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An investigation into the wellbeing and loneliness of PGR students and the effectiveness of institutional support strategies

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Statements and Declarations

1. Conflict of interest statement

- a. All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

2. Compliance of ethical standard statement and informed consent

Ethical approval for this study was obtained by the researchers, and was granted by the ethics board in the department of Behavioural Science at Warwick Business School. All participants who volunteered to take part received a participant information sheet, gave informed consent for their participation and were debriefed after the study was complete.

Abstract

There is a well-recognised mental health and wellbeing crisis among the undergraduate population in UK higher education. However, the wellbeing of postgraduate research students (PGRs) and the effectiveness of university strategies in supporting PGR wellbeing are much less understood. Early research shows that PGRs' wellbeing is impacted by their loneliness. These initial studies are limited however, primarily considering loneliness using qualitative approaches and treating it as a unidimensional phenomenon. Our study addresses these limitations, using a quantitative approach to investigate the impact of loneliness (as a multidimensional phenomenon) on PGR wellbeing and the effectiveness of institutional strategies to support PGR wellbeing. We conduct regression analyses on the wellbeing of PGRs, focusing on components of loneliness and stress as predictors. Analysis demonstrates social loneliness and stress separately predict lower PGR wellbeing. Further analysis reveals PGRs who experience both social loneliness and stress have additional declines in their wellbeing. Results also suggest typical strategies used by universities to support students are ineffective within the PGR community. Findings improve understanding of the nature of PGR wellbeing and loneliness providing a platform for further work to improve PGR support and wellbeing.

Keywords: Subjective wellbeing; postgraduate researchers; loneliness; stress; support strategies.

Introduction

The wellbeing of postgraduate researchers (PGRs) has become an increasingly urgent issue in academia, particularly in the context of a growing global mental health crisis in higher education (Carter et al., 2017; Hughes et al., 2018; Lewis & Stiebahl, 2024; Storrie et al., 2010). Studies consistently report rising psychological distress among both students and academic staff worldwide, alongside a growing demand for mental health and wellbeing services across higher education institutions (Bennett et al., 2024; Hill et al., 2024; Oswald et al., 2020). This crisis has garnered significant media attention (Bewick & Stallman, 2018; Coughlan, 2019; Gil, 2015; Weale, 2019) and has led to increased interest in student mental health and wellbeing from both academics and government organizations (Office for Students, 2018; UK Research Innovation & King's College London, 2019). PGRs play a pivotal role in driving innovation and maintaining the academic research ecosystem (Davis, 2009; O'Grady & Beam, 2011). However, they are in a particularly vulnerable stage of their careers, where personal, academic, and systemic pressures converge, often compromising their mental health and overall wellbeing (Wellcome Trust, 2020; Hazell et al., 2020; Riva et al., 2024). Studies on PGR populations reveal high levels of psychological distress and mental health issues (Allen et al., 2022; Casey et al., 2023; Evans et al., 2018), with recent research indicating that approximately 40% of PGRs experience moderate to severe depression and anxiety symptoms (Hazell et al., 2021; Milicev et al., 2021).

Within this context, emerging studies highlight loneliness as a significant contributor to students' wellbeing (Ellard et al., 2023; Brett et al., 2023), with implications for both mental and physical health, including increased risks of premature mortality (Ernst et al., 2022). These findings underscore the urgent need for effective interventions to support students. While much of the research has focused on the experiences of undergraduate and taught postgraduate students, this paper aims to explore the predictors of PGR wellbeing, specifically examining

the nature and impact of loneliness, and evaluating the effectiveness of existing university strategies in supporting PGR wellbeing.

Literature on PGR wellbeing, loneliness and support

Subjective wellbeing (SWB) is a multifaceted concept reflecting an individual's cognitive judgements about how life is going, their emotional state, and judgements about psychological functioning (OECD, 2013). Loneliness, as a key component of SWB, is understood as a negative feeling arising from a lack of meaningful contacts with others (Berg et al., 1981) or a deficient network of social relations (Perlman et al., 1981). Theories of loneliness construct it as multidimensional, including Weiss' (1973) early typology of social and emotional loneliness, which subsequent studies (including those of DiTommaso et al., 1997) have evidenced as distinct experiences. Loneliness, despite being a key predictor of wellbeing, remains a significant yet frequently overlooked issue among doctoral and early-career researchers. Cross-national studies demonstrate that, as a population, university students are at particular risk of loneliness (Bonsaksen et al., 2022). Further studies (WONKE, 2019) reveal over 15% of students grapple with daily loneliness, with higher rates observed among Black, Asian and Minority Ethnic students, those with disabilities, commuting students and international students (Wawera & McCamley, 2020). Loneliness has been studied for its profound impact on university students, linking it to heightened anxiety, stress, and depression (Diehl et al., 2018; Mann et al., 2022; Richardson et al., 2017). It has also been associated with maladaptive coping mechanisms, sleep disturbances, reduced life satisfaction, and suicidal ideation (Kurina et al., 2011; Zhang et al., 2018). Beyond these effects, loneliness negatively impacts cognitive health and alters brain functionality, with chronic loneliness shaping the nature and likelihood of social interactions (Lim et al., 2020). Research on loneliness among university students as a general population has delved into its correlations with various factors, including cultural background (Bauer & Rokach, 2004), gender (Beutel et al., 2017), social

media use (Yang, 2016), internet usage (Bozoglan et al., 2013), and smartphone habits (Bian & Leung, 2015). Other studies have explored its relationship with attachment styles (İlhan, 2012), mental distress (McIntyre et al., 2018), and academic achievement (Stoliker & Lafreniere, 2015).

The global COVID-19 pandemic in 2020 intensified challenges surrounding isolation and loneliness for students worldwide. Campus closures, the shift to remote learning, and the cancellation of social events significantly limited opportunities for socialising. Many students were confined to their accommodations or family homes, reducing chances to build connections through shared interests and activities. During the initial lockdowns, young people and students in the UK and US reported heightened loneliness and psychological distress compared to the general population (McGinty et al., 2020), with a notable increase in mental health symptoms (Tang et al., 2022). In the UK, individuals aged 18–24 were nearly three times as likely as those aged 65–74 to report experiencing loneliness "more often than normal" during lockdown (Royal Society for Public Health, 2020). Similar findings from Italy (Giusti et al., 2021) and the UK (Di Malta et al., 2022) during the pandemic revealed a concerning decline in the mental wellbeing of distance learners, tied to decreased emotional intimacy, heightened loneliness, and lower self-reported academic performance. Further expanding on this, Limone, Tota, and Messina (2022) conducted a comprehensive review of 32 studies involving 81,395 participants across multiple countries, including China, Turkey, Poland, Saudi Arabia, France, and India. Their findings highlight a significant increase in feelings of loneliness among university students during both the COVID-19 pandemic and the Russia-Ukraine conflict, identifying loneliness as a key predictor of stress and anxiety. Even more troubling are the findings of Labrague et al. (2021), which underscore the strong associations between loneliness and a range of negative outcomes, including stress, depression, anxiety, suicide, and physical health conditions such as heart issues, heightened inflammation, and impaired immunity.

Loneliness, despite being a key predictor of student wellbeing, remains a significant yet frequently overlooked issue among PGRs. Studies in this area are beginning to highlight the widespread issue of loneliness particularly amongst doctoral and early-career researchers (Moran et al., 2020), underscoring the need for targeted research and policy interventions. The Wellcome Trust's 2020 report on research culture found that doctoral and early-career researchers frequently experience high levels of isolation, often prioritising work over personal relationships and relocating away from support networks, which exacerbates loneliness. One PhD student shared, "I have felt the most isolated I ever have in my life in this PhD." The competitive and solitary nature of academic work, combined with limited support for mental health and restricted avenues for raising concerns, further contribute to these feelings. The survey revealed that 70% of junior researchers viewed a career in academia as inherently isolating. Patil et al. (2016) identified PGRs as particularly vulnerable to loneliness due to their hybrid roles as both students and staff, balancing research and teaching responsibilities. These dual roles can complicate social connections, leaving PGR students feeling isolated. Cantor (2020) further outlined key contributors to PGR loneliness, including physical isolation, challenges inherent to the PhD process, and difficulties with interpersonal relationships, especially the supervisory relationship. Additionally, individual differences such as personal characteristics (Das, 2024), self-discipline, motivation, and imposter syndrome were identified as factors exacerbating feelings of isolation. Similarly, Janta et al. (2014) documented the global prevalence of loneliness among doctoral students, analysing online forums where students shared experiences of isolation. One participant described being "100% alone day and night." While some were satisfied with their academic progress, others linked the lack of social connection to loneliness and, in some cases, depression.

