environmental factors can influence individuals' perceptions of the relevance of the situation, own stress levels and coping opportunities (Devonport & Lane, 2006). Examples of individual factors are previous CA (O'Connor, Arnold, & Maurizio, 2010), bereavement (Cohen et al., 1983) and belief and religious concepts (Tong & Teo, 2018). Examples of influential social and environmental factors are given

opportunities/restrictions (Devonport & Lane, 2006), unemployment, and high-level noise-exposure (Cohen et al., 1983). These can influence stress in both a positive or negative way (Kozusznik et al., 2018). Accordingly, CA seems to be a direct predictor of stress response (Harvey, Nathens, Bandiera & LeBlanc, 2010) and vice versa, different stressors can lead to varying interpretations of situations and appraisals (Lazarus, 1966).

After assessing a danger to own wellbeing in a situation (primary appraisal) and resources available to deal with the threat (secondary appraisal), *coping strategies* are applied, influenced by situational and individual-dependent psychosocial and environmental factors (Carver et al., 1989). Folkman and Lazarus (1980) generally distinguish between two main coping styles (CS): emotion-focused and problem-focused coping. Emotion-focused coping directs emotional distress experienced in a situation, and problem-focused coping fixates on problem-solving directed towards doing something to modify the stress's source (Carver et al., 1989). However, further distinctions between adaptive and maladaptive CS's, have been suggested; with behavioural disengagement, substance use, denial and self-blame being maladaptive, and positive reframing, seeking emotional or instrumental support, active coping being adaptive CS's (Carver et al., 1989).

Recent developments of the transactional model (e.g. Carver et al., 1989) incorporate additional concepts such as self-regulation and motivation adding the notion of coping being goal-focussed (Carver & Scheier, 1981; Rasmussen, Wrosch, Scheier & Carver, 2006). In contrast, the Cognitive Activation Theory of Stress (CATS) by Ursin and Erikson (2010) is a cognitive and psychobiological theory based on human and animal research and describes how stress-stimuli are cognitively processed and lead to a stress-response. Stress-responses can be brief and anabolic (train) or sustained and catabolic (strain), and generally describe activation in the form of increased sympathetic activation as well as cortisol and adrenaline levels. The stress response, as well as stimulus expectancy and response outcome expectancy can influence how the load of further stress-stimuli is perceived (Ursin & Erikson, 2010). Train stress-responses entrain coping mechanisms/strategies, and strain stress-responses learned helplessness and hopelessness, respectively (Ursin & Erikson, 2004). CATS offers a broader account of stress-stimuli processing than Folkman and Lazarus' (1980) stress model, as, besides coping, other forms of learning are included and linked to physiological response. Experiencing stress-responses over extended periods can lead to lowered ability to focus and immune function, depressive symptoms and cardiovascular disease (Ursin & Erikson, 2007). Thus, students have either positive or negative expectations

about tasks they are exposed to, as well as the outcomes. Negative expectations about the undergraduate dissertation project (UDP) or parts of it, a one-year project, can lead to prolonged physiological activation and hence negative health outcomes.

In contrast to transactional models, in CATS, coping is defined generally as the expectation to be able to handle the situation, or positive outcome expectancy. CATS, however, does not focus on specifying different coping behaviours or styles as Folkman and Lazarus do (1980). While Carver and colleagues (1989) argue for a good/bad coping style dichotomy, stress-responses (coping and learned helplessness or hopelessness) in CATS are defined as adaptive processes.

CA and coping are learned processes, closely connected with personality (Tosevski et al., 2010), and influenced by various environmental factors, such as stress (Wadsworth, 2015), social environment and socialisation (Ptacek, Smith & Dodge, 1994). When students' stress-coping strategies are maladaptive, academic performance can be impeded (Al-Dubai, Al-Naggar, AlShagga & Rampal, 2011; Weiner & Carton, 2012) or cause increased perceived stress levels (Palmer & Rodger, 2009). Wang and Miao (2009) found a correlation between mature CS's and positive mental health in medical students and problem solving to be a general predictor of positive mental health. On the other hand, avoidance coping, self-blame, and rationalisation were positively correlated with factors such as somatisation, obsessive-compulsiveness, depression, anxiety, hostility and psychoticism (Wang & Miao, 2009). Together with stress, avoidance coping is a good predictor of depressive symptoms (Dyson & Renk, 2006) and mindfulness scores in university students (Palmer & Rodger, 2009). According to Stewart et al. (1997), avoidant coping strategies lead to increased depression and anxiety levels in first year medical students, while active coping and positive reinterpretation had the opposite effect. Akram, Ahmad and Akram (2018) found adaptive CS's to be negative predictors of suicide-intentions in medical students in Pakistan, and maladaptive CS's to be positive predictors, respectively. Hence, it is important to investigate CA and CS's when looking at psychological distress in dissertation students.

