

Self-critical thinking mediates the relationship between perfectionism and perceived stress in undergraduate students: a longitudinal study

Dr Jodie Stevenson

University of Lincoln

Dr Umair Akram (✉ u.akram@shu.ac.uk)

Sheffield Hallam University

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Title: Self-critical thinking mediates the relationship between perfectionism and perceived stress in undergraduate students: a longitudinal study

Jodie C. Stevenson PhD¹ & Umair Akram, PhD^{2*}

¹School of Psychology, University of Lincoln, UK

²Department of Psychology, Sociology and Politics, Sheffield Hallam University, UK

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***Corresponding Author:** u.akram@shu.ac.uk Department of Psychology, Sociology and Politics, Collegiate Crescent, Sheffield, South Yorkshire, S10 2BP, UK.

Abstract

The present study examined the concurrent and longitudinal relationships between multidimensional perfectionism, perceived stress, and self-critical thinking in a sample of UK university students. Specifically, to determine whether self-critical thinking at baseline mediated the longitudinal relationship between baseline perfectionism and future stress at follow-up. At baseline, N=220 students completed measures of multidimensional perfectionism, perceived stress, and self-critical thinking, whereas N=84 completed the same measures at follow-up. Socially prescribed, and self-oriented perfectionism were related to increased stress, self-hatred, and self-inadequacy at baseline. Longitudinal analysis revealed that baseline self-oriented and socially prescribed perfectionism predicted increased reports of stress and self-critical thinking three weeks later at follow-up. More crucially, multiple mediation analysis found self-hatred and inadequacy at baseline mediated the longitudinal relationship between baseline perfectionism and perceived stress at follow-up. Perfectionistic and self-critical thinking appears to accentuate the experience of perceived stress in the university student population. Student-based interventions to reduce self-critical thinking may prove beneficial in preventing the onset of perceived stress.

Introduction

The transition to university level study typically involves significant academic and psychosocial challenges leaving university students particularly vulnerable to psychological distress (Holdaway et al., 2018; Taylor et al., 2013). Stress is as mental or emotional pressure experienced when an individual is faced with adverse or demanding circumstances that are perceived to or exceed their ability to cope (Lazarus & Folkman, 1974), and involves heightened autonomic nervous system and hypothalamic-pituitary-adrenocortical (HPA) activity (Ulrich-Lai & Herman, 2009). Acute physiological and psychological effects of stress include gastrointestinal discomfort, headaches, and cognitive impairments (e.g., poor memory and concentration; Waghachacare et al., 2013). Whereas prolonged stress appears to put individuals at risk of diabetes, cardiovascular disease, fatigue, depression, sleep disturbance and suicidal ideation (American Institute for Stress, 2014; Akram et al., 2020; Gardani et al., 2022; Iob & Steptoe, 2019; Nyberg et al., 2014).

University students face many situations that are likely to be perceived as stressful. Indeed, university level study comes with greater expectations of academic quality and capability within a less structured learning environment which emphasise independent learning (Cleary et al., 2011). Moreover, more frequent social activities associated with the university lifestyle, occurring in the absence of parental oversight, may present opportunities for increased alcohol intake, potential substance use and formation of sexual relationships (Cleary et al., 2011). In the UK, increasingly higher costs of living and increased tuition fees leave many students exposed to financial difficulties, debt, and self-management of a limited budget for the first time, which for some may prove especially difficult (O'Neil et al., 2018).

Over the past decade the experience of psychiatric difficulties appears to be continually rising among university students in the UK, with a fivefold increase in students opting to disclose their mental health difficulties to an institutional support service (Thorley, 2017). Despite this, institutional wellbeing services often fail to meet the increased demand for help and support (Motier et al., 2018; O'Neil et al., 2018). As such, the identification of potential modifiable predictors of stress in this population remains a vital means of refining the identification process for those at-risk, whilst offering novel insight into treatment targets (Mortier et al., 2018; O'Neil et al., 2018). With that in mind, specific aspects of multidimensional perfectionism and negative self-appraisal are frequently evidenced to be associated with increased reports of perceived stress amongst university students in several countries including the US (Chang, 2006; Chang & Rand, 2000; Dunkley et al., 2003), Australia (Schweitzer & Hamilton, 2002), Canada (Flett et al., 2016) and France (Saleh et al., 2017), alongside UK dental students (Collin et al., 2020) and Chinese and Indian international students studying in the US (Rice et al., 2012).