Linked to loneliness, stress is a common theme in the PGR literature and often measured as an indicator of poor wellbeing (see Schmidt & Hansson, 2018, p. 4). In one report,

PGR focus groups normalised stress as an intrinsic and expected part of the PhD experience (Metcalf et al., 2018). However, research shows that PGRs score significantly higher on perceived stress than the general population (Allen et al., 2021), and a recent systematic review found that high levels of stress in PGRs are associated with burnout, lower levels of well-being, and negative mental health impacts such as depression (Cho & Hayter, 2020). Anttila et al. (2015) found that over half of PGRs had contemplated quitting their PhD at some point during the doctoral journey, with many citing stress as a determining factor.

Stress and loneliness can also be interrelated issues, as stress and loneliness have a bidirectional relationship (Laustsen et al., 2024), suggesting that increased loneliness also increases stress and vice versa. While there is relatively little research showing the interplay of these variables in the PGR population, a recent study on medical students found that perceived stress mediated the relationship between loneliness and academic burnout (Malakcioglu, 2024). The bidirectional relationship between stress and loneliness could suggest that a possible route to lower stress for PGRs would be to reduce loneliness. As many universities already offer social activities in their institutional support for students, this could be a possible solution for reducing both stress and loneliness in PGRs.

In terms of institutional support for student wellbeing, most universities offer a range of support activities, mostly targeted to taught students. The range of offerings arise from evidence that participating in certain activities is beneficial in supporting students' SWB. For example, several studies have found that participating in yoga reduces stress (Park et al., 2021; Pascoe et al., 2017; Pascoe & Bauer, 2015), improves psychological wellbeing (Gaiswinkler & Unterrainer, 2016; Tulloch et al., 2018), and can help individuals reduce loneliness by building friendships (Cheshire et al., 2022; Ross et al., 2014). Yoga and meditation have been shown to reduce stress and improve wellbeing in medical students prior to exams (Prasad et al., 2016). Other physical activities are also linked to improvements in students' wellbeing e.g.,

a study of law students found that participating in a running group reduced psychological distress (Skead & Rogers, 2016). Further research also links aerobic exercise to reductions in perceived stress (von Haaren et al., 2015), and social walking groups with a decrease in social isolation (Shellito et al., 2019). A recent systematic review found that physical activity interventions were effective at reducing depression, anxiety and psychological distress across a variety of adult populations (Singh et al, 2023).

Non-exercise related activities are similarly found to improve student SWB. Research with undergraduates shows that spending time with therapy dogs lowers stress and increases happiness (Ward-Griffin et al., 2018). A similar study found that time with therapy dogs also significantly decreases stress and improves mood (Spruin et al, 2021). Mindfulness meditation and training, frequently offered at universities as a wellbeing support activity, have been shown to reduce stress and symptoms of depression and anxiety (Roeser et al., 2013), and have also been associated with reductions in loneliness and increased social contact (Duncan & Weissenburger, 2003; Lindsay et al., 2019). A report commissioned by the UK government, found activities involving socialisation, exercise, mindfulness, learning a new skill or altruism as all associated with improved mental health and wellbeing (Marks et al., 2008). However, most support initiatives and research studies primarily focus on the needs of taught undergraduate and postgraduate students (Ellard et al., 2023). Given the significant differences in the circumstances and environments of research programmes, findings on how to support the wellbeing and loneliness of undergraduate and taught postgraduate populations may not be directly applicable to PGRs. As previously mentioned, there is limited investigation into the wellbeing of PGRs compared to their taught counterparts, and this is true particularly regarding the effectiveness of strategies designed to support them (Metcalf et al., 2018; Watson & Turnpenny, 2022). The limited research on PGRs' wellbeing, loneliness, and support initiatives also tends to be predominantly qualitative (e.g., Bireda, 2015; Janson et al., 2004; Metcalfe et

al., 2018), focusing on subjective experiences. Notable exceptions include a small study by Marais et al. (2018), which tested an eight-week positive psychology intervention on ten PhD students, with an additional thirteen as a control group. While the experimental group showed reduced anxiety, no significant improvements were found in stress, depression, or overall well-being. Few studies quantitatively assess the effectiveness of interventions on PGRs' SWB, and those that do rarely address loneliness as a critical factor.

This paper contributes to these gaps in the literature by exploring predictors of PGRs wellbeing (including the nature and influence of loneliness on this) and the effectiveness of existing university strategies to support PGR SWB. We present quantitative data evaluating the effectiveness of a range of support initiatives on PGR wellbeing and loneliness and investigate the influence of different components of loneliness as predictors of poorer wellbeing. Our study adds to the research on PGR isolation by investigating loneliness in a new way. Specifically, we investigate PGR stress and loneliness (as a multi-dimensional phenomenon) using a quantitative approach. We utilise a measure for loneliness, broken down into social loneliness and emotional loneliness subcomponents to identify underlying sources of loneliness. This approach allows us to investigate stress and loneliness as predictors of wellbeing, controlling for common PGR demographics. Findings are useful in enhancing understanding of the nature of PGR loneliness, supporting the PGR experience and in shaping more effective PGR support provision.

Based on the literature, we expect to find that participation in a support activity reduces loneliness in PGRs, and that there will be negative associations between PGR stress, loneliness, and wellbeing.

H1. Regular participation in a support activity will reduce loneliness for PGRs.

H2. Loneliness and stress will be negatively associated with PGR wellbeing.

Methods

Support activities

The research team identified a range of institutional student support activities (identified within the literature discussed earlier as beneficial) for use within the project. These included guided mindfulness, gardening, social walking group, knitting, yoga, volunteering, aerobics, running group, time with support dogs, art class, online guided meditation, online gratitude diary, and an interactive seminar series focusing on normalising academic failure. Each activity ran for nine weeks in the autumn term and six weeks in the spring term.

Recruitment and procedure

The project was advertised to PGRs attending a large UK Russell Group university. Participants volunteered to take part in the study and were entered into prize draws as a thank-you for participating.

Participants accessed the study through a project website where they gave informed consent and took part in online questionnaires. Participants were assigned a project ID number, allowing us to track participants longitudinally and anonymously. Questionnaires included measures for wellbeing, loneliness, and demographic information, and invited participants to take part in a support activity. Interested participants indicated preferences for their first, second and third choice of available activities and were later assigned to an activity via email.

Attendance was recorded for each activity, with regular attendance being defined as attending at least half of the total sessions offered. At the end of term, participants were sent an email with the follow-up survey, containing the same measures as the baseline and some additional open-ended questions regarding their activity experience.

Sample

Two hundred and four participants took part in at least one survey. Data from participants in the October and January waves were combined to investigate the impact of loneliness and other predictors on the wellbeing of PGRs. Twenty-two participants did not complete the survey and were removed from the analysis. Some participants did not answer a few of the demographic questions (ten did not answer year of PhD and thirteen did not answer ethnicity); to use this data in our analysis, we replaced the missing data with the mean for the group. The final sample for the cross-sectional analyses consisted of one hundred and eighty-two participants.