Generally, CA (e.g. Devonport & Lane, 2006) and CS's (e.g. Bolger & Sarason, 1990; Park, Adler & Stone, 2003) have been found to influence students' wellbeing and mental health (Devonport & Lane, 2006). Covariates, most importantly time, have been found to influence perceived stress levels, CA and CS's (Carver et al., 1989;

Devonport & Lane, 2006). CS's might change over time due to their relationship with stress levels (e.g. in nursing students: Bodys-Cupak, Majda, Skowron, Zalewska-Puchała & Trzcińska, 2018), and controlling for long-term outcomes and individual differences requires repeated measures testing. Devonport and Lane (2006) examined CS and CA with UDP sports students and found no significant changes over time. Instead, their study showed fluctuations of perceived stress as well as loss appraisal, a type of PA measuring individuals' interpretation of a stimulus to be a possible threat leading to loss. To our knowledge, no other research has investigated stress levels or CS's in UK dissertation students.

Furthermore, there appears to be a relationship between CA and coping, and both influence outcomes of stressful encounters, such as perceived stress levels (Folkman, Lazarus, Dunkel-Schetter, DeLongis & Gruen, 1986; Folkman, Lazarus, Gruen & DeLongis, 1986). However, no study has yet examined the relationship between CA, CS's and perceived stress in university students. Prior work with correctional officers in Turkey, demonstrated clear links between different CS's, CA and psychological distress and significant gender differences for the PA challenge (Durak, 2007). Although they did not use a measure of stress, Devonport and Lane (2006) found a relationship between PA, SA and stress coping. Research on stress while writing a doctoral thesis concluded that stress-reduction should be embedded in the support students receive during this aspect of doctoral training, as stress may negatively influence the writing process as well as wellbeing (Russell-Pinson & Harris, 2017). These findings can apply to students writing their UPD. Understanding the background to, and triggers of, students' perceived stress might increase awareness and inform active stress-management approaches.

Hence, it is important to ask: Is there a relationship between CA, CS's and perceived stress in students and do the variables change across the UDP process? Psychology (and other) final year students' perceived stress levels, CA and coping are measured at three time points over a period of six months (start to end point of conducting the UDP) and the relationships between the variables are explored. It is predicted that CA and CS's will predict the level of perceived stress, and that scores of each CA, CS and levels of perceived stress will change over time, with stress levels increasing towards the submission deadline. Open-ended questions will investigate students' UDP concerns, stressors and coping strategies throughout the project period, focussing on the question 'What are the main concerns, and stressors, of UDP students and how do they cope with these?'

Method

Participants

Sixty-four final year undergraduate students based in Dundee, UK participated in all three phases of the study (72 participated in phase 1 and 67 in phase 2). Repeated data of the 64 participants was used to analyse changes over time. Participants were recruited in lectures and through recruitment posters. No incentives were provided, and Abertay University's School of Social and Health Sciences Research Ethics Committee approved the study. The data were collected in accordance with institutional GDPR data storage rules (data were downloaded as soon as possible, anonymised and deleted from the host site).

Insert Table 1

Materials and Apparatus

This was an online study, participants accessed questionnaires and study information via Google Forms.

Participants were asked to complete the study in their own time and could access this via a general link. Participants were asked to include their student number, if they were willing to participate in subsequent phases. They were informed that they could omit any questions they did not wish to answer, that data would be anonymised as soon as possible and were asked to give informed consent permitting the researcher to send study links via email.

Perceived Stress Scale (PSS-10) (Cohen et al., 1983): 10-item scale measuring students' perceived stress over the past month. Items used a 5-point Likert scale ranging from 0 (Never) to 4 (Very Often) and higher total scores indicated higher stress levels. An example is 'In the last month, how often have you been upset because of something that happened unexpectedly? While Lee (2012) found Cronbach's $\alpha > .7$, in a review of PSS across twelve studies (for PSS-10) with a total $N=8,702$ (both clinical and non-clinical samples such as university students), alpha values in the three phases of the current study were $\alpha_1=.124$; $\alpha_2=.124$; $\alpha_3=.268$.

