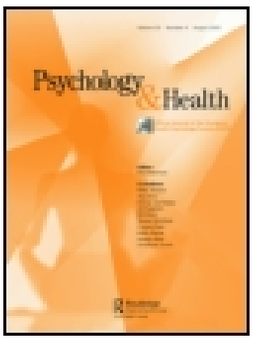

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Financial concern predicts deteriorations in mental and physical health among university students

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ABSTRACT

Objective: The aim of the present study was to investigate whether students' financial concerns predicted subsequent changes in their mental and physical health. In addition the opportunity was taken to test for reverse causality, by exploring whether initial levels of health predicted subsequent changes in financial concern. **Design:** The study employed a prospective correlational design. **Main Outcome Measures:** Undergraduate students at a British university ($N = 337$) completed measures of financial concern and health at two time points, approximately 8 weeks apart. **Results:** Regression analyses indicated that experiencing greater financial concern at baseline was associated with subsequent deteriorations in health on the following outcomes: role limitation due to physical problems, role limitation due to emotional problems, social functioning, mental health, general health perception and change in health. By contrast, there was no evidence that initial health influenced subsequent changes in financial concern. **Conclusion:** Findings suggest that financial concern might adversely impact mental and physical health outcomes in student populations.

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Student health; financial concern; higher education; mental health; physical health; university students

The current system of higher education funding in England means that many students accrue substantial debt over the course of their studies (Crawford & Jin, 2014). Indeed, the Institute of Fiscal Studies has estimated that current undergraduate students will graduate with an average amount of debt in excess of £50,000 (Belfield, Britton, & van der Erve, 2017). Perhaps unsurprisingly, therefore, university students frequently report worrying about their financial situation (National Union of Students, 2012). Importantly, research indicates that experiencing such finance-related concerns or stress (hereafter referred to as financial concern) is associated with worse mental and physical health outcomes. For example, with regard to mental health, financial concern has been related to an increased likelihood of students suffering from emotional problems, depression and anxiety (Jessop, Herberts, & Solomon, 2005; Lange & Byrd, 1998;

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McPherson, 2012; Richardson, Elliot, Roberts, & Jansen, 2017) and higher levels of financial concern are associated with worse overall mental health (Jessop et al., 2005; Richardson et al., 2017). Indeed, students experiencing financial concern have been found to be twice as likely to report mental illness (Stallman, 2010). In the context of students' physical health, financial concern has been linked to such varied outcomes as worse general health, reduced physical function, increased pain, difficulty sleeping and being more likely to experience general aches and pains (Cooke, Barkham, Audin, Bradley, & Davy, 2004; Jessop et al., 2005).

Although associations have also been reported between more objective measures of financial circumstance (e.g., debt amount [Carney, McNeish, & McColl, 2005] or difficulty paying bills [Richardson, Yeebo, Jansen, Elliott, & Roberts, 2018; Roberts, Golding, Towell, & Weinreb, 1999; Roberts et al., 2000]) and students' health, financial concern has been found to mediate such relationships (Jessop et al., 2005). This suggests that it may be students' subjective interpretation of their financial situation – in particular whether it is seen to present cause for concern - that is important in impacting health, rather than the amount of debt per se (see also Reading & Reynolds, 2001; Richardson et al., 2017; Selenko & Batinic, 2011).

However, one fundamental limitation to the literature referenced previously, which has documented relationships between financial concern and health outcomes, is its reliance on cross-sectional research designs, limiting the potential to draw conclusions regarding causality. As such, it is unclear whether greater financial concern leads to worse health outcomes, whether poor health exacerbates financial concern, or whether a bidirectional relationship exists. This issue is compounded by the fact that mechanisms have been proposed consistent with each of these directional pathways.