To test our hypotheses on support activities, we needed observations from two time points – before and after the intervention – for each participant. Therefore, only data where participants completed both the initial and follow-up questionnaires were used for the longitudinal analyses. The final sample for the longitudinal analyses consisted of fifty participants in autumn term and twenty-seven participants in spring term.

Measures

Tables 1 and 2 contain descriptive statistics and reliability for all measures. Table 1 focuses on the cross-sectional samples and tables 2 and 3 on the longitudinal samples.

Main variables. SWB was measured as life satisfaction and flourishing. Life satisfaction measures an individual's cognitive judgements about how their life is going (Diener et al., 1985), while flourishing measures a variety of wellbeing indicators such as meaning in life, self-esteem, and good relationships with others (Diener et al., 2009). Life satisfaction was measured with the Satisfaction with Life scale (Diener et al., 1985) and flourishing was measured with the 8-item Flourishing scale (Diener et al., 2009). Higher scores on both scales indicate better wellbeing. Despite being developed some time ago, the Satisfaction with Life scale by Diener remains the "dominant measure of life satisfaction since its inception more than 30 years ago" (Margolis et al., 2019, p. 21). Similarly, the widely

utilized and validated 8-item Flourishing Scale (Sumi, 2014; Silva & Caetano, 2013; Carmona-Halty et al., 2022) exhibits robust psychometric properties (Hone et al., 2014).

Loneliness was measured using the 11-item Loneliness Scale (De Jong-Gierveld & Van Tilburg, 1999). Items are on a 4-point scale, scored bimodally (0-0-1-1), and are summed creating a scale from 0 (not lonely) to 11 (severely lonely). The loneliness scale can be used as a unidimensional construct measuring overall loneliness or broken down into two subscales: social loneliness and emotional loneliness. The social loneliness subscale measures whether individuals feel they have enough friends (scores range from 0 to 5) and the emotional loneliness subscale measures whether individuals feel they have enough social support (i.e., close friends whom they can emotionally connect with, scores range from 0 to 6). Lower scores indicate less loneliness. Respondents who score three or higher on the unidimensional scale are considered to be lonely (De Jong-Gierveld & Van Tilburg, 1999).

We explored PGR loneliness by employing a quantitative loneliness measure, delineating it into the subscales of social and emotional loneliness to offer insight into its origins. As discussed earlier, previous research on PGR loneliness predominantly relies on qualitative methods. However, our more comprehensive analysis enhances comprehension around the intricacies of PGR loneliness, thereby offering a broader framework for devising effective support mechanisms for postgraduate researchers. Moreover, we selected the De Jong Gierveld short scale because it is a reliable and valid measurement instrument for overall, emotional, and social loneliness as demonstrated in large multi-national studies, with participants of different genders and ages (De Jong-Gierveld & Van Tilburg, 2010; Grygiel et al., 2019). The six-item scale is also suitable for large surveys (De Jong-Gierveld & Van Tilburg, 2010) such as ours. Additionally, the scale has been used by recent studies to evaluate loneliness among international higher education students in the UK (Wawera & McCamley, 2020) and university students in Germany (Diehl et al., 2018). Perceived stress was measured

using the 10-item Perceived Stress scale (Cohen, 1994), which asks participants to indicate frequency of particular feelings during the past month, with higher scores indicating higher perceived stress. We utilised this scale as it is well-accepted and demonstrated within the literature on stress as robust (Roberti et al., 2006; Baik et al., 2019).

Demographic variables. Previous research on SWB establishes relationships between wellbeing and a variety of socio-demographic variables such as age, gender, marital status, disability status, and income comfortability (e.g., Deeming, 2013; Vera-Villarroel et al., 2012). We also measured academic department, hours of social time per week, employment status (in addition to studies), year of PhD, mode of study (full/part-time), funding status (funded/self-funded), and fee status (UK/EU/International). All demographic variables are controlled for in the regressions; gender, age and marital status are controlled for in the ANCOVAs.

Open-ended questions. At the end of the follow-up surveys, participants were asked if they had attended an activity. If they had not (or signed up but attended less than half of the sessions), they were prompted with the question: “Can you briefly describe why you did not participate in an activity?” Participants who attended at least half of their activity sessions were asked whether the activity met their expectations and prompted with follow-up question: “Why/Why not”.

Ethical approval for this project was obtained by the University’s Humanities and Social Sciences Research Ethics Committee (Ethical Application Reference: 120/17-18 AM01).

Analysis

To investigate whether participants experienced a change in loneliness after participating in the support activities, we ran 2x2 mixed design ANCOVAs with the two subscales of loneliness as dependent variables. Activity participation was entered as a between-subjects variable with two groups: 1) participants who attended at least half of the weeks an

activity, and 2) participants who attended less than half of the weeks of an activity or who chose not to participate in an activity.

To explore the impact of loneliness and other predictors of wellbeing in PGRs, we ran OLS regression models to predict life satisfaction and flourishing.

Analyses for the ANCOVAs were conducted in SPSS v28 and analyses for the regressions were conducted in R statistical software (R Core Team, 2015).

To further our understanding of why participants did or did not attend activities, we analysed the open-ended questions with content analysis.

Results

Descriptive statistics for study samples

Surveys and cross-sectional sample. The final cross-sectional sample is biased towards female participants from the Science, Engineering and Medicine faculty. Participants were primarily university/grant funded and attending full-time (4% were part-time).

Table 1

Descriptive statistics for all variables used in regressions

	<i>n</i>	<i>M</i>	<i>SD</i>	Min	Max	α
Main variables						
Life Satisfaction	182	22.1	6.1	5	35	0.85
Flourishing	182	40.8	7.1	11	56	0.84
Social loneliness	182	2.7	1.9	0	5	0.81
Emotional loneliness	182	3.3	2.0	0	6	0.77
Perceived stress	182	19.9	7.1	2	38	0.88
Demographic variables						
Age	182	28.0	6.3	22	58	
Male	182	0.3	0.5	0	1	
Married	182	0.3	0.5	0	1	
Year of PhD	182	2.2	1.2	1	5	
UK student	182	0.5	0.5	0	1	
EU student	182	0.2	0.4	0	1	
International student	182	0.3	0.4	0	1	
Self-funded	182	0.2	0.4	0	1	
Social hours/week	182	12.5	13.8	0	70	
Income comfortability	182	3.1	0.8	1	4	
Disabled	182	0.3	0.5	0	1	
October 2018	182	0.6	0.5	0	1	

Note: Income comfortability has been reversed: high scores reflect that the individual is comfortable on their present income, low scores represent that the individual is struggling on their current income. October 2018 is a binary variable where 0 indicates that the participant took the survey in January 2019 and 1 indicates the participant took the survey in October 2018. α represents the Cronbach's alpha for the study sample.

Activities and longitudinal samples. The longitudinal samples have the same demographic biases as the cross-sectional sample. To control for potential confounds, we ran independent between-subjects t-tests to look for differences in loneliness between participants who signed up for support activities and those who did not, and found no significant differences between groups.

Table 2

Descriptive statistics for all variables used in ANCOVAs

Variable	October – Year 1 Autumn Term 1						December – Year 1 Autumn Term				
	<i>n</i>	<i>M</i>	<i>SD</i>	Min	Max	α	<i>M</i>	<i>SD</i>	Min	Max	α
Social loneliness	50	2.58	1.92	0	5	.88	2.36	2.02	0	5	.91
Emotional loneliness	50	3.34	1.95	0	6	.83	2.70	1.98	0	6	.81
Demographic variables											
Age	49	26.00	4.20	22	44						
Male	48	.30	0.5	0	1						
Married	47	.30	0.5	0	1						
Variable	January – Year 1 Spring Term						April – Year 1 Spring Term				
	<i>n</i>	<i>M</i>	<i>SD</i>	Min	Max	α	<i>M</i>	<i>SD</i>	Min	Max	α
Social loneliness	27	2.63	1.88	0	5	.82	2.11	1.76	0	5	.76
Emotional loneliness	27	3.00	2.11	0	6	.81	2.48	1.99	0	6	.76
Demographic variables											
Age	27	26.04	3.04	22	34						
Male	26	.19	.40	0	1						
Married	24	.29	.46	0	1						

Note: Demographic variables used as controls in ANCOVAs. α represents the Cronbach's alpha for the study sample.