Brief COPE 28-item inventory (Carver et al., 1989): measures coping styles (CS) on a 4-point Likert scale ranging from 1 (I haven't been doing this at all) to 4 (I've been doing this a lot) ($\alpha_1=.877$; $\alpha_2=.831$; $\alpha_3=.756$). Research on students showed an overall consistency of the scale between $\alpha=.8$ (for $N=376$ medical student, Al-Dubai et al.,

2011) and $\alpha=.85$ (N=359 students, Yusoff, 2010). In the Brief COPE, 14 different subscales/dimensions of coping were measured by two items each. These sub-scales cover denial, active coping, positive reframing, substance-use, seeking social support for instrumental reasons, planning, self-blame, behavioural disengagement, self-distraction, seeking social support for emotional reasons, religion, emotion venting, humour, and acceptance.

Short dissertation-related 28-item version of the Cognitive Appraisal of Health Scale (CAHS) (Kessler, 1998) (adapted by Devonport & Lane, 2006): used to measure primary and secondary appraisal of students while writing their UDP on a 5-point Likert-like scale ranging from 5 (strongly agree) to 1 (strongly disagree). Cronbach's alpha values for different CAHS versions reported for different populations ranged between $\alpha=.69$ and $\alpha=.88$ in five studies with N=912 (see review by Carpenter, 2016), but in this study were $\alpha_1=.366$; $\alpha_2=.504$; $\alpha_3=.548$. Subscale reliability measures are not supplied in the literature but were low in this study for primary ($\alpha_1=.288$; $\alpha_2=.468$; $\alpha_3=.548$) and secondary appraisal ($\alpha_1=.009$; $\alpha_2=-.286$; $\alpha_3=-.722$). Devonport and Lane (2006) adapted the CAHS to a dissertation-context by replacing the term 'illness' with 'dissertation', for example: 'This dissertation won't get me down.' instead of 'This illness won't get me down.', but kept the factors proposed by Kessler (1998). Other examples of questions are: 'This dissertation has negatively affected my life.' or 'I have lost interest in the things around me.'. Primary appraisal was measured by four subscales: challenge, threat, harm/loss and benign/irrelevance. A separate 5-item subscale measured Secondary Appraisal.

A series of open-ended questions were designed to collect textual data to explore concepts related to stress and coping. Questions were designed to examine whether the cognitive appraisal and coping styles could be measured satisfactory by CAHS and Brief COPE, for example by questions such as: 'What comes generally to your mind when you think about stress and your dissertation?' or 'How do you personally cope with stress connected to your dissertation?'. Moreover, to control for covariates the question 'Does anything besides the dissertation cause you stress? Please specify if you wish.' was included. Two further open-ended questions were added in phases 2 and 3 of the study (to ensure students were currently working on their UDP) to explore possible support universities might give to help students cope with university stress. These were 'What could the university do to help you overcome dissertation related stress?' and 'What could your supervisor or other lecturers do to help you overcome dissertation related stress'.

Procedure

Demographics (gender, programme of study and age) were collected at Phase 1, alongside consent to contact participants via email for phases 2 and 3. Participants completed the questionnaires in a counterbalanced order, including 4 open-ended questions and were given an online debrief form. This procedure was repeated in phases 2 and 3 (minus demographics) and included 2 additional open-ended questions.

Results

Data were downloaded from Google Forms, anonymised, coded and scored. Data was imported into SPSS (v25) and textual data was categorised. All scores were cumulative with a single perceived stress score, 14 paired coping styles scores, cognitive appraisal (CA) scores and secondary appraisal (SA) scores.

Textual data was analysed using Content Analysis (e.g., Stemler, 2000). After familiarization with the data, initial codes and categories were established which were reviewed and further defined before writing the report. Initial codes for the phase 1 dataset were applied and refined for the initial coding of phase 2 and 3 datasets to make the code structures of the 3 phases comparable. After repeatedly refining the codes in all three phases, a code hierarchy was created for each phase displaying most common to least common categories identified in the textual data.