In line with the hypothesis that greater levels of financial concern result in worse health, finance-related worries may generate stress and negative affect, which have the potential to promote emotional distress, confer negative implications for both the immune and cardiovascular systems and contribute to health-detrimental behaviours (Carver & Vargas, 2011; Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002; Matthews & Gallo, 2011; Pruett, 2003; Puterman et al., 2013; Steptoe, Brydon, & Kunz-Ebrecht, 2005; Turunen & Hiilamo, 2014). Indeed, evidence indicates that financial strain may be linked to increased cortisol levels (Grossi, Perski, Lundberg, & Soares, 2001), increased ambulatory blood pressure (Steptoe et al., 2005), and lowered immune response (Halim, Kaplan, & Pollack, 2000). Furthermore, financial difficulties have been associated with greater levels of alcohol consumption (Berg et al., 2009), smoking (Adams & Moore, 2007; Berg et al., 2009; Roberts et al., 2000), and cocaine and amphetamine use (Adams & Moore, 2007).

On the other hand, compatible with the hypothesis that poor health may lead to greater levels of financial concern, it has been suggested that those suffering from depression may be more susceptible to accruing problematic debt (Fitch, Hamilton, Basset, & Davy, 2009; Richardson, Elliot, & Roberts, 2013). It also seems plausible that worse health could exacerbate financial concern by limiting students' ability to gain, or retain, paid employment.

The handful of longitudinal studies that have been published provide some (albeit not unanimous) support for the presence of a causal pathway between financial concern and health, whereby indicators of worse financial circumstances (both objective

and subjective) have been found to negatively impact students' mental health (Andrews & Wilding, 2004; Richardson et al., 2017; Walsemann, Gee, & Gentile, 2015; but see also Richardson, Elliott, & Roberts, 2015). For example, Richardson et al. (2017) found that feeling stressed about one's level of debt predicted detrimental changes in anxiety and global mental health over time. However, the longitudinal research that exists among students has focused exclusively on mental health outcomes. Although research from non-student samples similarly suggests that a prospective causal relationship may exist between financial circumstances and physical health outcomes (e.g. Sweet, Nandi, Adam, & McDade, 2013), the context of students' financial circumstances is arguably unique and caution should be applied before extrapolating such findings to student populations. As such, there is a need for longitudinal research to explore whether students' financial circumstances exert a detrimental impact on subsequent physical health outcomes.

Furthermore, there are suggestions in the literature that student health may have a causal effect on financial concern (e.g. Fitch et al., 2009; Richardson et al., 2013). However, as far as the authors are aware, only one study has examined whether students' mental health might lead to subsequent changes in financial circumstances, in which initial levels of global mental health were found to predict (albeit inconsistently) worsening financial difficulties among British undergraduate students (Richardson et al., 2017). Further, no studies appear to have examined whether physical health might lead to subsequent changes in financial concern among students. Given this, it would seem to be important to explore further whether worse health among students might exacerbate financial concern, in order to more fully understand the nature of the relationship between students' financial circumstances and their wellbeing.

In light of the above, the present research utilised a prospective, longitudinal approach to explore the causal associations between students' levels of financial concern and indices of mental and physical health. Specifically, the research reported here addressed the following research questions:

1. Do initial levels of financial concern predict subsequent changes in mental and physical health outcomes, such that greater financial concern leads to worse health?
2. Do initial levels of mental and physical wellbeing predict subsequent changes in financial concern, such that worse health results in increased financial concern?

Materials and methods

Design and procedure

The study employed a prospective, correlational design. At the start of the second term in the academic year (late January 2014), an email was sent to UK-resident undergraduate students in any year of study at a university in the south of England inviting them to take part in a study on student wellbeing; the email contained the link to the Time 1 questionnaire. This questionnaire was left online for 2.5 weeks. Students who provided their email address at Time 1 were contacted towards the end of the same term (~8 weeks later) and provided with a link to the Time 2 questionnaire.

This questionnaire was left online for 4 weeks. We elected to collect data over the course of an academic term, as this seemed to represent a reasonable timeframe within which one might expect to see fluctuations in both student health and financial concern.

In order to encourage participation and deter attrition, participants who completed both questionnaires were entered into a prize draw with a chance to win an iPad mini. Participants were informed at the start of both questionnaires that participation was voluntary, that they were free to withdraw from the study at any time, and that all information would be treated confidentially. Identifying information was stored separately from the main data file.

The measures reported below were collected as part of a large study exploring student well-being. Details of all measures included in this study are reported in the supplemental materials. Ethical approval for the study was obtained from the institutional Ethics Committee.