The effect of support activities on PGR loneliness (See Table 3)

To test whether support activities alleviated social or emotional loneliness, participants were grouped by whether they participated in half of the activity sessions (Autumn: n Activities = 28, n Control = 22; Spring: n Activities = 12, n Control = 15). In the autumn term, we found no significant differences in social loneliness for participants who took part in the support activities compared to those who did not. There were significant differences in emotional loneliness across time ($F(df\ 1, 37)=5.36, p = .026, \eta^2=.13$ (small effect) and between groups ($F(df\ 1, 37)=7.68, p = .009, \eta^2=.17$ (small effect). Examination of the estimated marginal means revealed that in September, the activity group and the control group had similar levels of emotional loneliness ($M_{control}=3.34, SE_{control}=.43, M_{activities}=3.35, SE_{activities}=.42$). At the end of term (December), the control group reported being less emotionally lonely than at the start of term ($M_{control}=1.96, SE_{control}=.43$), however the activity group reported similar opening levels of emotional loneliness as they did at the start of term ($M_{activities}=3.23, SE_{activities}=.42$), see

Figure 1. This rejects H1, as the activities provided did not improve the social or emotional loneliness of participating PGRs.

In the spring term, we found no significant differences in emotional or social loneliness for participants who engaged with the support activities compared to those who did not.

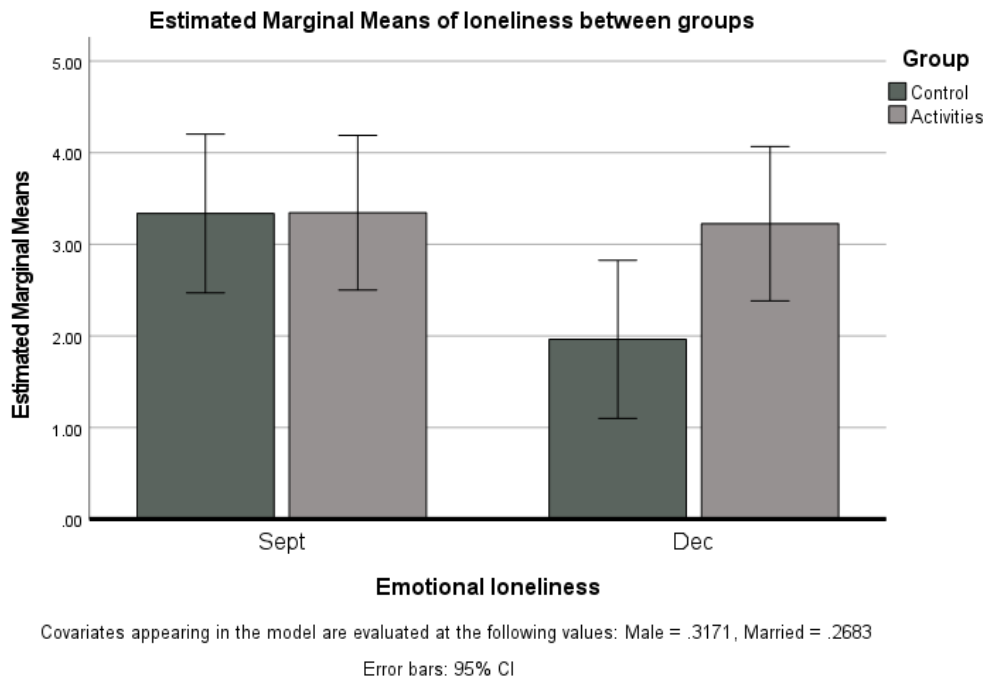


Figure 1. Estimated marginal means for emotional loneliness, displaying a change in loneliness for the control group, but not for the activities group.

Predictors of PGR wellbeing

For the wellbeing regressions, we found significant negative associations between social loneliness and life satisfaction ($B = -1.07$, $SE = .25$, $p < .001$, Table 3, column 1), and social loneliness and flourishing ($B = -1.30$, $SE = .30$, $p < .001$, Table 3, column 3), suggesting participants who reported higher social loneliness also reported lower wellbeing. There were also significant negative relationships between both types of wellbeing and perceived stress (life satisfaction: $B = -.29$, $SE = .06$, $p < .001$, Table 3, column 1; flourishing: $B = -.41$, $SE = .07$, $p < .001$, Table 3, column 3), suggesting that PGRs who report higher levels of perceived stress

also report lower levels of wellbeing. These findings support H2 which predicted that loneliness and stress would be negatively associated with PGR wellbeing.

There were also relationships between the wellbeing measures and some demographic variables. For life satisfaction, these included gender ($B = -2.04$, $SE = .79$, $p < .05$, Table 3, column 1), income comfortability ($B = 1.57$, $SE = .47$, $p < .001$, Table 3, column 1), and disability ($B = -2.19$, $SE = .80$, $p < .01$, Table 3, column 1). For flourishing, there was a significant association for one of the dummy variables for fee status (EU student, $B = -2.36$, $SE = 1.12$, $p < .05$, Table 3, column 3) suggesting UK students reported higher levels of wellbeing than students from the EU.

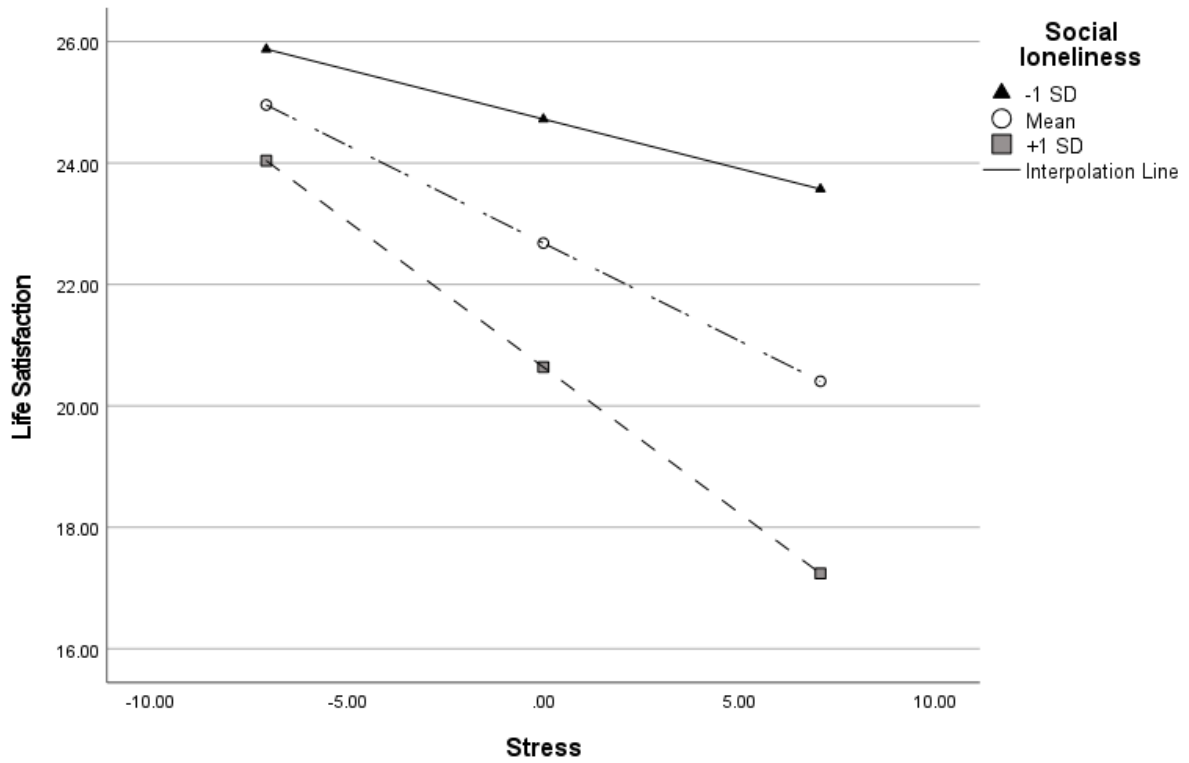
As stress and loneliness have both been previously reported as negative components of the PGR experience, we conducted an exploratory moderation to investigate whether social loneliness moderated the relationship between perceived stress and wellbeing. We chose to look at social loneliness as a moderator as opposed to both types of loneliness, as creating opportunities for PGRs to make friends is something within the control of universities. Our results revealed that for both measures of wellbeing, social loneliness strengthened the negative relationship between perceived stress and wellbeing (life satisfaction: $B = -.09$, $SE = .03$, $p < .001$, Table 3, column 4; flourishing: $B = -.11$, $SE = .03$, $p < .001$, Table 3, column 4). See Figures 2 and 3. Adding the moderations to the regression models significantly improved the fit of the model to the data (life satisfaction: $F(1, 163) = 11.47$, $p < .001$; flourishing: $F(1, 163) = 11.59$, $p < .001$). The final models explained 46% of the variance in life satisfaction and 42% of the variance in flourishing.