Relationships between Cognitive Appraisal, Coping Styles and Perceived Stress

To examine relationships between subscales of cognitive appraisal (CA), coping styles (CS) and levels of perceived stress, three Linear Regression models were created with CA and 14 paired CS's explaining variance in perceived stress. The *phase 1* regression model indicated that CA and CS's explained 56.2% of the variance in perceived stress $R^2=.562$, $F(19,72)=3.58$, $p<.001$ (see Table 2 for individual predictor information)

Insert Table 2 here

In *phase 2*, 47.5% of the variance in perceived stress could be explained by CA and CS's $R^2=.475$, $F(19,66)=2.24$, $p=.0128$, but perceived stress could not be significantly predicted by the variables. In *phase 3*, CA and CS's

explained 60.3% of the variance of perceived stress $R^2=.603$, $F(19,63)=3.52$, $p<.001$ (see Table 2 for individual predictor information). Although no single CA or CS could predict perceived stress consistently over all 3 phases, the data suggest that CA and CS's predict perceived stress, supporting the first hypothesis.

Changes Over Time

In phase 1, because of an error, the responses of 39 participants were not recorded for the item "This dissertation is frightening to me.". For the analysis, those missing values were replaced with the mean response value of the other items of the according sub-scale. Furthermore, in phase 1 and 2, one piece of duplicated data was excluded.

Perceived stress over time. To examine the effect of time-point in the semester on perceived stress, a 1x3 repeated measures ANOVA was conducted. No significant effect of time point was found $F(2,126) = 2.02$, $p=.137$, stress did not differ significantly across the academic year.

Cognitive appraisal over time. To examine the effect of time point in the semester on Cognitive Appraisal, a repeated measures MANOVA was carried out and revealed a significant change of overall CA over time $F(10,54)=36.9$, $p<.001$, partial $\eta^2=.87$.

From examining the univariate effects, challenge, $F(2,126)=62.4$, $p<.001$, partial $\eta^2=.5$, harm/loss $F(2,126)= 46.2$, $p<.001$, partial $\eta^2=.4$, and benign/irrelevance $F(2,126)=73.4$, $p<.001$, partial $\eta^2=.5$, changed significantly over time, whereas threat ($p=.114$) and secondary appraisal ($p=.497$) did not (see Table 3 for pairwise comparisons). A Greenhouse-Geisser correction was applied for harm/loss and benign/irrelevance as the sphericity assumption was not met. The overall power of the MANOVA was 1, calculated post-hoc using G*Power (effect size $f=2.4$ (calculated based on partial η^2), $\alpha=.05$, $N=64$) (see Faul, Erdfelder, Lang, & Buchner, 2007).

Insert Table 3 here

Coping styles over time. To examine the effect of time point in the semester on CS's, a repeated measures MANOVA was conducted on the coping styles variables, however, no significant effect of time was found $F(28,36)=.79$, $p=.738$, Wilks' Lambda=.619.

Content Analysis: Concerns, Coping Styles and Stressors

The research question 'What are the main concerns and stressors of UDP students, and how do they cope with these?' was addressed using Content Analysis. All open-ended question responses were considered in the analysis with the aim of systematically creating categories.

Insert Table 4 here

Concerns about the project. Content Analysis revealed **time management, data collection** as well as **feedback and grade** as students' most common concerns about their UDP (see Table 4). Concerns about **time management** in phase 1 addressed data collection "I worry that I won't get the data collection done in time due to how intensive it is" and "worried about getting participants and the time commitment for this.", but also procrastination: "I'm worried I will procrastinate; this is a bad habit of mine that I need to overcome.", as well as general time management and pressure concerns: "Time keeping. I keep myself incredibly busy or else I don't function well however finding a balance will be tricky", "Getting everything finished in time on top of all the other work I have to do for different modules.", "I'm worried things won't be handed in on time, or up to par.". The concern of not being able to finish the data collection or UDP in time were also expressed in phase 2: "I'm scared I'll fall behind or not get enough participants", "I feel like I will be doing everything at the last minute.", and "My only concern is getting the testing finished so I have enough time to get the results done and feedback from my supervisor a couple of weeks before the embargo!". Phase 3 time management concerns were more general or focussed on the final parts of the UDP: "concerned with getting my results section completed on time.", "Not having enough time to get it all done, with having to do other assessments and having a job", and "Getting it done in time and to a good standard". The category **data collection** focussed on concerns over not being able to collect enough data, mainly in the first two phases: "I am a bit worried about getting a sufficient number of participants but I don't really know how that is going to go yet.", "being able to collect the amount of participants that I need, and writing the discussion alone without help". As the hand-in deadline approached in phase 3, most students had their data collection completed. The category **feedback and grade** addresses concerns about not doing well or getting a bad grade: "I'm concerned that I let myself down with the writing of the report, as it's worth double credits and I've had great grades up until now." or "I'm afraid I won't get a good grade". In addition, single phase three specific concerns touched on the UDP writeup "We don't get our

discussions read through. This is a major stressor for me as my writing skills are not good”, word count “I will have to be careful how much detail I go into for my results, there is a lot of analysis and I may not have enough words”, and the UDP presentation.

