University of Twente

The relation between unfinished tasks, rumination and perceived stress among university students

Bachelor Thesis Psychology

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Abstract

Negative health effects (such as burnout) can arise when employees are not able to unwind from job demands during their leisure time. Therefore, recovery seems to be an important factor to be able to refill one's personal resources that might get depleted from stressors at work. Unfinished tasks have shown to be one important stressor for employees. As previous research was only directed to the work context, the goal of the current study was to find out if unfinished tasks might also be a stressor for students in the university context. As rumination has shown to be an important factor related to a higher perceived stress level, it was researched if it mediates or moderates the potential relation between unfinished tasks and perceived stress.

An online questionnaire was administered to measure university students' (perception of) unfinished tasks, their level of perceived stress, and their level of state and trait rumination. Participants were collected via convenience sampling. After the exclusion of some participants due to not finishing the questionnaire or not being a university student, 129 participants were left for analyses regarding unfinished tasks and perceived stress, and 115 for analyses regarding state and trait rumination. Pearson correlations indicated that there was a moderate correlation ($r = .45$, $p < .01$) between unfinished tasks and perceived stress. Furthermore, mediation and moderation analyses showed that state rumination was no mediator and trait rumination no moderator. Unexpectedly, additional analyses showed that the relationship between unfinished tasks and perceived stress was partially mediated by trait rumination.

To conclude, the current study gave evidence that unfinished tasks and perceived stress are not only related in the work context, but also in the study context. Additionally, trait rumination partially explained this relationship in the current study. However, conclusions could not be drawn about the role of state rumination, as the self-developed questionnaire showed not to be valid. Furthermore, the design of the current study was not optimal, as due to the cross-sectional survey design, no conclusions could be drawn regarding causal relationships. Therefore, it would be interesting to do experimental research in this field, to investigate if unfinished tasks lead to perceived stress among university students, and to investigate if rumination mediates or moderates this relationship. An implication for practice was that it is important for universities to help students in their recovery process and to help them in planning their tasks wisely, so that they are not left with a lot of unfinished tasks at once.

Introduction

To prevent negative health effects, it is important to unwind from job demands during leisure time. Several negative consequences of not being able to cope with the stress of work demands have been found. For example, sleep impairment may arise if one cannot unwind from one's work (Akerstedt, Knutsson, Westerholm, Theorell, Alfredsson, & Kecklund, 2002). Additionally, it has been found that work stress is related to lower well-being (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001).

Eustress and distress

Stress can be defined as the organisms' reaction to every sort of strain (Selye, 1956). Thus, if an individual is confronted with something he perceives as demanding (a stressor), a stress response follows. However, not every stress response following a stressor is equal. Namely, two different forms of stress exist: eustress and distress (Selye, 1956). Eustress is positively perceived stress; stressors are viewed as challenges that can help individuals to increase their motivation in e. g. executing daily tasks (Selye, 1956). In contrast to that, distress is negatively perceived stress; stressors are viewed as overwhelming and threatening, or as not challenging enough (Selye, 1956). Thus, distress is regarded as following from either too much or too little demands, whereas eustress can be regarded as following from the mean between too much and too little demands. Therefore, eustress can be regarded as the optimal level of perceived stress.

Recovery

After every stressful phase, it is necessary for individuals to relax (Struhs-Wehr, 2017). Specifically, recovery is a factor that might aid people in preventing negative health effects. It can be described as a means to refill psychological and physical resources that have been exhausted by certain kinds of stressors (Meijman & Mulder, 1998). Resources include for example effort, energy, or personal characteristics and seem to be necessary to cope with stress or stressors (Hobfoll, 1989). When a person is exposed to stressors (such as a lot of work demands), her resources might get depleted. If that person finds no way to refill her resources, this might lead to negative effects on that person's health, such as burnout (Hobfoll & Shirom, 2001).

However, if a person engages in recovery activities or experiences, she might replenish her resources (Sonnentag, 2001; Sonnentag & Fritz, 2007). Recovery activities might for

example be to go out with friends or to talk to someone (Sonnentag, 2001). Examples of recovery experiences are the subjective feeling of relaxation and the feeling of psychological detachment from something (Sonnentag & Fritz, 2007). Hence, to prevent negative health effects, it is important to find a way to recover from stress by engaging in recovery activities and experiences, and by that be able to refill one's resources.

Related to the work context, it seems to be important for employees to recover from work stress to be able to prevent negative health effects. Otherwise, stressors at work might lead to the depletion of their personal resources (such as their energy level), which seem to be responsible for negative effects on health (Hobfoll & Shirom, 2001). Thus, recovery activities and experiences seem to be essential for the long-term well-being of employees.