Table 3

Wellbeing regression models

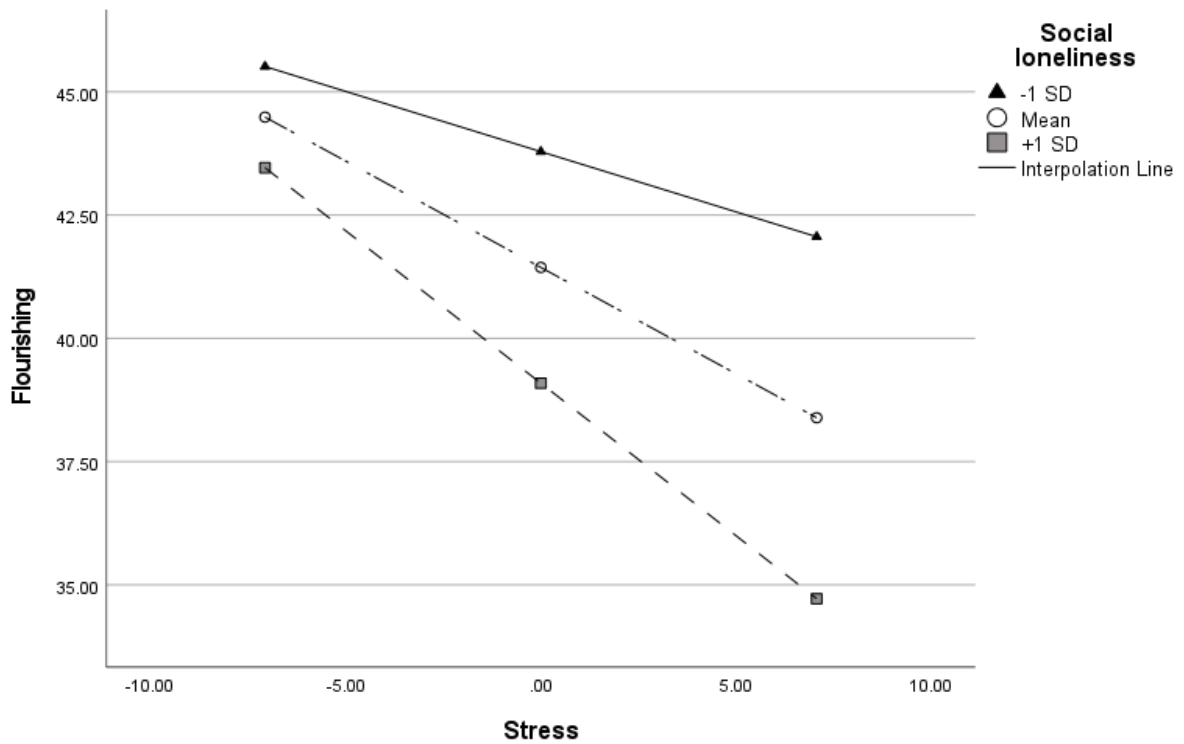
	<i>Dependent variable:</i>			
	Life Satisfaction		Flourishing	
	(1)	(2)	(3)	(4)
Age	-0.12 (0.07)	-0.12 (0.07)	0.02 (0.08)	0.02 (0.08)
Male	-2.04* (0.79)	-2.05** (0.77)	-0.78 (0.95)	-0.78 (0.92)
Married	0.21 (0.79)	0.38 (0.77)	-1.50 (0.95)	-1.29 (0.92)
Year of PhD	-0.29 (0.31)	-0.23 (0.30)	-0.59 (0.37)	-0.51 (0.36)
SEM faculty	0.14 (1.24)	0.21 (1.20)	-0.45 (1.49)	-0.37 (1.45)
Social Science faculty	0.12 (1.35)	-0.31 (1.31)	2.61 (1.62)	2.09 (1.58)
EU student	-0.64 (0.93)	-0.40 (0.91)	-2.36* (1.12)	-2.08 (1.09)
International student	-0.47 (1.02)	-0.27 (0.99)	-1.28 (1.23)	-1.04 (1.19)
Self-funded	-0.48 (0.99)	-0.27 (0.97)	-2.11 (1.19)	-1.85 (1.16)
Social hours/week	0.001 (0.03)	0.01 (0.03)	-0.03 (0.03)	-0.02 (0.03)
Employed in addition to studies	1.17 (0.73)	1.45* (0.71)	0.81 (0.88)	1.14 (0.86)
Income comfortability	1.57** (0.47)	1.51** (0.46)	0.44 (0.57)	0.36 (0.55)
Disabled	-2.19** (0.80)	-2.07** (0.78)	-0.67 (0.96)	-0.52 (0.93)
October 2018	-0.98 (0.75)	-0.79 (0.73)	-0.40 (0.91)	-0.17 (0.88)
Socially lonely	-1.07*** (0.25)	0.74 (0.59)	-1.30*** (0.30)	0.87 (0.71)
Emotionally lonely	-0.09 (0.25)	-0.15 (0.24)	0.02 (0.30)	-0.05 (0.29)
Perceived stress	-0.29*** (0.06)	-0.05 (0.09)	-0.41*** (0.07)	-0.12 (0.11)
Stress x Socially lonely		-0.09*** (0.03)		-0.11*** (0.03)
Constant	31.66*** (3.67)	26.89*** (3.82)	54.02*** (4.41)	48.32*** (4.59)
Observations	182	182	182	182
Adjusted R ²	0.42	0.46	0.39	0.42
Residual Std. Error	4.66 (df = 164)	4.52 (df = 163)	5.60 (df = 164)	5.43 (df = 163)
F Statistic	8.81*** (df = 17; 164)	9.50*** (df = 18; 163)	7.67*** (df = 17; 164)	8.35*** (df = 18; 163)

Note: *p < .05, **p < .01, ***p < .001. Faculty variables are in comparison to the Arts Faculty. Fee status variables are in comparison to UK students. High scores on income comfortability reflect that the individual is comfortable on their present income, low scores represent that the individual is struggling on their current income. October 2018 is a binary variable where 1 represents participants who took the survey in October 2018 and 0 represents participants who took the survey in January 2019.



Note: Variables centered in figure above.

Figure 2. Social loneliness strengthens the negative relationship between stress and life satisfaction



Note: Variables centered in figure above.

Figure 3. Social loneliness strengthens the negative relationship between stress and flourishing.