Perfectionism can be defined as the tendency to set excessively high standards for oneself and to engage in overly critical self-evaluations (Frost et al., 1990). Given methodological variation between studies sampling students, conclusions regarding which specific perfectionistic subscales are related to stress remain equivocal. Rice and colleagues (2012) found perceived stress to be related to increased levels of the discrepancy subscale (inadequate attainment of personal performance expectations) of the Almost Perfect Scale-Revised (Slaney et al., 2002) when examining international students attending college in the US. Combining both the standards and discrepancy subscales of the short form Almost Perfect Scale (Rice, 2014), Collin and colleagues (2020) clustered UK dental students into groups experiencing maladaptive perfectionism, adaptive perfectionism, and non-perfectionist controls. Here, those experiencing maladaptive perfectionism reported increased levels of perceived stress relative to controls and adaptive perfectionists (Collin et al., 2020). Several studies (Chang, 2006; Chang & Rand, 2000; Flett et al., 2016) have used Hewitt and colleagues (1991) conceptualisation of

perfectionism, comprised of three dimensions: unrealistic standards for the self (self-oriented perfectionism); unrealistic standards expected of others (other oriented perfectionism); and the belief that others hold high standards for oneself (socially prescribed perfectionism). Here, socially prescribed perfectionism appears consistently related to increased stress amongst university students (Cang, 2006; Chang & Rand, 2000; Flett et al., 2016). However, whether these relationships are direct or mediated by other psychological factors is yet to be confirmed.

Perfectionistic tendencies and perceived stress in the student population are often associated with the experience of negatively oriented self-appraisal, manifesting in the form of self-criticism, self-disgust, self-efficacy, self-doubt (Bong et al., 2014; Burns, 1990; Blat, 1995; Blankstein et al., 2008; Dunkley et al., 2003; Low, 2020; Gilbert et al., 2006). For example, socially prescribed perfectionism has been found to be negatively related to self-efficacy amongst medical students in Korea (Yu et al., 2016). Further, socially prescribed perfectionism has been significantly related to increased self-hate (i.e., desire to remove undesired aspects of the self), self-inadequacy (i.e., perceived failure but a desire to improve) and reduced self-reassurance (i.e., ability to be self-validating, supportive, compassionate), whereas other oriented perfectionism has been associated with greater reassurance amongst a sample of undergraduate students (Gilbert et al., 2006). Likewise, perceived stress in Czech university students appears to be positively related to self-hate and self-inadequacy, yet negatively related to self-reassurance (Kotera et al., 2021). When examining predictors of stress in US college students, Saleh and colleagues (2017) demonstrated a substantially high prevalence of low self-esteem (57.6%) and Self-efficacy (62.7%, both predicting an increased experience of stress. Considering these interrelationships, the associations between dimensions of multidimensional perfectionism and stress may be mediated by self-critical thinking.

To the best of the authors knowledge, this proposition has yet to be examined in the UK student population. Therefore, the present study examined the concurrent and acute prospective associations between multidimensional perfectionism, perceived stress, and self-critical thinking over the course of three weeks. Specifically, to determine: the extent to which significant relationships between perfectionism and perceived stress were mediated by facets of self-critical thinking at baseline; whether self-critical thinking at baseline mediated the longitudinal relationship between baseline perfectionism and future stress at follow-up.