Unfinished tasks and stress

Coping with the stress of job demands is not always easy, particularly if one is confronted with a lot of unfinished tasks. When a lot of tasks are undone and goals are not yet achieved, people tend to have difficulties with detaching from job demands (Smit, 2016; Weigelt & Syrek, 2017; Weigelt, Syrek, Schmitt, & Urbach, 2019). Specifically, unfinished tasks might foster the perception of stress. This perceived stress due to unfinished tasks might impair psychological well-being, e. g. in form of sleepless nights (Syrek, Weigelt, Peifer, & Antoni, 2017).

A possible relationship between unfinished tasks and perceived stress can be explained due to the so called Zeigarnik effect. This effect includes that one tends to remember unfinished tasks better than finished ones (Zeigarnik, 1927). The explanation for that is that if there is an unfinished task, a tension arises which leads to the drive to finish that task. This fits to Lewin's Field Theory, which states that there is a tension connected to an unfinished task, which leads to an improved cognitive accessibility of relevant content during the completion of that task (Lewin, 1939). As soon as the task is finished, the tension fades. However, during the completion of a task, people have the motivation and tension to reach their goal connected to the task (Lewin, 1939). During the completion of a certain task, this tension might be motivating and might let people reach better results (= perceived eustress). However, it might also let people think during their leisure time about unfinished tasks at work or regarding their studies, which might cause perceived distress.

Rumination as a possible mediator or moderator

The effect of unfinished tasks on psychological well-being is not the same for every person. Namely, people who have a tendency for rumination are more prone to experience stress due to unfinished tasks (Cropley & Millward, 2009). An explanation for that might be that by the tendency to ruminate, the depletion of personal resources might be enhanced. Rumination refers to consistently thinking about a certain issue, even if there are no external demands that might give reason to think about those issues (Martin & Tesser, 1996). High ruminators perceive no real boundaries between leisure time and working time (Cropley & Millward, 2009).

Therefore, when high ruminators cannot stop thinking about an unfinished task at work in their home life, it is likely that their personal resources (e. g., their energy level) suffer. When it is not possible to stop thinking about something (such as an unfinished task), it seems to be difficult to refill one's personal resources. Even if a high ruminator would engage in recovery activities, it is likely that he misses recovery experiences, such as relaxation (Sonnentag & Fritz, 2007). The reason for that is that even during activities that are aimed at recovery (such as meeting friends), a high ruminator is likely to be not able to switch-off his thoughts regarding his unfinished tasks. Therefore, high ruminators are likely to experience more stress due to unfinished tasks, because they miss the opportunity to refill their personal resources by recovery experiences and activities. Research gives evidence for this claim. Namely, a study of Nolen-Hoeksema (2002) has shown that high ruminators are prone to negative health effects due to stress, such as depression or anxiety. Therefore, if unfinished tasks appear to be a stressor, it is likely that persons who tend to ruminate are especially prone to experience stress symptoms.

Rumination can be separated into two different forms. Namely, it can be seen either as a personal trait or as a state (Key, Campbell, Bacon, & Gerin, 2008). As a trait, rumination includes that a person has a general tendency to ruminate; this person uses rumination as a style of coping with different stressors in life. As a state, rumination depends on a specific stressor that triggers ruminative thoughts.

As it is not clear whether rumination is mostly a trait or a state, both forms of rumination will be investigated in the current study. Namely, as a trait, rumination will be regarded as a potential moderator that might enhance the relation between unfinished tasks and perceived stress (see Figure 1). People that have a general tendency to ruminate are likely to think about unfinished tasks, but also about other things that happen in their lives. Thus, the trait of rumination might limit the possibility of coping with stress from job demands, leading to higher perceived stress. If people are continuously busy with ruminating about a lot of things, it is

likely that they are even more stressed if unfinished work tasks come into play. Therefore, trait rumination is supposed to moderate the relationship between unfinished tasks and perceived stress.
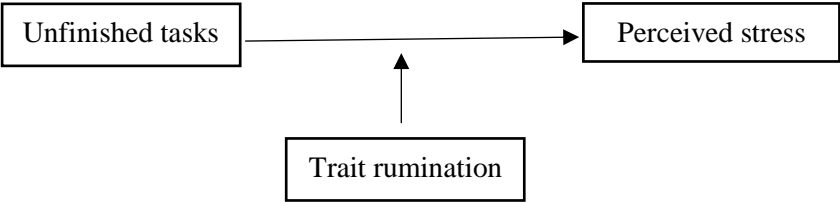

Figure 1. Conceptual model 1 of the current study.

As a state, rumination will be regarded as a potential mediator between unfinished tasks and stress (see Figure 2). According to Berset, Elfering, Lüthy, Lüthi, and Semmer (2011), there is a strong association between stressors and rumination. Namely, they found a connection between work stress (in the form of time pressure and effort-reward imbalance) and rumination. People tend to ruminate about stressors at work in their leisure time. Connected to the current study, it is likely that the stressor of unfinished tasks might lead to rumination about these tasks, leading in turn to the perception of stress.