Open-ended responses. The content analysis revealed that participants who chose not to take part in activities or started an activity but did not attend for at least half of the weeks cited time constraints as an issue. Many felt they were too busy to attend an activity, or the timing of scheduled activities did not match their availability. Some participants also cited little desire to take part in activities as they were involved in other activities off-campus or did not want to interact with undergraduates whom they felt they shared little in common with.

Discussion

The purpose of this study was twofold: first, we sought to investigate the efficacy of typical support activities offered by universities in their ability to reduce loneliness in PGRs. Results across the wide range of activities explored show them not to be as beneficial for PGRs as predicted. Second, in seeking to understand this finding, our research explored aspects of the PGR experience, identifying predictors of PGR wellbeing, including that social loneliness is negatively associated with both types of wellbeing. Our exploratory analysis reveals that social loneliness strengthens the negative relationship between perceived stress and wellbeing, suggesting that if PGRs are both stressed and socially lonely, they report even lower wellbeing. These results are of interest to universities seeking to improve PGR support strategies, support PGR wellbeing and enhance the PGR experience.

Support activities and loneliness

Contrary to our predictions, institutional support activities offered did not have a significant impact on PGR loneliness. Findings reveal no difference in social loneliness between the activities and control groups across both the autumn and spring terms. This suggests that support activities routinely provided by universities were ineffective at reducing PGR loneliness. In the autumn term, the control group was significantly less emotionally lonely in December than in September. This might suggest that individuals in the control group who

felt emotionally lonely at the start of term sought their own remedies, which were more effective than the activities offered to the experimental group. These findings are contrary to our hypotheses and to previous literature which suggests that activities such as meditation/mindfulness (Duncan & Weissenburger, 2003; Lindsay et al., 2019), yoga (Purohit et al., 2016; Ross et al., 2014), spending time with support dogs (Banks & Banks, 2002), and social walking clubs (Shellito & Velasco Roldan, 2019) can reduce loneliness. However, much of the current literature available on loneliness focuses on the elderly population (as evidenced by the mean participant age in most loneliness studies such as the meta-analysis of Masi et al., 2011). While there is some literature investigating loneliness in PGRs (for example, Cantor, 2020; Janta et al., 2014), to the best of our knowledge, little of this literature explores loneliness interventions. It is therefore possible that the needs of the PGR population in regard to loneliness is different, requiring distinct types of interventions. Research on the PGR experience is sparse, and more research is needed to identify what differentiates PGRs and why initiatives which work for other populations are not as beneficial for PGRs. One potential difference may stem from the academic culture around taking breaks from research tasks. There is some evidence that PGRs struggle to take breaks, and feel guilty when not working, as evidenced by the Twitter hashtag #phdguilt and many blogposts (i.e., Agata, 2017; Hill, 2019; Marias, 2015). It is possible that this guilt could prevent PGRs from signing up to activities, or weigh on their minds while taking part, counteracting the benefits of taking part in a social activity. Timing of activities may also play a role in this, as PGRs in our study expressed that activity times conflicted with their research duties. Feedback from the open-ended surveys indicated that the times these activities are offered may not always be possible or convenient for PGRs.

Another possible reason for the activities not being as effective as predicted may be that activities on university campuses are usually aimed at undergraduate students. It also

means that most of the attendees of these activities tend to be undergraduates, whom, according to the open-ended survey questions, the PGRs feel they have little in common with. Although PGRs are considered to be students in UK higher education, the PGR role is more aligned with that of academic staff. This may explain why our PGRs viewed engaging with undergraduate students as a deterrent for signing up for activities. A recent article highlights this conflict in the PGR identity (Livermore & Gallagher, 2015). These combined factors suggest that it may be beneficial for universities to develop activities specifically for PGRs. Future research should consider using co-design to involve PGRs in the development of such activities, to ensure they are fit for purpose.

Predictors of PGR wellbeing. To build on the information about the PGR experience, the regression models explored the relationships between two types of wellbeing, different types of loneliness, and perceived stress. In our models, high-perceived stress is a strong predictor of both lower life satisfaction and lower flourishing. This finding is supported further by evidence from the general population that stress is related to lower wellbeing (Thoits, 2010). Stress is also commonly cited as an intrinsic part of the PhD process (Corner et al., 2017; Schmidt et al., 2014; Stubb et al., 2011). Additionally, our regression models reveal that social loneliness is associated with both lower life satisfaction and lower flourishing. This relationship is also unsurprising, as social connection is a well-known predictor of wellbeing (Kawachi & Berkman, 2001). As previous literature on the PGR experience cites both loneliness (Brown, 2013; Cantor, 2020; Janta et al., 2014; Wawera & McCamley, 2020) and stress (Cornwall et al., 2019; Schmidt & Hansson, 2018; Stubb et al., 2011) as common experiences, we conducted a further exploratory moderation revealing that social loneliness significantly strengthened the negative relationship between perceived stress and both types of wellbeing. This moderation suggests that social loneliness exacerbates the relationship between

high levels of stress and poor wellbeing in PGRs, meaning that PGRs who are both stressed and lonely have poorer wellbeing than PGRs who are also stressed but not lonely. As both stress and loneliness are common experiences on the PGR journey, it is important that universities develop support for PGR loneliness to mitigate the negative interaction between stress and loneliness on PGR wellbeing. Better understanding of the predictors of high perceived stress and social loneliness for PGRs may support universities in the development of more effective initiatives.

To the best of our knowledge, this research is one of the first to conduct quantitative research on PGR loneliness. It is also among the first to investigate PGR social and emotional loneliness. While the concept of loneliness is explored in the PGR literature the focus is on the qualitative description of its experience, with little research on how to address it. Exceptions include research by Verlie et al (2017), and Janson et al (2004); who endeavour to build community and combat loneliness through frequent social contact with other PGRs and early career researchers. Some academic subjects may have an advantage in combatting loneliness, as a previous study found that Chemistry PGRs were more satisfied with their research environment than Education PGRs due to the team-based nature of the subject (Chiang, 2003). This team-based approach may be especially useful to combat emotional loneliness as lab-independent PGRs may be lacking opportunities to build deep connections which only form through frequent and repeated social contact. While the literature suggests that frequent social contact can combat PGR loneliness (Hastings et al., 2022), our study demonstrates that the activities commonly in place on university campuses are ineffective in reducing loneliness in PGRs.

Designing support programs for PGR loneliness and wellbeing

Universities and researchers interested in developing support programmes for PGRs may be able to learn from our findings. Currently, support activities offered by universities tend to revolve around meeting the needs of undergraduate students. Our results suggest that activities tailored toward undergraduates are ineffective for PGRs, as activities may be offered at times which do not fit with their schedules and/or offer socialisation primarily with undergraduates which PGRs do not desire. We found perceived stress to be a strong predictor of poor wellbeing in our sample. Perceived stress was also moderated by social loneliness, suggesting that if PGRs are suffering from high levels of stress, loneliness can exacerbate the issue leading to even lower wellbeing. This knowledge, combined with our finding that PGRs felt they had little in common with undergraduate students, reinforces the importance of offering activities which are PGR exclusive. Prior research strengthens this argument with multiple studies finding that peer support is important for PGR wellbeing (e.g. Schmidt & Umans, 2014; Stubb et al., 2011). We recommend future support programmes are co-designed and co-produced with PGRs (Piper & Emmanuel, 2019), to take account of their specific needs and at the same time offering an opportunity for fostering community amongst PGRs and staff. Activities should be PGR exclusive, encourage peer support, and may need to be offered at the School/Departmental level to ensure they take place a time where PGRs are available.

Limitations and future work

Our research may have self-selection bias as participants volunteered to take part. Our samples were biased towards white, female, full-time UK students from the sciences, which may affect the generalisability of our study across the broader PGR population. The disproportionately high number of female participants is a common issue in PGR wellbeing studies (Levecque et al., 2017; Marais et al., 2018). As these studies took place in the UK, it is possible the PGR experience differs in other countries, which may affect how variables are associated with SWB. Also, we did not find any significant differences in loneliness due to

activity attendance. It is possible that participants were not exposed to the activities for enough time or frequency for the effects identified in previous studies to occur.