Method

Sample and Procedure

In accordance with the British Psychological Society's Code of Human Research Ethics and the host institution's Research Ethics Policy, the study was approved by the University's Research Ethics Committee, and all participants provided online informed consent prior to data collection. Undergraduate students were recruited using an Online Research Participation System (ORPS) as well as from a university-wide email distribution list. While only undergraduate students were permitted to take part in the study, no age cut offs were imposed. Students accessed the web-based survey via Qualtrics, which was live for a period of 3 weeks at baseline (T1). Following, participants were invited to complete the same questionnaire after an interval of 15 weeks (T2). Incomplete entries were discarded. Only complete cases were used in the analysis due to the ethical right to withdraw from the survey at any time. The data was also examined for duplicate responses based on matching IP addresses, where none were found. At baseline, N=220 respondents (68.2% female; mean age = 19.41 ± 2.86, range = 17 – 47yrs) provided complete data for the variables of interest (i.e., multidimensional perfectionism, perceived stress, self-critical thinking) were entered into the final analysis. Eighty-four of these participants successfully completed the same measures at follow-up (T2) (66.7% female;

mean age = 19.89 ± 3.92, range = 18 – 47yrs). A series of independent t-tests were conducted to determine whether those participants who completed the study differed from those who did not for the included measures. No significant differences were reported (all p 's > .05; see Table 1).

Insert Table 1

Measures

Hewitt and Flett's Multidimensional Perfectionism Scale short form (MPS-HF, 1991) was used to assess participant levels of perfectionism. This 15-item measure dimensions of perfectionism – self-oriented (5 items, e.g., "One of my goals is to be perfect in everything I do"), other-oriented (5 items, e.g., "Everything that others do must be of top-notch quality"), and socially prescribed (5 items, e.g., "The better I do, the better I am expected to do"). For each item, respondents were instructed to indicate on a 7-point Likert scale ranging from 1 (*Strongly agree*) to 7 (*Strongly disagree*). The individual dimensions of the MPS have been shown to have good internal consistency, the Cronbach's α for the current sample were self-oriented (.86), other-oriented (.73), and socially prescribed (.71).

Perceived stress was assessed using the Perceived Stress Scale (PSS-4; Cohen, Kamarck, & Mermelstein, 1983). The PSS is designed to measure the degree to which respondents find their lives unpredictable, uncontrollable, and overloading as these three items have been repeatedly found to be central components of the experience of stress. For each item, respondents were instructed to indicate on a 6-point Likert scale ranging from 0 (*Never*) to 5 (*Very often*). The PSS-4 has been shown to have high internal consistency, the Cronbach's α for the current sample was .76.

The Forms of Self-Criticizing/Attacking & Self-Reassuring Scale (FSCRS; Gilbert et al., 2004) was used to examine self-criticism. The FSCRS is a 22-item measure that has been designed to measure inadequate self ("I am easily disappointed with myself"), hated self ("I have a sense of disgust with myself"), and reassured self ("I find it easy to forgive myself"). For each item, respondents were instructed to indicate on a 5-point Likert scale ranging from 0 (*Not at all like me*) to 4 (*Extremely like me*). The Cronbach's α for the current sample were inadequate self (.91), hated self (.88), and reassured self (.89).

Statistical Analyses

Pearson's bivariate correlations examined concurrent and longitudinal associations between the subscales of the PSS-4, MPS-HF, and the FSCRS at baseline and follow-up. A series of t-tests compared mean variable scores between baseline and follow-up. This was followed by multiple mediation analysis to determine whether any emerging relationships between perfectionism and perceived stress were mediated by self-perception. All statistical analyses were performed using Jamovi version 1.02 (The Jamovi Project, 2019). Significance was considered at the $p < 0.05$ level (two-tailed).

Results

Descriptive statistics and bivariate correlations for the dimensions of perfectionism, perceived stress, and self-criticism at baseline (T1) and follow-up (T2) are presented in Tables 1 and 2.

Baseline relationships

Concurrent analysis indicated that, at baseline, self-oriented perfectionism was positively correlated with other oriented ($r=.45$, $p<.01$) and socially prescribed perfectionism ($r=.49$, $p<.01$), perceived stress ($r=.18$,

$p < .01$), and self-inadequacy ($r = .32$, $p < .01$) and self-hatred ($r = .16$, $p < .05$). Other oriented perfectionism was significantly positively correlated with socially prescribed perfectionism ($r = .37$, $p < .01$), whereas no significant relationships were observed with the remaining variables (all p 's $> .05$). Socially prescribed perfectionism was significantly related to increased reports of stress ($r = .34$, $p < .01$), self-inadequacy ($r = .40$, $p < .01$) and self-hatred ($r = .36$, $p < .01$), and reduced self-assurance ($r = -.26$, $p < .01$). Finally, perceived stress was related to increased reports of self-hatred ($r = .65$, $p < .01$) and inadequacy ($r = .62$, $p < .01$) and reduced self-assurance ($r = -.56$, $p < .01$).