Personal coping styles. Students stated they personally coped with UDP-related stress by **exercising, working on the UDP** and through **support from others** “Talk to peers, family and loved ones” over the course of the UDP year (see Table 4). The category **exercising** included a variety of sports, often not specified exercising, walking or running, for example “I run and lift weights”. **Working on the UDP** in the first phases was characterised by students reporting to continue working on the project in response to UDP-connected stress: “Research the topic and come up with discussion points I could use later on”. In addition, in phase 3 the will to get on and done with the UDP was frequently reported among those coping by working on the UDP “I just try to get on with it.”

Stressors besides the dissertation. **Other coursework, working/volunteering** and **future planning** were the most common stressors besides the UDP (see Table 4). In all three phases, but especially phase 3, several students outlined **other coursework** as stressful, since it added additional tasks to already required UDP tasks “Some of the coursework, which is less related to what I want to study than my dissertation topic, is actually causing me more stress than the honours project is.” or “The other assessments on top of the dissertation that I need to do well on as well as work commitments [cause me stress].”, and hence additional organisational (or time management) requirements: “Data collection and deadlines that I have set myself. Juggling other modules and working on the dissertation at the same time”, “Balancing this with my other assessments” and “Having lengthy assignments and exams in addition to the dissertation”. Another concern were the grades in such assessments (which were not part of the UDP module): “Assessments. [I] worry about doing well”. Across phases, **working/volunteering** included for most students in that category having a job besides university courses: “I have to complete training for work before next month, so I'm a little stressed about that” or “[What causes me stress besides the dissertation is] my work life outside of uni.”. However, some students also reported to volunteer for university staff and reported hence “time struggles because of my extra-curricular (voluntary) work for some professors” or in organisations outside the university, making time management work: “The chaos in my life trying to juggle uni, volunteering with two different organisations, working and applying for a

post grad! Everything combined causes stress!”. In the last phase, the response rate was lowest and fewer responses indicated stressors besides the UDP, especially for the category work/volunteering (see Table 4).

The category **future planning** touched on all future-directed planning expectations and behaviours which were perceived as stressful. Those included general future-planning “What I will do after uni. Where I will go.”, or more specifically post-graduate applications and “Finding work after uni” or “finding relevant working experience for [a] master’s degree”.

Discussion

Single coping styles (CS) and cognitive appraisal (CA) harm/loss predicted perceived stress levels in UDP students, but this pattern was inconsistent across the academic year. CS’s and CA explained approximately 50% of the variance of perceived stress in students, supporting the first hypothesis. The second hypothesis was supported for CA due to a significant overall effect of time point as well as effects individually on the sub-scales benign/irrelevance, harm/loss and challenge. However, SA, threat, all CS’s and perceived stress did not change significantly over time. Over the course of the study’s three phases, students identified time management, data collection and marking/grade as their greatest concerns and mainly used exercising, working on the UDP and support from others as coping strategies. Other coursework, working/volunteering and future planning represented the most common stressors besides the UDP.

Relationship between Cognitive Appraisal, Coping Styles and Perceived Stress

In accordance with Lazarus’ (1966) transactional model of stress and coping, CS’s and CA could generally explain perceived stress. After a stimulus is identified as a stressor (PA) and coping strategies are applied, stress should be reduced or the stressor re-appraised, re-starting the process until stress is reduced. Accordingly, a relationship between CA, CS’s and perceived stress in different student populations has been identified in the literature (e.g. Bodys-Cupak et al., 2018), with adaptive problem-focussed and emotion-focussed CS’s reported to reduce stress (e.g., Chiesa & Serretti, 2009) and maladaptive problem-focussed coping strategies increasing perceived stress (Littleton, Horsley, John, & Nelson, 2007; Stewart et al., 1997). However, in this study, single CS’s and CAs did not consistently predict perceived stress over time.