Additionally, Syrek et al. (2017) investigated unfinished tasks as a main predictor of rumination. They regarded unfinished tasks as a stressor and found that the relation between unfinished tasks and sleep impairment is mediated by rumination. Thus, people seem to be influenced by uncompleted tasks, leading them to think about them also in their leisure time, which then leads to the perception of stress. This stress might then show up in form of sleep impairment.
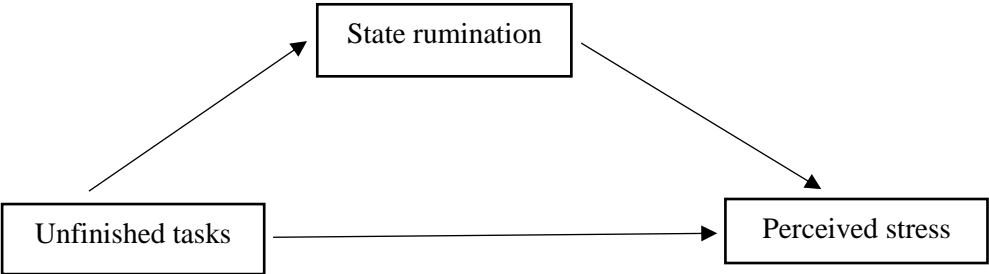

Figure 2. Conceptual model 2 of the current study.

Students as a target group

Some research has been done regarding the relationship of unfinished tasks on rumination and on different forms of stress in the *work*-related context (Syrek & Antoni, 2014; Syrek et al., 2017; Weigelt et al., 2019). However, as students are especially prone to psychological distress (Stallman, 2010), this target groups seems also worth to be investigated. Namely, a study of Stallman (2010) has shown that students' level of distress is significantly higher than the rate in the general population. This finding is problematic, as lower academic achievement and disability are connected to psychological distress (Stallman, 2010). Therefore, students would be a reasonable target group for investigating the relation between unfinished tasks and perceived stress. As it was found that there is evidence for an influence of unfinished tasks on perceived stress among employees (e. g., Syrek & Antoni, 2014), it is worth investigating if this might also be the case among students.

Further, it would be interesting to find out if rumination mediates or moderates this relation, as previous research has shown that high ruminators are especially prone to stress (Cropley & Millward, 2009). Therefore, the research question of the current study is: *In what way are unfinished study-related tasks and perceived stress related, and does rumination moderate or mediate this relationship?*

As no literature exists for the topic of the current study in study-related context, it is appropriate to investigate the topic in an explorative manner. Therefore, instead of hypotheses, sub-research questions will be formulated. Namely, the following sub-research questions can be derived:

RQ1: Do students who have more unfinished tasks experience a higher level of perceived stress than students who have less unfinished tasks?

RQ2: Is the relationship between unfinished tasks and perceived stress stronger for students who score high on trait rumination than for students who score low on trait rumination?

RQ3: Do more unfinished tasks, as compared to less unfinished tasks, cause a higher level of state rumination, which in turn leads to a higher level of perceived stress?

Method

Participants and Design

This cross-sectional survey study initially involved 170 participants. Exclusion criteria of this study were not being a university student, not finishing the subscales of unfinished tasks and perceived stress of the questionnaire, and indicating a bad understanding of the questionnaire. After exclusion of participants, 129 university students remained, aged between 18 and 29 years (see Table 1 for all demographic variables). The participation in this study was partly voluntarily, or students received study participation credits for participating.

In this study, a within-subject design with unfinished tasks as independent variable and perceived stress as dependent variable was used. Rumination (trait and state separately) was treated as a possible influencing variable (i. e., moderator or mediator).

Table 1

Background characteristics of 129 university students

Demographic variable	Category	All students (N = 129)
Age, years (SD)		21.85 (1.73)
Range of age, years		18-29
Gender, n (%)		
	Female	80 (62)
	Male	49 (38)
Nationality, n (%)		
	German	104 (80.6)
	Dutch	4 (3.1)
	Other	21 (16.3)
Study, n (%)		
	Psychology	48 (37.2)
	Communication Sciences	6 (4.7)
	Other	75 (58.1)
Years of study (SD)		2.96 (2.16)
Phase of study, n (%)		
	Bachelor year 1	29 (22.5)
	Bachelor year 2	20 (15.5)
	Bachelor year 3	32 (24.8)
	Bachelor year 4 or higher	30 (23.3)
	Master year 1	9 (7.0)
	Master year 2	7 (5.4)
	Master year 3 or higher	2 (1.6)

Procedure

The questionnaire of the current study was created on Qualtrics. Participants were recruited via the SONA-system of the University of Twente, where the link to the questionnaire on Qualtrics was uploaded. Additionally, the link was distributed via Facebook groups and WhatsApp. After clicking on the link, participants could fill in the online questionnaire on Qualtrics.