Future work can build and improve on our findings by investigating both short-term and long-term impacts to PGR wellbeing and loneliness (especially in regard to activity participation) using different methods such as experience sampling. Studies of this nature should test different exposure times and frequency to activities to determine if there is a cut-off point for duration before such activities are beneficial. Additionally, future work could create a set of support activities specifically for PGRs, designed with PGRs input to explore if this impacts participation, and should seek to test these variables on a representative sample. More work is needed to develop interventions to address both social and emotional loneliness in PGRs.

Finally, it is possible that the issues discussed above are not specific to PGRs but extend across academic staff with evidence suggesting that loneliness is also an issue for academic staff (Jandrić, 2022). A recent study points to a large spike in the number of university staff accessing mental health/wellbeing services on university campuses (Richardson, 2019). This spike occurs just before the period when the student mental health crisis became apparent in 2017 (Shackle, 2019). It is therefore possible that these are related issues, as there is evidence from research in other educational contexts which show that teachers' job satisfaction and emotional exhaustion impact students' academic outcomes, school satisfaction and perceptions of teacher support (Arens & Morin, 2016; Dicke et al., 2019; Klusmann et al., 2016). These findings may replicate across the higher education context, suggesting that the wellbeing and emotional exhaustion of university academics impacts university student/PGR academic outcomes, wellbeing, and perceptions of supervisor support. While some work is starting to emerge in this area, more is needed to investigate the loneliness, wellbeing, and perceived stress of university academics (Morrish, 2019; O'Brien & Guiney, 2019).

Conclusions

This study addresses gaps in the literature around PGR wellbeing, loneliness and support. It explores PGR SWB looking specifically at the social and emotional subcomponents of loneliness and stress as quantitative predictors of PGRs' wellbeing. Additionally, it investigates the effectiveness of institutional support activities in reducing loneliness and promoting wellbeing with the PGR community.

Our results show that the wide range of typical institutional support activities we investigated, which have been found to improve loneliness in other student populations, were ineffective within the PGR community, delivering no improvements in the SWB of participating PGRs. Our findings identify social loneliness and stress as predictors of poorer wellbeing amongst PGRs, and that experiencing a combination of social loneliness and stress predicted further declines in PGR SWB.

Results are useful to universities looking to better understand the PGR experience, specifically around the nature of PGR wellbeing and loneliness. They also provide insight into how loneliness interacts with stress to create further declines in PGR wellbeing. These insights provide a platform for further work to build the literature on PGR wellbeing and to deliver improvements to institutional support strategies and initiatives within the PGR community to safeguard students' wellbeing. Future work could therefore usefully focus on identifying further barriers to wellbeing in the academy and seek to develop solutions to loneliness in the PGR experience.

References

- Abbott-Chapman, J. (2006). Time out in “green retreats” & adolescent wellbeing. *Youth Studies Australia*, 25(4), 9–16.
- Agata. (2017). *PhD guilty feeling*. University of Nottingham Blogs: Student Life.
- Allen, H. K., Barrall, A. L., Vincent, K. B., & Arria, A. M. (2021). Stress and Burnout Among Graduate Students: Moderation by Sleep Duration and Quality. *International Journal of Behavioral Medicine*, 28(1), 21–28. <https://doi.org/10.1007/s12529-020-09867-8>
- Allen, H. K., Lilly, F., Green, K. M., Zanjani, F., Vincent, K. B., & Arria, A. M. (2022). Substance use and mental health problems among graduate students: Individual and program-level correlates. *Journal of American College Health*, 70(1), 65–73.
- Anttila, H., Lindblom-Ylänne, S., Lonka, K., & Pyhältö, K. (2015). The Added Value of a PhD in Medicine - PhD Students’ Perceptions of Acquired Competences. *International Journal of Higher Education*, 4(2). <https://doi.org/10.5430/ijhe.v4n2p172>
- Arens, A. K., & Morin, A. J. S. (2016). Supplemental Material for Relations Between Teachers’ Emotional Exhaustion and Students’ Educational Outcomes. *Journal of Educational Psychology*, 108(6), 800–813. <https://doi.org/10.1037/edu0000105.supp>
- Baik, S. H., Fox, R. S., Mills, S. D., Roesch, S. C., Sadler, G. R., Klonoff, E. A., and Malcarne, V. L. (2019). Reliability and validity of the Perceived Stress Scale-10 in Hispanic Americans with English or Spanish language preference. *Journal of Health Psychology*, 24(5), 628-639.
- Banks, M. R., & Banks, W. A. (2002). The effects of group and individual animal-assisted therapy on loneliness in residents of long-term care facilities. *Journal of Gerontology*, 57A(7), 428–432. <https://doi.org/10.2752/089279305785593983>
- Bauer, N., & Rokach, A. (2004). The experience of loneliness in university: A cross-cultural

- study. *Int. J. Adolesc. Youth*, 11, 283–302.
- Bennett, J., Kidger, J., Haworth, C., Linton, M. J., & Gunnell, D. (2024). Student mental health support: A qualitative evaluation of new well-being services at a UK university. *Journal of Further and Higher Education*, 48(4), 372–387.
<https://doi.org/10.1080/0309877X.2024.2335379>.
- Berg S, Mellström D, Persson G, Svanborg A. Loneliness in the Swedish aged. *J Gerontol*. 1981 May;36(3):342-9. doi: 10.1093/geronj/36.3.342. PMID: 7229282.
- Beutel, M.E., Klein, E.M., Brahler, E., Reiner, I., Junger, C., Michal, M., Wiltink, J., Wild, P.S., Munzel, T., Lackner, K.J., et al. (2017). Loneliness in the general population: Prevalence, determinants and relations to mental health. *BMC Psychiatry*, 17, 97.
- Bewick, B., & Stallman, H. (2018). *How universities can combat the student mental health crisis*. The Independent.
- Bian, M., Leung, L. (2015). Linking loneliness, shyness, smartphone addiction symptoms, and patterns of smartphone use to social capital. *Soc. Sci. Comput. Rev.*, 33, 61–79.
- Bireda, A. D. (2015). Challenges to the Doctoral Journey: a Case of Female Doctoral Students from Ethiopia. *Open Praxis*, 7(4), 287–297.
<https://doi.org/10.5944/openpraxis.7.4.243>
- Bonsaksen, T., Chiu, V., Leung, J., Schoult, M., Thygesen, H., Price, D., Ruffolo, M., Geirdal, A. (2022). Students' Mental Health, Wellbeing, and Loneliness during the COVID-19 Pandemic: A Cross-National Study. *Healthcare* 2022, 10, 996.
- Bozoglan, B., Demirer, V., Sahin, I. (2013). Loneliness, self-esteem, and life satisfaction as predictors of internet addiction: A cross-sectional study among turkish university students. *Scand. J. Psychol.*, 54, 313–319
- Brett, C. E., Mathieson, M. L., & Rowley, A. M. (2023). Determinants of wellbeing in university students: The role of residential status, stress, loneliness, resilience, and sense