A power calculation revealed that a minimum sample size of 107 was required in order to detect a medium effect size (f) of 0.15 with a 0.95 level of power. A medium effect size is consistent with that found by other studies reporting significant associations between financial concern and health outcomes (e.g. Jessop et al., 2005). Data analysis did not commence until data from all participants had been collated.

Participants

Seven hundred and nine students completed the Time 1 questionnaire, of whom 337 completed the Time 2 questionnaire, representing an attrition rate of 52.47%. Chi-square and independent measures t-test analyses revealed that sample attribution did not vary by gender, age, socioeconomic status, Time 1 financial concern, or any of the indicators of mental and physical health at Time 1 (all $p>0.089$). However, attrition was found to vary by year of study, $\chi^2(3) = 11.49,\ p = 0.009,\ \text{Cramer's } V = 0.13$. Inspection of the cell ns indicated that students in their third and fourth year were more likely to have completed the Time 2 questionnaire than were those in their first or second year.

Of the final sample, 95 (28.19%) participants identified as male, 233 (69.14%) identified as female, and 9 (2.67%) elected not to report their gender. Ages ranged from 18 to 49 years $(M = 21.13,\ SD = 3.65)$; 88 (26.11%) students were in their first year of study, 101 (29.97%) were in their second year, 117 (34.72%) were in their third year and 24 (7.12%) were in their fourth year.

Materials

Questionnaires at both time points included the following measures.

Demographic information

Participants were asked to indicate their gender, age, and year of study.

Socioeconomic status

Socioeconomic status (SES) was measured using an adaptation of The MacArthur Scale of Subjective Social Status (Adler & Stewart, 2007). This measure has strong

associations with conventional, objective indicators of SES such as employment, education and income (e.g. Singh-Manoux, Adler, & Marmot, 2003), and confers the advantage that it can be readily applied to a student sample. Possible scores ranged from 1 to 10 in the present study, with higher scores indicating relatively higher subjective SES.

Financial concern

Following Jessop et al. (2005), financial concern was assessed using six items (e.g. 'I worry about my financial situation' and 'I would list financial difficulties as one of the major stresses in my life at the moment'), with responses given on 7-point Likert-type scales ranging from *strongly disagree* to *strongly agree*. The scale was found to have acceptable internal reliability at both time-points ($\alpha_{\text{Time 1}} = 0.91, \quad \alpha_{\text{Time 2}} = 0.92$). A mean score was calculated for each participant at each time point, with higher scores indicating greater levels of financial concern.

Mental and physical health

Participants completed the following subscales of the Short Form 36 Health Survey (SF-36; Jenkinson, Layte, Wright, & Coulter, 1996): role limitation due to physical problems, role limitation due to emotional problems, social functioning, mental health, energy/vitality, pain, general health perception and change in health. The SF-36 has undergone testing in both the USA and the UK to establish content, criterion and construct validity (Jenkinson et al., 1996) and has been used to assess mental and physical health in previous research utilising student samples (e.g. Jessop et al., 2005; Roberts et al., 2000). Factor analysis suggests that the role limitation due to physical problems, pain and general health perception subscales can be considered as representing outcomes aligned with physical health, while the remaining subscales utilised in the present study represent indicators of mental health (Jenkinson et al., 1996).

All subscales were found to have acceptable internal reliability at both time points in the present study (all αs > 0.80; rs > 0.55[1]). Responses were coded and participants' composite scores on each dimension at each time point were calculated in accordance with the SF-36 manual (Jenkinson et al., 1996). The range of possible scores for each dimension is 0–100, with higher scores indicating better health.

Analyses

For cases with missing data on one or more of the financial concern items, we imputed the within-participant mean response at the corresponding time point prior to calculating mean scores. In line with guidance presented in the user manual (Jenkinson et al., 1996), missing data was not imputed for the SF-36 subscales. Missing data resulted in a small number of participants not having scores on the composite measures of financial concern and SF-36 constructs (maximum $n = 21$ for Time 1 measures, maximum $n = 10$ for Time 2 measures); these participants were thus not eligible for inclusion in corresponding analyses. Consistent with the patterns of distribution reported elsewhere (e.g. Burholt & Nash, 2011), data on the SF-36 subscales frequently

demonstrated a negative skew; there was a trend towards a positive skew on the measure of financial concern.