At the beginning of the questionnaire, participants were informed about the topic of the study, by whom the study was conducted, what the purpose of the study was, how long the questionnaire would take, and how the data would be used. Further, participants were informed that they could withdraw from the study at any time, they were informed about possible risks,

and they were told that their data would be anonymized. Contact details of the researchers were given. Participants were asked to give their informed consent by ticking a box at the end of the page.

On the next page of the questionnaire, participants were asked to give some biographic data. Afterwards, participants were asked to answer questions regarding unfinished tasks, regarding perceived stress, and regarding trait and state rumination. Furthermore, two additional subscales were included in the questionnaire, namely regarding psychological capital and conscientiousness. However, these subscales were not used for the current study, but were instead part of the Bachelor thesis of two other students. At the end of the questionnaire, students were asked to what extent they were able to understand the questions, and they were thanked for their participation.

Materials and Measures.

The materials used in this study consisted of an online questionnaire. At the beginning of the questionnaire, participants were asked to indicate some biographic data, namely if they were a university student at the moment, what their gender and nationality was, what they were studying, and in which phase of study they were. Additionally, they were asked to indicate their age in numbers.

Perceived stress. The dependent variable perceived stress was measured with the Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983). The scale consists of 10 items using a 5-point Likert scale ranging from 0 (*never*) to 4 (*very often*). In a study of Reis, Hino, and Rodriguez-Añez (2010) with 793 participants, the scale had a reliability of $\alpha = .87$. In the current study, the questionnaire had a reliability of $\alpha = .90$. The scale includes items such as '*In the last week, how often have you felt nervous and "stressed"?*' and '*In the last week, how often have you felt that things were going your way?*' (see Appendix A for a full list of the items used). Initially, the scale was constructed for a time span of one month; however, for the current study, it was adapted to one week. The total score was calculated with the sum score. The possible range of scores was 0 to 40, with higher scores indicating a higher level of perceived stress.

Unfinished tasks. Unfinished tasks were measured with six items from a study of Syrek, Weigelt, Peifer, and Antoni (2017). In the current study, students were instructed to complete this scale for tasks related to their study at university. Items such as '*I have not finished important tasks that I had planned to do this week.*' and '*I have not started working on urgent tasks that were due this week.*' were used (see Appendix B for a full list of items). The items

were measured using a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). In a study of Syrek et al. (2017), the scale had a reliability of α = .93. In the current study, the questionnaire had a reliability of α = .82. The total score was calculated with the sum score; the possible range of scores was 6 to 30, with higher scores indicating a perception of more unfinished study-related tasks.

Rumination as a trait. Rumination as a trait was assessed with the Rumination scale of the Rumination-Reflection Questionnaire by Trapnell and Campbell (1999). The scale includes 12 items using a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). In the study of Trapnell and Campbell (1999), the subscale of rumination had a reliability of α = .90. In the current study, the questionnaire had a reliability of α = .88. Items such as '*I often find myself reevaluating something I've done*' and '*It is easy for me to put unwanted thoughts out of my mind*' are included in the scale (see Appendix C for all items used). The total score was calculated with the sum score; the range of scores was 12 to 60, with higher scores indicating a higher level of trait rumination.

Rumination as a state. No appropriate questionnaire could be found to measure state rumination. Therefore, three items were produced for the current study, such as '*When I know that I need to finish a task for university, I have difficulties to unwind from thinking about that task.*' (see Appendix C for all items). A 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) was used. The questionnaire had a reliability of α = .78. The total score was calculated with the sum score; the range of scores was 3 to 15, with higher scores indicating a higher level of state rumination.

Data analysis plan

First, the data set was screened. It was checked if all participants fulfilled the criterion of being a university student. Otherwise, these participants were excluded from the analysis. Additionally, those participants who withdrew from the questionnaire before answering the scales of unfinished tasks and perceived stress were excluded. No participant indicated a bad understanding of the questionnaire, so no one needed to be excluded due to this criterion.

Afterwards, some variables were recoded (see Appendix for which items needed to be reverse-scored) and scales were computed by adding up the variables of the particular scales. Further, the reliability of all scales was determined; Cronbach's alpha was calculated for all subscales. Then, the data were explored by first getting a general impression of the data set. Namely, the normal distribution of the data was checked. Kurtosis, Skewness, and histograms

indicated that the data were normally distributed. Furthermore, means, standard deviations, and Pearson correlations were calculated.

The research questions were answered by applying statistical tests to the data set and by analyzing their results. A Pearson's r test was used to test RQ1, a regression analysis was done to test for interaction to be able to answer RQ2, and multiple regression analyses were done to test for mediation to be able to answer RQ3 (Baron & Kenny, 1986). Additional regression analyses were done to test if state rumination might also be a moderator, and to test if trait rumination might also be a mediator.