Stress could be predicted by the CS's emotion venting and denial as well as CA harm/loss in phase 1, and by denial, active coping, acceptance and secondary appraisal in phase 3. Negative appraisal, such as harm/loss (Elliott, Chartrand, & Harkins, 1994) and emotion-focussed coping (McGowan, Gardner, & Fletcher, 2006), such as emotion venting or acceptance, found to be significant predictors of perceived stress in this study, have generally been identified as predictors of distress. Personal adjustment negatively relates to emotion venting (Leong, Bonz, & Zachar, 1997; Rice & Lapsley, 2001), suggesting that it may have been a significant predictor of perceived stress only in phase 1 as individuals still had not had personally adjusted to future UDP challenges. Denial was a significant predictor of perceived stress in phases 1 and 3, supported by Al-Dubai et al. (2011). Moreover, Kohler Giancola, Grawitch, and Borchert (2009) showed that denial could predict life-satisfaction and hence it could be linked to perceived stress. However, in other studies with students, denial did not predict perceived stress (Hirsch, Barlem, Tomaschewski-Barlem, Lunardi, & Oliveira, 2015) or was weakly associated with it (Moffat, McConnachie, Ross, & Morrison, 2004). The Content Analysis highlighted that students deemed imminent challenges to be stressful, such as data collection in phase 1 and the discussion section in phase 3, and it is likely that students no longer perceived completed UDP parts to be stressful. Similarly, although no temporal changes of CS were revealed by the quantitative data, it is possible that students' CS's are influenced by the stage of the UDP and challenges connected to it. While students most frequently reported to use exercise, working on the UDP as well as support from others as CS's in each of the study's three phases, in phase 3, before the deadline, students did report CS's sleep and self-care only infrequently. Approaching deadlines for other coursework in addition to the UDP might leave less time available for these CS's in the final UDP phase. Time management seems to play an important role for perceived UDP and non-UDP stressors identified by the CoA. Simultaneously, a decreasing number of students answered what part of the UDP or non-UDP challenge would concern.

The Effect of Time on Cognitive Appraisal, Coping Styles and Perceived Stress

Experiencing or appraising UDP-related stressors is an individual experience and hence, challenges should be expected to change during the UDP process. Devonport and Lane (2006) did not find a temporal effect but as they only collected data from 6-weeks prior to submission versus the current 24 weeks, it is plausible they missed a number of stressors captured here. Although Lazarus' (1966) model indicates that a greater variety of stressors would need to lead to more variance in CA's and CS's, quantitative measures showed no changes in SA and CSs

over time, as reported in previous studies on UK dissertation students (Devonport & Lane, 2006) and high school students (Steiner, Erickson, Hernandez, & Pavelski, 2002).

Furthermore, CS's as well as cognitive (re-)appraisal seem to be individual, as those are influenced by covariates such as personality (Bolger & Sarason, 1990; Connor-Smith & Flachsbart, 2007; Tosevski et al., 2010) and mental health (Plancherel & Bolognini, 1995). Moreover, covariates such as affectivity (Oliver & Brough, 2002; Tugade, Fredrickson, & Feldman Barrett, 2004) and empathic concerns (Lamm, Batson, & Decety, 2007) interact with CA, and coping has been reported to correlate, and interact, with a variety of variables such as social support (Dwyer & Cummings, 2001), adjustment (Tao, Dong, Pratt, Hunsberger & Pancer, 2000), attachment style and subjective wellbeing (Schmidt & Welsh, 2010). This was reflected by the CoA showing a variety of interpersonal, health and financial stressors outside the university to be perceived as stressful, and specifically one of these, future planning, regained importance during the final phase of the project. It is therefore important to monitor students' individual situations and problems and offer support where possible.

Implications and Suggestions for University Staff and Students

Quantitative measures revealed no differences in stress levels as a function of time. However, qualitative data showed that the parts of the undergraduate dissertation project (UDP) which were perceived as stressful changed according to the project stage. A variety of new tasks and challenges are introduced throughout the UDP which can lead to uncertainties, as for many students this is the first project of such magnitude. Hence, it is important to support students from the beginning of the UDP with tasks and challenges at hand. Detailed explanations of the different parts of the UDP and how to tackle these could provide an overview of the project, making students aware of the workload but also reassuring them they are able to succeed in the process (Jordan, 2000). This could strengthen the student-supervisor relationship as well as the feeling of safety and might in turn support positive appraisal and CS's (Jordan, 2000). Time management was one of the most frequently mentioned concerns of students in connection with perceived UDP-related as well as UDP-unrelated stressors, and it is recommended that supervisors support students to plan their UDP's, for example by setting goals for different parts of the UDP, time management workshops are also useful for students. Furthermore, students should be aware of the importance of monitoring their physical and mental health and take action in the event of problems, for example, by talking to their supervisor, module teams or university services. University services