Linear multiple regression was used to explore whether initial levels of financial concern predicted subsequent changes in health. Each of the Time 2 health outcomes was regressed in turn on to Time 1 financial concern, controlling for the corresponding health outcome at Time 1 (Finkel, 1995). Linear multiple regression analyses were also used to determine whether initial health predicted subsequent changes in financial concern. Financial concern at Time 2 was regressed on to each of the Time 1 indicators of health controlling for financial concern at Time 1. All regression analyses were first run without controlling for any potential confounds, as it is considered important to document whether or not relationships are evident under such circumstances (Simmons, Nelson, & Simonsohn, 2011). It is conceivable, however, that SES might confound the associations between financial concern and health in the present study, as it has the potential to influence (for example) both the initial levels of financial concern experienced and subsequent changes in health. Accordingly, the multiple regression analyses were run a second time controlling for SES at a separate first step.

Results

Table 1 reports the bivariate correlations between measures of financial concern and health at both time points; descriptive statistics for these variables are given in the supplemental materials.

Predicting mental and physical health outcomes

To test whether initial levels of financial concern predicted subsequent changes in health, Time 2 scores on each of the indicators of mental and physical health were regressed onto Time 1 financial concern scores, while controlling for Time 1 levels of the health indicator under investigation. The resultant multiple regression equations are summarised in Tables 2 and 3. It can be seen that Time 1 financial concern significantly predicted the following Time 2 health outcomes: role limitation due to physical problems, role limitation due to emotional problems, social functioning and change in health. It also marginally predicted mental health and general health perception. The negative valence of the regression coefficients for financial concern demonstrates that, in each instance, higher initial levels of financial concern were associated with subsequent reductions in health.

When the multiple regression analyses reported above were re-run controlling for SES at a separate first step, the pattern of findings remained unchanged, with the exception that the marginally significant impact of financial concern on general health perception was rendered non-significant. Overall, this suggests that the apparent relationships between financial concern and health outcomes are not attributable to pre-existing differences in SES.

Predicting financial concern scores

To explore whether initial levels of mental and physical health were able to predict subsequent changes in financial concern, financial concern scores at Time 2 were

Table 1. Bivariate correlations (Pearson's *r*) between financial concern and health outcomes.

Variable	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
FC (T1)	−0.21[a]	−0.32[a]	−0.28[a]	−0.30[a]	−0.27[a]	−0.20[a]	−0.28[a]	−0.03	0.81[a]	−0.23[a]	−0.28[a]	−0.27[a]	−0.27[a]	−0.24[a]	−0.20[a]	−0.32[a]	−0.13[c]
RLP (T1)		0.17[a]	0.43[a]	0.21[a]	0.27[a]	0.59[a]	0.40[a]	0.17[a]	−0.18[b]	0.46[a]	0.14[c]	0.35[a]	0.22[a]	0.24[a]	0.44[a]	0.43[a]	0.12[c]
RLE (T1)			0.52[a]	0.63[a]	0.52[a]	0.16[a]	0.30[a]	0.18[a]	−0.25[a]	0.20[a]	0.51[a]	0.36[a]	0.44[a]	0.38[a]	0.18[b]	0.26[a]	0.15[b]
SF (T1)				0.65[a]	0.58[a]	0.47[a]	0.50[a]	0.22[a]	−0.21[a]	0.39[a]	0.37[a]	0.58[a]	0.52[a]	0.47[a]	0.42[a]	0.50[a]	0.20[a]
MH (T1)					0.73[a]	0.28[a]	0.41[a]	0.24[a]	−0.27[a]	0.20[a]	0.54[a]	0.45[a]	0.75[a]	0.61[a]	0.23[a]	0.38[a]	0.19[a]
EV (T1)						0.30[a]	0.51[a]	0.25[a]	−0.28[a]	0.22[a]	0.48[a]	0.40[a]	0.63[a]	0.76[a]	0.29[a]	0.49[a]	0.19[a]
Pain (T1)							0.44[a]	0.21[a]	−0.18[b]	0.38[a]	0.18[a]	0.32[a]	0.24[a]	0.26[a]	0.58[a]	0.43[a]	0.14[c]
GHP (T1)								0.25[a]	−0.24[a]	0.37[a]	0.26[a]	0.45[a]	0.44[a]	0.47[a]	0.42[a]	0.83[a]	0.20[a]
CH (T1)									−0.04	0.12[c]	0.04	0.04	0.13[c]	0.10	0.11[c]	0.16[b]	0.54[a]
FC (T2)										−0.17[b]	−0.30[a]	−0.22[a]	−0.29[a]	−0.27[a]	−0.15[b]	−0.29[a]	−0.12[c]
RLP (T2)											0.16[b]	0.52[a]	0.22[a]	0.24[a]	0.64[a]	0.44[a]	0.17[b]
RLE (T2)												0.47[a]	0.61[a]	0.52[a]	0.16[b]	0.31[a]	0.17[b]
SF (T2)													0.57[a]	0.50[a]	0.54[a]	0.52[a]	0.19[a]
MH (T2)														0.78[a]	0.23[a]	0.47[a]	0.27[a]
EV (T2)															0.29[a]	0.50[a]	0.25[a]
Pain (T2)																0.48[a]	0.12[c]
GHP (T2)																	0.30[a]
CH (T2)																	