The program PROCESS by Andrew F. Hayes was used to conduct the moderation and mediation analyses. A moderation effect was determined to be present when the effect of unfinished tasks on perceived stress was altered by state rumination (or: trait rumination; Baron & Kenny, 1986). Therefore, the relation between unfinished tasks*state rumination (or: trait rumination) on perceived stress should be significant at a significance level of α = .05 if a moderation effect was present.

A full mediation effect was determined to be present when (1) there was a positive relation between unfinished tasks and perceived stress, (2) between unfinished tasks and state rumination (or: trait rumination), (3) between state rumination (or: trait rumination) and perceived stress, and (4) if the effect of unfinished tasks on perceived stress faded when the mediator was added to the analysis (Baron & Kenny, 1986). A partial mediation effect was determined to be present when all previous mentioned criteria, except step 4, were fulfilled. The indirect effect indicated the amount of mediation (Baron & Kenny, 1986). The total effect model (see Table 3) was taken from the mediation output, as PROCESS did not give the total effect model in the moderation analyses.

As some participants withdrew from the study after answering the questionnaires regarding unfinished tasks and perceived stress, 115 participants were left for analyses regarding trait and state rumination.

Table 2

Means (M), Standard Deviations (SD), and Pearson Correlations between the Variables

Variables	N	M	SD	1	2	3	4	5	6
1. Unfinished tasks[2]	129	16.33	5.55						
2. Perceived stress[1]	129	18.71	7.40	.45**					
3. Rumination (trait)[2]	115	43.39	7.69	.20*	.50**				
4. Rumination (state)[2]	115	9.78	2.87	-.10	.21*	.16			
5. Age	129	21.85	1.73	.09	-.02	-.05	.04		
6. Gender	129			.05	.11	-.01	.20*	-.17	

Note. [1] = Likert scale 0-4; [2] = Likert scale 1-5

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

Overall, students had on average a moderate number of unfinished tasks and a moderate level of perceived stress (see Table 2). Further, also the level of trait and state rumination indicated that both were moderate on average. Age and gender did not correlate with either unfinished tasks and perceived stress, and by that it could be excluded that those variables had an influence on the results of the current study. Gender was weakly related to state rumination. Trait and state rumination did not correlate with each other (see Table 2).

Unfinished tasks and perceived stress. A Pearson's r test showed a statistically significant correlation between unfinished tasks and perceived distress (see Table 2). The strength of the correlation was moderate. Therefore, the results indicate that RQ1 can be answered affirmative; unfinished tasks and perceived stress were related.

Further, a Pearson's r test showed a statistically significant correlation between unfinished tasks and trait rumination (see Table 2). The strength of the correlation was small. However, unfinished tasks were unrelated to state rumination (see Table 2). Trait rumination did correlate with perceived stress; the strength of the correlation was moderate (see Table 2). Additionally, a significant correlation was found between perceived stress and state rumination; the strength of the correlation was small (see Table 2).

Trait rumination. No relation could be found between unfinished tasks and perceived stress when trait rumination was regarded as a moderator (see Table 3). Further, no relation could be found between trait rumination and perceived stress. No significant interaction effect could be found between unfinished tasks*rumination_trait on perceived stress. Therefore, the results indicate that RQ2 needs to be negated; trait rumination could not be regarded as a moderator.

Table 3

Moderation analysis of trait rumination and total effect model

Parameter	R^2	b	SE_b	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Model summary	.39				< .01		
Model 1							
(Constant)		4.97	10.14	0.49	.63	-15.13	25.06
Unfinished tasks		-0.20	0.56	-0.36	.72	-1.32	0.91
Trait rumination		0.13	0.23	0.59	.56	-0.32	0.59
Unfinished tasks x Trait rumination		0.02	0.01	1.27	.21	-0.01	0.04
Model 2 (total effect model)	.21				<.01		
(Constant)		8.74	1.96	4.45	<.01	4.85	12.63
Unfinished tasks (total effect of X on Y)		0.61	0.11	5.44	<.01	0.39	0.83

Note. N=115

State rumination. No significant relation could be found between unfinished tasks and state rumination (see Table 4). Unfinished tasks and state rumination together had a significant effect on perceived stress. Further, state rumination had a significant effect on perceived stress. However, the effect of unfinished tasks on perceived stress did not decrease. Further, the 95% confidence interval of the indirect effect did include zero (see Table 4). Therefore, RQ3 had to be negated; state rumination could not be regarded as a mediator (see also Figure 3).