Inset Table 2

Baseline mediation

Using the MEDMOD plugin for Jamovi, we examined whether self-inadequacy and self-hatred mediated the relationship between SOP and SPP with perceived stress at baseline. Bootstrapping with 1000 bias-corrected and accelerate resamples and 95% confidence intervals were used, and the Sobel test (z) was used to indicate the hypothesized mediation effects. As demonstrated in Table 3, the results demonstrated no significant direct effects between perceived stress with SOP and SPP. However, significant indirect effects of SOP and SPP (respectively) with perceived stress via self-hate and inadequacy were evidenced.

Inset Table 3

Follow-up relationships

Concurrent analysis indicated that, at follow-up, self-oriented perfectionism was positively correlated with other oriented ($r = .48$, $p < .01$) and socially prescribed perfectionism ($r = .63$, $p < .01$), and perceived stress ($r = .23$, $p < .05$). Socially prescribed perfectionism was significantly related to other oriented perfectionism ($r = .44$, $p < .01$), increased reports of stress ($r = .37$, $p < .01$), self-inadequacy ($r = .43$, $p < .01$) and self-hatred ($r = .34$, $p < .01$). Finally, perceived stress was related to increased reports of self-hatred ($r = .59$, $p < .01$) and inadequacy ($r = .76$, $p < .01$) and reduced self-assurance ($r = -.71$, $p < .01$).

Longitudinal relationships

Baseline levels of SOP were significantly associated with increased reports of perceived stress ($r = .22$, $p < .01$), self-hatred ($r = .29$, $p < .01$) and inadequacy ($r = .24$, $p < .01$) at follow-up. Baseline OOP failed to predict future stress or deficits in self-perception (all p 's $> .05$). However, baseline SPP was significantly related to greater reports of perceived stress ($r = .48$, $p < .01$), self-hatred ($r = .46$, $p < .01$) and inadequacy ($r = .48$, $p < .01$), and reduced self-reassurance ($r = -.34$, $P < .10$). Perceived stress at baseline predicted an increase in future SPP ($r = .38$, $p < .01$), stress ($r = .65$, $p < .01$), self-hatred ($r = .55$, $p < .01$) and inadequacy ($r = .63$, $p < .01$), and reduced self-reassurance ($r = -.60$, $P < .10$). Interestingly, self-hatred and inadequacy at baseline predicted future stress ($r = .69$, $r = .57$ respectively, both at $p < .01$) and increased levels of SOP ($r = .22$, $p < .05$; $r = .38$, $p < .01$ respectively) and SPP ($r = .29$, $r = .40$ respectively, both at $p < .01$) at follow-up. Interestingly, greater reports of self-reassurance at baseline emerged to be a protective factor against future stress ($r = -.62$, $p < .01$), self-hatred ($r = -.52$, $p < .01$) and inadequacy ($r = -.650$, $p < .01$), and SPP ($r = .86$, $p < .01$).

Inset Table 4

Longitudinal mediation

Like baseline analysis, the MEDMOD plugin for Jamovi was used to examine whether self-inadequacy and self-hatred at baseline mediated the longitudinal relationship between baseline SOP and SPP and future stress at

follow-up. Bootstrapping with 1000 bias-corrected and accelerated resamples and 95% confidence intervals were used, and the Sobel test (z) was used to indicate the hypothesized mediation effects. As demonstrated in Table 5,

Insert Table 5

Discussion

The current outcomes provide further evidence that the experience of multidimensional perfectionism amongst university students is related to greater reports of perceived stress and self-critical thinking (Bong et al., 2014; Burns, 1990; Blat, 1995; Blankstein et al., 2008; Dunkley et al., 2003; Gilbert et al., 2006; Low, 2020; Salaeh et al., 2017; Kotera et al., 2021; Yu et al., 2016). More specifically, socially prescribed, and self-oriented perfectionism were related to increased reports of perceived stress, self-hatred, and self-inadequacy at baseline. Furthermore, the relationships between self-oriented and socially prescribed perfectionism with perceived stress were mediated by self-hatred and inadequacy at baseline.