Abbreviations: CH = change in health; EV = energy/vitality; FC = financial concern; RLP = role limitation due to physical problems; GHP = general health perception; MH = mental health; RLE = role limitation due to emotional problems; SF = social functioning; T1 = time 1; T2 = Time 2.

[a] $p < 0.001$.

[b] $p < 0.01$.

[c] $p < 0.05$.

Table 2. Summary of multiple regression analyses predicting health outcomes (1).

	Health outcome at Time 2 (dependent variable)			
	Role limitation due to physical problems	Role limitation due to emotional problems	Social functioning	Mental health
Time 1 scores on the health outcome (β)	.43***	.48***	.55***	.73***
Time 1 financial concern (β)	−.12*	−.14**	−.13**	−.08[a]
Model *F*	45.96***	65.43***	85.04***	201.46***
Model R^2	.22***	.29***	.35***	.56***

Note: Total *df* ranged from 313 to 327.
***$p < 0.001$; **$p < 0.01$; *$p < 0.05$; [a]$p = 0.054$.

Table 3. Summary of multiple regression analyses predicting health outcomes (2).

	Health outcome at Time 2 (dependent variable)			
	Energy/vitality	Pain	General health perception	Change in health
Time 1 scores on the health outcome (β)	.76***	.56***	.82***	.53***
Time 1 financial concern (β)	−.01	−.06	−.05[b]	−.10*
Model *F*	217.99***	81.28***	366.32***	69.63***
Model R^2	.58***	.34***	.70***	.30***

Note: Total *df* ranged from 320 to 327.
***$p < 0.001$; **$p < 0.01$; *$p < 0.05$; [b]$p = 0.092$.

regressed onto each Time 1 indicator of mental and physical health in turn, while controlling for Time 1 levels of financial concern (Table 4). It can be seen that none of the Time 1 indicators of health were able to predict financial concern at Time 2 (all $ps \geq 0.17$), indicating that initial levels of health were not associated with subsequent changes in financial concern. Controlling for SES at a separate first step in the multiple regression analyses did not change the pattern of findings.

Discussion

With regard to the first research question, the findings of the present research indicate that initial levels of financial concern were able to predict subsequent changes in mental and physical health outcomes. Specifically, greater levels of financial concern at the start of term were associated with students suffering from worse health later in the term, evidenced in terms of their experiencing greater role limitation due to both physical problems and emotional problems, reduced social functioning, worse mental health and more negative perceptions regarding both their general health and how their health had changed.