supporting mental and physical health and academic skills (e.g., writing) can be promoted during UDP classes, in information emails, or face-to-face by supervisors. The next crucial stage in the UDP seems to be the time before the deadline as CA's benign/irrelevance and harm/loss increased during that period, whereas CA challenge decreased indicating a gain of expertise. While overlaps between coursework and UDP deadlines can be circumvented, it might not be possible to avoid the trend of perceiving UDP challenges as more harmful and benign the closer the deadline. However, the steps mentioned above to support students might enable students to use adaptive coping styles during that challenging phase. Finally, it is important to stay in contact with students throughout the entire supervision process and help with challenges at hand.

Limitations of the Study

In accordance with Devonport and Lane's (2006) findings, perceived stress did not increase towards the submission deadline. However, these findings should be interpreted carefully, as the Perceived Stress Scale did not appear to measure stress reliably ($\alpha < .3$). This low internal consistency specifically influences the results of the regression analysis, as perceived stress was the variable predicted by the model. Also, the reliability of Kessler's (1998) CAHS's was $\alpha < .6$ and hence below the acceptable value reported in the literature (between .7 and .95) (Tavakol & Dennik, 2011), and especially low (close to 0) for Secondary Appraisal (SA) over the three phases of this study. Only primary appraisals changed significantly over time, however, its scale's low internal consistency challenges the reliability of the findings. Overall, the findings were of low reliability and follow-up research is needed to make claims on the findings' validity.

Although circa 75% of the studies using the Brief COPE reconstructed the conceptual structure of the scale by factor analysis (Kato, 2015), such differences across studies and a search for trends in the literature was inconclusive (compare Ayers, Sandier, West, & Roosa, 1996; Billings & Moos, 1981). Hence, items were not grouped into factors for the analyses but were presented in the order used in a similar study by Devonport and Lane (2006). It remains unclear whether the presented structure could serve as a reliable factor construct. For example, denial and substance-use were categorised as adaptive problem-focussed coping but in other studies as avoidant coping (e.g., Moffat et al., 2004). More rigorous research with congruent methodologies building upon previous findings is necessary to identify an appropriate factor structure for the Brief COPE in student populations. Moreover, the Brief COPE could not capture individual sample-specific differences revealed by the

Content Analysis. Hence, future research could further investigate the role of identified CS's such as sports, working on the UDP, social support and self-care and how these change over time in different populations.

The open-ended questions, which provided the data for the Content Analysis, were created without basing these on any previously tested inventory. The wording and focus of these questions might have influenced the results of the Content Analysis. As suggested by the results, future research using similar questions might focus on adapting the specificity of the questions to the single challenges faced during the UDP process, such as ethics approval and discussion section. Moreover, the process of cognitive appraisal was not addressed by the open-ended questions in this study and its further observation could give valuable insights about the mechanisms of students' stress appraisal. Although the general response rate to the open-ended questions was high, nearly a quarter of the participants did not answer selected questions (see Table 4) and the response rate generally decreased over time (possibly indicating fewer stressors at this point). Hence, to better understand students' perceived stress, cognitive appraisal and copings styles during the UDP and similar projects further qualitative investigations are recommended.

Conclusion

This study has shown that coping styles and cognitive appraisal can be used to explain approximately half the variance of perceived stress in UK dissertation students. However, single coping styles and primary appraisal harm/loss predicted perceived stress levels only inconsistently. Content Analysis revealed that certain sample-specific aspects of coping might change over time, opposing the quantitative findings and suggesting that CAHS and Brief COPE are not suitable to examine all aspects of coping in dissertation students. Supporting UDP-planning from the beginning of the project process, creating awareness around stress and health, and informing about the possibility of using health and/or academic services when there is need, as well as continuous contact between supervisor and student can promote students' health and success when writing a UDP. A UDP-specific module accompanying the project can be a valuable platform to support these goals by giving optional repetition or immersion sessions on different parts of the UDP or skills required to complete the project. The module can also provide a space ask questions, get help and talk to a third party, who is not the supervisor, as well as to meet other dissertation students.