Table 4

Mediation analysis regarding state rumination

| Parameter	R^2	b	SE_b	t	Sig.	95% Confidence Interval	
Effects						Lower Bound	Upper Bound
From unfinished tasks to state rumination	.01				.27		
(Constant)		10.66	0.85	12.61	<.01	8.99	12.34
Unfinished tasks		-0.05	0.05	-1.10	.27	-0.15	0.04
From unfinished tasks and state rumination to perceived stress	.27				<.01		
(Constant)		1.55	2.93	0.53	.60	-4.25	7.36
Unfinished tasks (direct effect of X on Y)		0.65	0.11	5.96	<.01	0.43	0.86
State rumination		0.67	0.21	3.21	<.01	0.26	1.09
Indirect effect of X on Y		-0.04	0.04			-0.11	0.03

Note. N=115
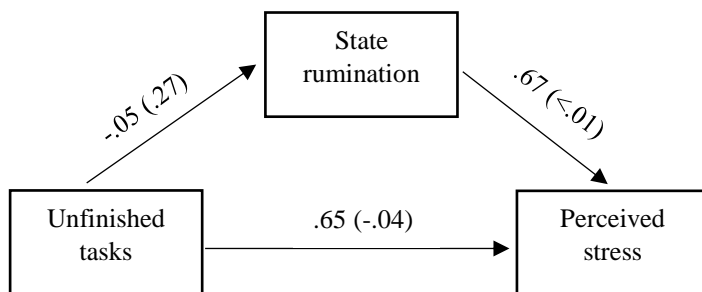
Figure 3. State rumination cannot be regarded as a mediator. Numbers include the b-values, and the p-values between brackets. For the relation between unfinished tasks and perceived stress, the indirect effect is between brackets.

Additional analyses

Additional analyses were conducted for state rumination as a potential moderator, and for trait rumination as a potential mediator. As the reasoning in the introduction of this study gave no evidence for these potential relationships, both were not included in the main analyses. However, as the current study was designed in an explorative manner, it could not be excluded that state and trait rumination might act in a different manner than expected. Therefore,

additional analyses were conducted for both, to be sure to not miss potential relationships between variables.

State rumination. No relation could be found between unfinished tasks and perceived stress when state rumination was regarded as a moderator (see Table 5). Further, no relation could be found between state rumination and perceived stress. No significant interaction effect could be found between unfinished tasks*rumination_state on perceived stress. Therefore, the results give no evidence for state rumination as a potential moderator.

Table 5

Moderation analysis of state rumination

Parameter	R^2	b	SE_b	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Model summary	.27				< .01		
Model							
(Constant)		0.07	7.41	0.01	.99	-14.61	14.75
Unfinished tasks		0.73	0.39	1.86	.07	-0.05	1.50
State rumination		0.82	0.71	1.16	.25	-0.59	2.23
Unfinished tasks x State rumination		-0.01	0.04	-0.22	.83	-0.08	0.07

Note. N=115

Trait rumination. A signification relation could be found between unfinished tasks and trait rumination (see Table 6). Unfinished tasks and trait rumination together had an effect on perceived stress. Further, trait rumination had an effect on perceived stress. However, the effect of unfinished tasks on perceived stress was still significant but decreased. The 95% confidence interval for the indirect effect did not include zero, giving evidence for trait rumination as a partial mediator. Therefore, the results give evidence for trait rumination as a partial mediator between unfinished tasks and perceived stress (see also Figure 4).

Table 6

Mediation analysis regarding trait rumination

| Parameter Effects	R^2	b	SE_b	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
From unfinished tasks to trait rumination	.04				.03		
(Constant)		38.82	2.23	17.41	<.01	34.40	43.24
Unfinished tasks		0.28	0.13	2.16	.03	0.02	0.53
From unfinished tasks and trait rumination to perceived stress	.38				<.01		
(Constant)		-7.19	3.35	-2.15	.03	-13.82	-0.56
Unfinished tasks (direct effect of X on Y)		0.50	0.10	4.89	<.01	0.30	0.70
Trait rumination		0.41	0.07	5.57	<.01	0.26	0.56
Indirect effect of X on Y		0.11	0.06			0.002	0.22

Note. *N*=115
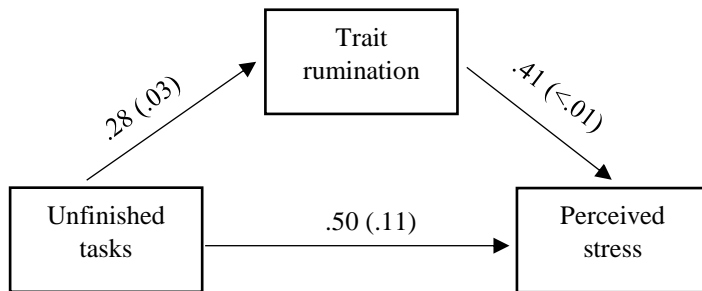
Figure 4. Trait rumination as a partial mediator. Numbers include the b-values, and the p-values in brackets. For the relation between unfinished tasks and perceived stress, the indirect effect is between brackets.

Discussion

The results of the current study showed that unfinished tasks and perceived stress were related (RQ1), but that trait rumination did not enhance the relationship (RQ 2). Further, state rumination did not act as a mediator between unfinished tasks and perceived stress (RQ 3). Unexpectedly, additional analyses showed that trait rumination acted as a partial mediator between unfinished tasks and perceived stress. This means that trait rumination accounted for some, but not all, of the relationship between unfinished tasks and perceived stress.