These findings suggest that financial concern may lead to worse health among students, and support previous research findings documenting adverse prospective effects of students' financial circumstances on mental health outcomes (Andrews & Wilding, 2004; Richardson et al., 2017). Furthermore, the present findings extend those of previous research by demonstrating that financial concern may contribute to subsequent deteriorations in physical health outcomes, albeit this pattern of findings was not consistent across all indicators of physical health – notably there was no impact of financial concern on pain and the impact of financial concern on general health

Table 4. Summary of multiple regression analyses predicting Time 2 financial concern scores.

	Predictors	β	Model F	Model R^2
Regression 1	Time 1 financial concern	0.81***		
	Role limitation due to physical problems	0.01		
			300.39***	0.65***
Regression 2	Time 1 financial concern	0.81***		
	Role limitation due to emotional problems	0.00		
			300.32***	0.65***
Regression 3	Time 1 financial concern	0.80***		
	Social functioning	−0.02		
			288.35***	0.65***
Regression 4	Time 1 financial concern	0.79***		
	Mental health	−0.05		
			296.24***	0.65***
Regression 5	Time 1 financial concern	0.79***		
	Energy/vitality	−0.05		
			300.71***	0.65***
Regression 6	Time 1 financial concern	0.81***		
	Pain	0.01		
			297.36***	0.65***
Regression 7	Time 1 financial concern	0.81***		
	General health perception	0.01		
			291.54***	0.65***
Regression 8	Time 1 financial concern	0.80***		
	Change in health	−0.01		
			296.14***	0.65***

Note: Total *df* ranged from 316 to 325.
*** $p < 0.001$.

perception was only marginally significant. It is plausible that financial concerns could lead to increased role limitation due to physical problems (and marginally worse general health perception) over the course of an academic term through various pathways. For example, financial concern might impact immune function, resulting in greater susceptibility to infectious diseases (Halim et al., 2000). Alternatively, financial concern might precipitate health-detrimental behaviours, such as excessive alcohol consumption, and impair sleep (Berg et al., 2009; Martinez, Beebe, Thompson, Wagener, Terrell, & Campbell, 2018). While it is not possible to establish the precise nature of the pathways involved in the relationship between financial concern and physical health outcomes from the current data, this remains an interesting question for future research to address.

If students' finance-related concerns have a causal impact on their health, a number of important implications follow. Students have been identified as a group who may be particularly vulnerable to mental health problems (for a discussion of this issue please see Andrews & Wilding, 2004). The findings of the present study contribute to a literature which suggests that the financial burden imposed by the current system of university funding in England may be contributing to or exacerbating this vulnerability. Indeed, in 2012, the cap on tuition fees that higher education institutions in England were permitted to charge was raised from £3,375 to £9,000 per year, the largest one-year increase in the cost of higher education ever observed worldwide (Bolton, 2012). Combined with new repayment terms requiring students to pay real (i.e. above inflation) interest on their loans, this has meant that the average student will graduate with an estimated £50,800 worth of debt, compared to £24,754 under the previous system (Belfield et al., 2017; Crawford & Jin, 2014). Such changes seem

unlikely to mitigate the levels of financial concern experienced by students over the course of their studies. It is perhaps noteworthy that, in the present study, students in their first and second year were subject to the new, higher, tuition fees while those in their third and fourth year were charged under the old system. This could possibly have resulted in an underestimation of the amount of financial concern experienced by those in their later years of study, compared to that which would have been found if all participants had been charged under the new system. However, it should be noted that Richardson, Elliott, and Roberts (2015) found little evidence that increased tuition fees had an impact on mental health outcomes, including perceived stress.

Students' mental and physical health might not only have implications for overall quality of life and well-being; rather, poor health may also adversely impact academic performance (e.g. Busch et al., 2014; Ickovics et al., 2014; McLeod, Uemura, & Rohrman, 2012). Indeed, although going beyond the findings of the present study, it is not beyond the realm of possibility to speculate that the financial costs (and associated concerns) of obtaining a university education might preclude some students from excelling at the very education they are paying for by negatively affecting their health.