The experience of stress in perfectionistic individuals can manifest in various forms, such as an overwhelming burden to attain, and indeed maintain, incredibly high standards. Such pressure may originate from the internal (i.e., SOP) or external (SPP) self, leading to dysfunctional cognitive (i.e., contextual worry and rumination) and behavioural (i.e., the active pursuit of unrealistic goals) mechanisms. Furthermore, individuals pre-exposed to constant daily pressures (e.g., students) face greater vulnerability to psychological distress when negative life events occur (Hewitt & Flett, 2002). As such, perfectionistic thinking may act as a predisposing and precipitating factor in the context of stress and psychological distress in the university student population. Indeed, the desire to obtain high grades, maintain academic performance and personal standards in perfectionistic students may accentuate self-critical thinking, particularly in those who may be struggling to maintain the desired level of attainment (Collin et al., 2020).

Longitudinal analysis of the current data revealed that baseline self-oriented and socially prescribed perfectionism predicted increased reports of stress and self-critical thinking three weeks later at follow-up. More crucially, self-hatred and inadequacy at baseline mediated the longitudinal relationship between baseline perfectionism and perceived stress at follow-up. Whilst perfectionism may amplify perceived stress, self-critical thinking may accentuate this relationship due to self-defeating styles of cognitive appraisal (Hewitt & Flett, 2002). Self-oriented perfection involves a strong desire for the self to be perfect whilst maintaining unrealistic expectations and intensive self-evaluation fixated on personal shortcomings (Hewitt & Flett, 1991). Whereas socially prescribed perfectionism involves the notion that other people impose unrealistic and unobtainable demands and expectations on to them, where the self will not be satisfied unless these demands are met (Hewitt & Flett, 2002). Together, this fuels a cycle of pre-existing self-critical thinking in the form of self-hatred and inadequacy. Here, self-inadequacy maintains the drive for unrealistic levels of perfection whilst self-hatred accentuates the desire to remove undesired aspects of the self (Gilbert et al., 2004). Underlying this cycle, cognitive processes including attentional (e.g., perseverative thoughts related to performance) and interpretive biases (e.g., more likely to perceive an event as a mistake, then attributed as a personal failure), worry, rumination, and deficits in cognitive appraisal (e.g., overgeneralizing negative outcomes to aspects of the self) culminate to increase the physiological and psychological presentation of stress in the student population (Macedo et al., 2014). Therefore, student-based interventions to reduce self-critical thinking may prove beneficial in preventing the onset of perceived stress.

Several limitations of the current study should be noted. Although three time points are typically used to assess mediation in the context of a longitudinal design, this avenue was not pursued in the current study due to the high level of attrition at follow-up. Moreover, as the present sample was mostly comprised of young adult females, further research using a more balanced sample should clarify the role of sex.

Overall, we further evidence that the experience of multidimensional perfectionism amongst university students appears to be concurrently and longitudinally related to greater reports of perceived stress and self-critical thinking. More crucially, self-hatred and inadequacy at baseline mediated the longitudinal relationship between baseline perfectionism and perceived stress at follow-up. Whilst self-critical thinking may provide a novel treatment target in the student population, the current outcomes should be considered as preliminary given the aforementioned limitations.

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Tables

Table 1.

Mean scores \pm standard deviations for measures of perfectionism, perceived stress, and self-perception at baseline and follow-up.

	Baseline (n = 220)	Follow-up (n = 84)	t	Sig.
	M \pm SD	M \pm SD		
Self oriented perfectionism	23.16 \pm 7.48	23.29 \pm 7.70	0.134	.893
Other oriented perfectionism	17.57 \pm 5.97	18.35 \pm 6.80	0.979	.328
Socially prescribed perfectionism	20.66 \pm 6.34	22.27 \pm 7.03	1.920	.056
Perceived stress	7.81 \pm 3.13	7.48 \pm 3.02	0.830	.407
Inadequate self	20.82 \pm 8.97	19.48 \pm 8.88	1.168	.244
Hated self	5.17 \pm 5.43	5.06 \pm 5.75	0.155	.977
Reassured self	17.69 \pm 7.07	17.44 \pm 7.28	0.273	.785

Note:

*Sig at $<.01$, ** $<.01$, *** $<.001$

Table 2.