The finding that unfinished tasks and perceived stress seem to be related is in line with previous research. Namely, Weigelt et al. (2019) also found that unfinished tasks are an important stressor. However, they investigated the relationship between unfinished tasks and stress in the work context. The current study gives evidence that unfinished tasks are a stressor also in the study context. Thus, not only employees experience stress due to unfinished tasks at work, but also students experience stress due to unfinished tasks at university.

In the current study, it was not considered reasonable to assume that unfinished tasks might lead to trait rumination, as trait rumination seemed to be a style of coping in general. Thus, it was assumed that trait rumination cannot be elicited by a specific stressor (i. e., unfinished tasks), as the tendency to ruminate was assumed to take place at almost every moment in a high ruminator's life. Still, additional analyses were conducted to test if trait rumination might mediate the relationship between unfinished tasks and perceived stress and unexpectedly, the results were significant.

Although the results of the current study suggest that trait rumination mediates the relationship between unfinished tasks and perceived stress, an alternative explanation for this finding would also be possible. Namely, it is possible that a high ruminator constantly thinks about different kinds of issues, including unfinished tasks. Therefore, it is likely that a high ruminator experiences a lot of stress if he is confronted with a lot of unfinished tasks, but that does not mean that unfinished tasks lead to increased rumination. However, although unfinished tasks, trait rumination, and perceived stress are related, it is not possible to infer a causal relationship from this cross-sectional study.

Further research is necessary to investigate the role of trait rumination as a mediator between unfinished tasks and perceived stress. It would be interesting to do experimental research to be able to investigate cause-effect relationships. Namely, it would be interesting to investigate if unfinished tasks indeed lead to perceived stress (and if it is not vice versa), and if trait rumination is indeed a mediator in this relationship. In the current study, there is evidence

for these assumptions; however, further research is necessary to investigate if there is a causal relationship.

Other research showed that rumination has a mediating role between stress at work and bad sleep (Berset et al., 2011). In the study of Berset et al (2011), a similar model as in the current study was used to explain this relationship. Namely, it was stated that the reason for rumination to have a mediating role might be that high ruminators have difficulties to recover from stressors at work. This might be due to the inability to refill personal resources that have been depleted by stressors at work.

The findings of Berset et al. (2011) are partly in line with those of the current study, as correlations between unfinished tasks (the stressors) and perceived stress were found. However, the relationship between unfinished tasks and trait rumination was small, and the indirect effect of unfinished tasks, mediated by trait rumination, on perceived stress was small. Therefore, it would be interesting to further investigate if trait rumination is indeed related to unfinished tasks and perceived stress among students. Specifically, experimental research would be necessary to find out if trait rumination indeed acts as a mediator between unfinished tasks and perceived stress. It would be interesting to research if trait rumination still acts as a (partial) mediator – and maybe even as a full mediator – in an experimental design.

Cropley and Millward (2009) found that the tendency to ruminate as a style of coping (trait rumination) is connected to the perception of boundaries between work and leisure time. Namely, high ruminators tend to perceive less boundaries between work life and home life, and thereby experience a higher level of stress because it seems to be difficult for them to unwind from job demands. In the current study, a correlation was found between trait rumination (and also state rumination) and perceived stress. This finding fits to the study of Cropley and Millward (2009), as they also suggested that rumination and stress are related to each other, due to the inability to switch-off from work.

The findings of the current study suggest that rumination and stress are not only related among employees, but also among university students; however, further research is necessary to investigate this potential relationship further, as no previous research exists in the context of university students. Therefore, further research needs to replicate the results of the current study. Additionally, as mentioned above, the current study could not account for causal relationships, as it was a cross-sectional survey design. Therefore, it would be interesting to conduct experimental research regarding the relationship between trait and state rumination among university students.

In the current study, state rumination (in contrast to trait rumination) was not related to unfinished tasks. Additionally, there was no correlation between state rumination and trait rumination. This indicates that the measurement of state rumination was not valid. Probably, the questionnaire design to measure state rumination was not appropriate. As no appropriate questionnaire was found, it was necessary to develop an own questionnaire. However, the questionnaire for state rumination was only based on face validity, which is not sufficient for drawing conclusions about the questionnaires' validity. Therefore, further research is necessary to validate this questionnaire, so that it is possible to find out if the absent relationship between unfinished tasks and state rumination was dependent on the questionnaire design. To validate the questionnaire, it would be necessary to do a pilot test on a large sample of university students, to identify the underlying components of the items, to check the internal consistency of the questionnaire, and to revise the questionnaire if it is necessary (Collingridge, 2014).