With regard to the second research question identified at the start of this paper, the current study found no support for the position that students' mental and physical health might have a causal impact on their levels of financial concern. Indeed, none of the initial indicators of health predicted subsequent changes in financial concern approximately eight weeks later. These findings thus provide no support for the hypothesis that students' health might impact their financial circumstances. Although our results might appear to contradict Richardson et al. (2017)'s finding that a measure of global mental health predicted subsequent changes in students' financial difficulties, it should be noted that the follow-up period at which this relationship was apparent was considerably longer (∼6–8 months). Indeed Richardson et al. found no evidence that mental health impacted financial difficulties at 3–4 month follow-up. Therefore, it is possible that students' mental and physical health may well impact financial concern over a longer time period than that tested in the present research. Nevertheless, our findings demonstrate that – whilst greater financial concern may lead to worse health among students – a reciprocal causal relationship is not consistently evident, at least within the timeframe under investigation.

The findings of the present study, together with our interpretation of these, must – of course – be considered within the limitations of the research design. Whilst the longitudinal design is commendable in terms of allowing tentative conclusions to be drawn regarding causality, it is nevertheless subject to certain shortcomings. More specifically, an important caveat to the conclusions drawn from the present analyses is their reliance on the assumption that the period of time between the two waves of measurement (i.e. the length of the academic term) was appropriately matched to the length of any true causal lags between the variables under investigation. For example, if the time taken for health to exert a causal influence on financial concern was longer than the period of time between the two waves of measurement, the present analyses would not have been able to detect this effect. Indeed, it seems highly plausible that serious health issues would ultimately affect financial concern, if – for example – they

have an adverse impact on academic outcomes and/or employment opportunities. Eight weeks is arguably a relatively short time frame (cf. Richardson et al., 2017); furthermore the actual time to follow-up may have varied between participants, given the amount of time that the online questionnaires were open for. In addition, we cannot rule out the possibility that observed associations between financial concern and subsequent changes in health may have been due (or partially due) to some joint relationship that both financial concern and health have with a third variable. Controlling for SES in the present analyses did not alter the basic pattern of findings, however it remains conceivable that some further, unidentified variable may be responsible for both the initial level of financial concern experienced and the subsequent changes in health.

Attrition was also relatively high between the two data collection points. This is perhaps unsurprising, given that the second data collection point occurred towards the end of term when students typically have assignments due and hence may have had less time available to complete the study. Furthermore, relatively high attrition is not unusual in research utilising opportunistic student samples (e.g. Andrews & Wilding, 2004; Richardson et al., 2017). Reassuringly, in the present study, analyses revealed no indication that Time 2 responders differed from non-responders in terms of the core variables of interest (i.e. the measures of financial concern and health). Nonetheless, future research should attempt to boost retention, perhaps by offering larger or individualised incentives for study completion.

A further limitation to the present study is that the measures of mental and physical health were reliant on self-report data. The SF-36 is an established, validated measure (Jenkinson et al., 1996), which has previously been used in research exploring associations between students' financial circumstances and their health (Jessop et al., 2005; Roberts et al., 2000). Nevertheless, future research would benefit from exploring whether the findings reported here hold across more objective measures, such the number of physician visits or indicators of immune function. Lastly, we did not collect data on ethnicity and hence it is not possible to ascertain how the sample was represented on this variable.

The above notwithstanding, the present study makes an important contribution to the literature by documenting a prospective impact of students' financial concern on health outcomes associated with mental and physical health. Furthermore, it presents an early empirical test of the position that students' health might prospectively influence finance-related variables and – importantly – finds no evidence to support the hypothesis that poor health might exacerbate financial concern over the course of a term.

In conclusion, therefore, the findings of the present study are consistent with the position that financial concerns experienced by students may have detrimental consequences for their mental and physical health. There was no evidence for any reciprocal causal effect of health on financial concern, albeit this may be attributable to the relatively short follow-up period. Given the high cost of higher education in many countries (OECD, 2015), and the prevalence of finance-related worries among students (National Union of Students, 2012), financial concerns could potentially be damaging the health of many of students. Furthermore, given the evidence that physical and

mental health are linked to academic performance (e.g. Ickovics et al., 2014; McLeod, et al., 2012), the financial pressures of attending university might impair students' ability to succeed academically by adversely affecting their health. These represent important avenues for future research to explore.

Note

1. Cronbach's alpha is given as a measure of internal reliability for subscales with three or more items, Pearson's *r* for subscales with two items.

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