Concurrent correlations between perfectionism, perceived stress, and self-perception at baseline and follow-up.

	1	2	3	4	5	6	7
1. Self oriented perfectionism	-	.48**	.63**	.23*	.36**	.20	-.05
2. Other oriented perfectionism	.45**	-	.44**	.09	.10	.01	.06
3. Socially prescribed perfectionism	.49**	.37**	-	.37**	.43**	.34**	-.21
4. Perceived stress	.18**	.11	.34**	-	.59**	.76**	-.71**
5. Inadequate self	.32**	.11	.40**	.62**	-	.71**	-.48**
6. Hated self	.16*	.06	.36**	.65**	.72**	-	-.67**
7. Reassured self	-.06	-.05	-.26**	-.56**	-.55**	-.65**	-

Note: Baseline (n = 220) correlations are displayed below the diagonal; follow-up (n = 84) correlations are displayed above the diagonal.

*Sig at <.01, **<.01

Table 3.

Baseline examination of the mediating effect of self-hatred and inadequacy, with self-oriented and socially prescribed perfectionism as independent variables (IV) and perceived stress as dependent (DV).

IV	Mediator	Z: Total effect (c path)	Z: Direct effect (c' path)	Total indirect effect		β	P
				Point est.	95% CI		
[A]							
SOP	Hated self	2.08		.03	.01, .06	.08	.038*
	Inadequate self	2.96		.04	.02, .07	.10	.003**
		2.72		.08	-.04, .05	.18	.007**
			0.28	.01	.02, .13	.02	.783
[B]							
SPP	Hated self	4.04		.08	.05, .12	.17	.001***
	Inadequate self	3.10		.06	.02, .09	.12	.002**
		5.42		.17	.11, .23	.34	.001***
			1.51	.04	-.01, .09	.09	.131

Note: P, Sobel test; Mediation model, 1000 bootstrap BCa samples.

* Sig at < .05, ** < .01, ***<.001

Table 4.

Longitudinal correlations between perfectionism, perceived stress, and self-perception at baseline and follow-up.

Baseline (T1)	Follow-up (T2)						
	1	2	3	4	5	6	7
1. Self oriented perfectionism	.80**	.38**	.50**	.22*	.29**	.24*	-.14
2. Other oriented perfectionism	.39**	.69**	.40**	.21	.14	.10	-.09
3. Socially prescribed perfectionism	.49**	.27*	.77**	.48**	.46**	.48**	-.34**
4. Perceived stress	.21	.10	.38**	.65**	.55**	.63**	-.60**
5. Inadequate self	.38**	.19	.40**	.57**	.80**	.68**	-.55**
6. Hated self	.22*	-.01	.29**	.69**	.65**	.90**	-.72**
7. Reassured self	-.04	.03	-.23*	-.62**	-.52**	-.60**	.86**

Note: Baseline (n = 220) correlations are displayed below the diagonal; follow-up (n = 84) correlations are displayed above the diagonal.

*Sig at <.01, **<.01

Table 5.

Longitudinal examination of the mediating effect of baseline self-hatred and inadequacy, with self-oriented and socially prescribed perfectionism at baseline as independent variables (IV) and perceived stress at follow-up as the dependent (DV).

IV	Mediator	Z: Total effect (c path)	Z: Direct effect (c' path)	Total indirect effect		β	P
				Point est.	95% CI		
[A]							
SOP	Hated self	2.30		.06	.02, .12	.16	.022*
	Inadequate self	1.02		.02	-.01, .08	.06	.306
		2.10		.09	.01, .17	.22	.038*
			0.10	.00	-.06, .08	.01	.920
[B]							
SPP	Hated self	3.78		.11	.06, .18	.16	.010**
	Inadequate self	0.86		.02	-.03, .08	.06	.338
		4.92		.21	.13, .29	.22	.001***
			0.16	.07	-.01, .15	.01	.092

Note: P, Sobel test; Mediation model, 1000 bootstrap BCa samples.

* Sig at < .05, ** < .01, ***<.001