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Tables

Table 1

Sample Characteristics (Frequencies and Percentages) by Time

Group	Phase 1	Phase 2	Phase 3
Total	72	67	64
Males	12 (16.7%)	12 (17.9%)	10 (15.6%)
Females	59 (81.9%)	54 (80.6%)	54 (82.8%)
Other	1 (1.4%)	1 (1.5%)	1 (1.6%)
Younger 22	31 (43.1%)	28 (41.8%)	25 (39.1%)
22 and Older	41 (56.9%)	39 (58.2%)	39 (60.9%)
Psychology	51 (70.8%)	47 (70.1%)	45 (70.3%)
Social Science	14 (19.4)	13 (19.4%)	13 (20.3%)
Sport and Exercise Science	5 (6.9%)	5 (7.5%)	5 (7.8%)
Civil Engineering	1 (1.4%)	1 (1.5%)	0 (0%)
Computer Games Applications Design	1 (1.4%)	1 (1.5%)	1 (1.6%)

Table 2

Multiple Regression Analysis of Cognitive Appraisal and Coping Style as Predictors of Perceived Stress: Significant Predictors

	Phase 1					Phase 2					Phase 3				
	B	SE B	β	t	p	B	SE B	β	t	p	B	SE B	β	t	p
Primary Appraisal															
Harm/Loss	.26	.09	.42	2.77	.008	.12	.09	.24	1.34	.188	-.16	.10	-.29	-1.60	.117
Adaptive Problem-Focussed Coping															
Denial	.75	.34	.328	2.18	.034	.22	.41	.07	.54	.594	.81	.4	.24	2.04	.048
Positive Reframing	-.43	.36	-.20	-1.19	.238	-.6	.35	-.25	-1.7	.097	-1.10	.5	-.38	-2.18	.035
Emotion-Focussed Coping															
Emotion Venting	.7	.3	.33	2.33	.023	.23	.34	.1	.68	.497	.60	.4	.21	1.53	.134
Acceptance	-.03	.32	-.01	-.1	.922	.39	.34	.16	1.13	.265	1.41	.4	.46	3.52	.001

Table 3

ANOVA Post-hoc Pairwise Comparisons of Cognitive Appraisal Scores over Time

Cognitive Appraisal	Time	Mean	SD	Bonferroni-corrected comparison		Cohen's d	
				T1	T2	T1	T2
Challenge	T1	13.27	4.38		<.001		2.00
	T2	22.39	4.80				
	T3	13.70	5.06	1	<.001		1.78
Harm/Loss	T1	32.58	5.60		<.001		1.92
	T2	19.02	8.34	<.001		1.92	
	T3	26.91	7.96	<.001	<.001	.83	.98
Threat ⁺	T1	16.61	3.06				
	T2	14.80	5.38				
	T3	15.97	5.43				
Benign/ Irrelevance	T1	15.19	3.47		<.001	1.89	
	T2	8.38	3.79	<.001			1.89
	T3	16.19	3.78	.412	<.001		2.06
Secondary Appraisal ⁺	T1	15.17	2.51				
	T2	14.83	2.43				
	T3	14.64	2.16				

Note: All values indicated as $p < .001$ were significant at the Bonferroni-adjusted level for multiple comparison.

⁺ Non-significant univariate effects

Table 4
Hierarchical Presentation of Categories identified over Phase 1-3

Do you have any concerns about your project? Please explain without mentioning names.	How do you personally cope with stress connected to your dissertation?	Does anything besides the dissertation cause you stress? Please specify if wished.
No Answer (9,11,17)	Exercise (Physical) (14,13,11)	Other Coursework (16,10,27)
Time Management (12,14,10)	Working on the UDP (9,10,11)	Working/Volunteering (14,17,7)
Collecting enough Participants/Data (15,11,5)	Support from Others (7,11,8)	No Answer (7,10,15)
No Concerns (7,11,11)	Self-Care (14,7,4)	Future Planning (9,5,9)
Feedback and Grade (9,9,2)	Planning well and Informing Myself (9,8,7)	Relationship and Family Challenges (8,8,4)
Statistics (6,5,4)	Avoidance (6,5,5)	Financial Issues (6,3,2)
Fulfilling Own Expectations (4,3,3)	Distract Myself (6,5,5)	Yes (unspecified) (3,5,1)
Communication and Relationship to Supervisor (3,3,3)	Mindfulness Practice (3,4,4)	Social Life (4,2,3)
Discussion Section (2,3,3)	Sleep (5,5,0)	Psychological Problems (3,2,3)
Own Skills to accomplish Project (5,0,0)	Procrastinating (3,1,3)	Health Issues (3,3,2)

Note: The three displayed numbers refer to counts of the specific category in phase 1, 2 and 3 (in this order).