Besides the inappropriate measurement of state rumination, another limitation of the current study is that it is difficult to draw firm conclusions regarding its results. As the design of the current study did only allow to investigate correlations between variables, it is not possible to infer causal relationships. It is not clear in which direction the relationship between unfinished tasks and perceived stress goes. It might for example also be that students who perceive a lot of stress have more unfinished tasks, due to their inability to concentrate on their tasks. By that possible inability to concentrate, they might miss the opportunity to finish the tasks. Therefore, further research should take this possible alternative explanation into account. Additionally, experimental research would be necessary to rule out this alternative explanation.

Still, a positive aspect of the current study was that all questionnaires had a high Cronbach's alpha, indicating a good reliability of all questionnaires. A further positive aspect of the current study is that it opens up a new field of research. Unfinished tasks seem to be an important stressor, not only in work-related context, but also in study-related context. Furthermore, even though a lot of German participants were included in the current study, also many other nationalities participated. Therefore, there unfinished tasks might act as a crucial stressor across different nationalities among university students. However, as mentioned above, further research is necessary to test this relationship.

The results of the current study suggest that it seems to be important to enhance interventions in universities that help students in their recovery process. Universities should help students in planning their tasks wisely, so that students avoid to not finish tasks in time, and thereby avoid having a lot of unfinished tasks at once. It is likely that by having a lot of unfinished tasks, students' personal resources get depleted (Meijman & Mulder, 1998). To refill

them, it is important to engage in recovery activities and to also experience recovery, for example by the feeling of relaxation (Sonnentag & Fritz, 2007). Therefore, universities should help students for example in planning their tasks wisely, and also give them enough time free to recover from stressful phases during their studies at university.

To conclude, unfinished tasks and stress seem to be related not only in the work context, but also in the study context. Furthermore, trait rumination partially explains this relationship, but conclusions cannot be drawn about the role of state rumination as the self-developed questionnaire showed not to be valid. As the design of the current study was not optimal and as no previous research exists that investigated the relationship in the study-related context, it is important to do further research in this field. Further, it would be interesting to further research if trait rumination indeed mediates this relationship, and if state rumination might also play a role in this relationship if the questionnaire is adjusted and validated.

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Appendices

Appendix A: Perceived Stress Scale questionnaire items

(items 4, 5, 7, 8 reverse scored)

Response options for each question were:

0 = never

1 = almost never

2 = sometimes

3 = fairly often

4 = very often

1. In the last week, how often have you been upset because of something that happened unexpectedly?
2. In the last week, how often have you felt that you were unable to control the important things in your life?
3. In the last week, how often have you felt nervous and "stressed"?
4. In the last week, how often have you felt confident about your ability to handle your personal problems?
5. In the last week, how often have you felt that things were going your way?
6. In the last week, how often have you found that you could not cope with all the things that you had to do?
7. In the last week, how often have you been able to control irritations in your life?
8. In the last week, how often have you felt that you were on top of things?
9. In the last week, how often have you been angered because of things that were outside of your control?
10. In the last week, how often have you felt difficulties were piling up so high that you could not overcome them?

Appendix B: Unfinished tasks questionnaire items

Response options for every statement were:

1 = strongly disagree

2 = somewhat disagree

3 = neither agree nor disagree

4 = somewhat agree

5 = strongly agree

Consider tasks of previous week:

1. I have not finished important tasks that I had planned to do this week.
2. I have not finished a large amount of due tasks this week.
3. I have not completed this week's urgent tasks.
4. I have not even started with important tasks, I wanted to fulfill this week.
5. I need to carry many of this week's due tasks into the next week.
6. I have not started working on urgent tasks that were due this week.

Appendix C: Rumination questionnaire items

Response options for every statement of both questionnaires were:

1 = strongly disagree

2 = disagree

3 = neutral

4 = agree

5 = strongly agree

Rumination as a trait

(items 6, 9, 10 are reverse scored)

1. My attention is often focused on aspects of myself I wish I'd stop thinking about.
2. I always seem to be rehashing in my mind recent things I've said or done.
3. Sometimes it is hard for me to shut off thoughts about myself.
4. Long after an argument or disagreement is over with, my thoughts keep going back to what happened.
5. I tend to "ruminate" or dwell over things that happen to me for a really long time afterward.
6. I don't waste time rethinking things that are over and done with.
7. Often I'm playing back over in my mind how I acted in a past situation.
8. I often find myself reevaluating something I've done.
9. I never ruminate or dwell on myself for very long.
10. It is easy for me to put unwanted thoughts out of my mind.
11. I often reflect episodes in my life that I should no longer concern myself with.
12. I spend a great deal of time thinking back over my embarrassing or disappointing moments.

Rumination as a state

(item 3 is reverse scored)

1. When I know that I need to finish a task for university, I have difficulties to unwind from thinking about that task.
2. When coming home from university, it is difficult for me to relax when I know I should still work on something for university.
3. Most of the time, I am able to stop thinking about open tasks for university during my leisure time.