- of coherence. *Current Psychology*, 42(23), 19699-19708.
- Brown, P. (2013). Loneliness at the bench. Is the PhD experience as emotionally taxing as it is mentally challenging? *EMBO Reports*, 14(5), 405–409.
<https://doi.org/10.1038/embor.2013.35>
- Cantor, G. (2020). The loneliness of the long-distance (PhD) researcher. *Psychodynamic Practice*, 26(1), 56–67. <https://doi.org/10.1080/14753634.2019.1645805>
- Cheshire, A., Richards, R., & Cartwright, T. (2022). ‘Joining a group was inspiring’: a qualitative study of service users’ experiences of yoga on social prescription. *BMC Complementary Medicine and Therapies*, 22(1). <https://doi.org/10.1186/s12906-022-03514-3>
- Carmona-Halty M., Marín-Gutierrez M., Mena-Chamorro P., Sepulveda-Páez G. & Ferrer-Urbina R. (2022). Flourishing Scale: Adaptation and Evidence of Validity in a Chilean High School Context. *Front Psychol.*, 31;13:795452. Carter, M. A., Pagliano, P., Francis, A., & Thorne, M. (2017). Australian university students and mental health: Viewpoints from the literature. *International Journal of Innovation, Creativity and Change*, 3(3), 1–25.
- Carter, M. A., Pagliano, P., Francis, A., & Thorne, M. (2017). Australian university students and mental health: Viewpoints from the literature. *International Journal of Innovation, Creativity and Change*, 3(3), 1–25.
- Casey, C., Taylor, J., Knight, F., & Trenoweth, S. (2023). Understanding the Mental Health of Doctoral Students. *Encyclopedia*, 3(4), 1523-1536.
- Chiang, K. (2003). Learning experiences of doctoral students in UK universities. *International Journal of Sociology and Social Policy*, 23(1), 4–32.
<https://doi.org/https://doi.org/10.1108/01443330310790444>
- Cho, S., & Hayter, C. S. (2020). Under pressure: A systematic review of stress and its impact

among graduate students. *Science and Public Policy*, 47(6), 758–771.

<https://doi.org/10.1093/scipol/scaa053>

Cohen, S. (1994). *Perceived Stress Scale*. www.mindgarden.com

Corner, S., Lofstrom, E., & Pyhalto, K. (2017). The relationships between doctoral students' perceptions of supervision and burnout. *International Journal of Doctoral Studies*, 12, 91–106.

Cornwall, J., Mayland, E. C., van der Meer, J., Spronken-Smith, R. A., Tustin, C., & Blyth, P. (2019). Stressors in early-stage doctoral students*. *Studies in Continuing Education*, 41(3). <https://doi.org/10.1080/0158037X.2018.1534821>

Coughlan, S. (2019). *Students want parents to be told in mental health crisis*. BBC News.

Davis, G. (2009). Improving the postdoctoral experience: An empirical approach. In R. B. Freeman & D. L. Goroff (Eds.), *Science and engineering careers in the United States: An analysis of markets and employment*. Chicago: University of Chicago Press.

Das, B. (2024). Loneliness of PhD-ing: Migrant bodies of colour and Irish neo-liberal academia. *Irish Journal of Sociology*, 32(1-2), 47-65.
<https://doi.org/10.1177/07916035241259254>.

Di Malta, G., Bond, J., Conroy, D., Smith, K., & Moller, N. (2022). Distance education students' mental health, connectedness, and academic performance during COVID-19: A mixed-methods study. *Distance Education*, 43(1), 97-118.

De Jong-Gierveld, J., & Van Tilburg, T. (1999). *Manual of the Loneliness Scale*. 1–26.
http://home.fsw.vu.nl/tg.van.tilburg/manual_loneliness_scale_1999.html

De Jong Gierveld J., Van Tilburg T. (2010). The De Jong Gierveld short scales for emotional and social loneliness: tested on data from 7 countries in the UN generations and gender surveys. *European Journal of Ageing*, 7(2):121-130.

Deeming, C. (2013). Addressing the social determinants of subjective wellbeing: The latest

challenge for social policy. *Journal of Social Policy*, 42(03), 541–565.

<https://doi.org/10.1017/S0047279413000202>

Dicke, T., Marsh, H. W., Parker, P. D., Guo, J., Riley, P., & Waldeyer, J. (2019). Job satisfaction of teachers and their principals in relation to climate and student achievement. *Journal of Educational Psychology*. <https://doi.org/10.1037/edu0000409>

Diehl, K., Jansen, C., Ishchanova, K., & Hilger-Kolb, J. (2018). Loneliness at universities: Determinants of emotional and social loneliness among students. *International Journal of Environmental Research and Public Health*, 15, 1865.

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, 49(1), 71–75.

https://doi.org/10.1207/s15327752jpa4901_13

Diener, E., Wirtz, D., Tov, W., Shigehiro, D. C., & Robert, O. (2009). New wellbeing measures: Short scales to assess flourishing and positive and negative feelings. *Social Indicators Research*, 97, 143–156. <https://doi.org/10.1007/s11205-009-9493-y>

DiTommaso, E., & Spinner, B. (1997). Social and emotional loneliness: A re-examination of Weiss' typology of loneliness. *Personality and Individual Differences*, 22(3), 417-427.

[https://doi.org/10.1016/S0191-8869\(96\)00204-8](https://doi.org/10.1016/S0191-8869(96)00204-8).

Duncan, L., & Weissenburger, D. (2003). Effects of a brief meditation program on wellbeing and loneliness. *TCA Journal*, 31(1), 4–14.

<https://doi.org/10.1080/15564223.2003.12034617>

Ellard, O. B., Dennison, C., Tuomainen, H. (2023). Review: Interventions addressing loneliness amongst university students: a systematic review. *Child Adolesc Ment Health*, 28(4):512-523. doi: 10.1111/camh.12614.

Ernst, M., Niederer, D., Werner, A.M., Czaja, S.J., Mikton, C., Ong, A.D., Rosen, T., Brahler, E., & Beutel, M.E. (2022). Loneliness Before and During the COVID-19

- Pandemic: A Systematic Review With Meta-Analysis. *American Psychologist*, Vol. 77, No. 5, 660-677.
- Evans, T. M., Bira, L., Gastelum, J. B., Weiss, L. T., & Vanderford, N. L. (2018). Evidence for a mental health crisis in graduate education. *Nature Biotechnology* 36(3), 282–284.
- Gaiswinkler, L., & Unterrainer, H. F. (2016). The relationship between yoga involvement, mindfulness and psychological wellbeing. *Complementary Therapies in Medicine*, 26, 123–127. <https://doi.org/10.1016/j.ctim.2016.03.011>
- Gil, N. (2015). *Majority of students experience mental health issues, says NUS survey*. The Guardian.
- Giusti, L., Mammarella, S., Salza, A., Del Vecchio, S., Ussorio, D., Casacchia, M., & Roncone, R. (2021). Predictors of academic performance during the covid-19 outbreak: impact of distance education on mental health, social cognition and memory abilities in an Italian university student sample. *BMC Psychology*, 9, 142, <https://doi.org/10.1186/s40359-021-00649-9>.
- Grygiel, P., Humenny, G., & Rębisz, S. (2019). Using the De Jong Gierveld Loneliness Scale With Early Adolescents: Factor Structure, Reliability, Stability, and External Validity. *Assessment*, 26(2), 151-165. <https://doi.org/10.1177/1073191116682298>
- Hastings, C., Davenport, A., & Sheppard, K. (2022). The loneliness of a long-distance critical realist student: the story of a doctoral writing group. *Journal of Critical Realism*, 21(1), 65–82. <https://doi.org/10.1080/14767430.2021.1992740>
- Hazell, C. M., Niven, J. E., Chapman, L., Roberts, P. E., Cartwright-Hatton, S., Valeix, S., & Berry, C. (2021). Nationwide assessment of the mental health of UK Doctoral Researchers. *Humanities and Social Sciences Communications*, 8(1), 305.
- Hazell, C. M., Chapman, L., Valeix, S. F., Roberts, P., Niven, J. E., & Berry, C. (2020).

- Understanding the mental health of doctoral researchers: A mixed methods systematic review with meta-analysis and meta-synthesis. *Systematic Reviews*, 9(1), 197.
- Hill, P. (2019). *Any excuse to get away from your desk? Escaping PhD guilt*. Pubs and Publications: The PhD Experience.
- Hill M., Farrelly N., Clarke C., & Cannon M. (2024) Student mental health and well-being: Overview and Future Directions. *Irish Journal of Psychological Medicine*. 41(2):259-266. doi:10.1017/ipm.2020.110.
- Hone, L., Jarden, A., & Schofield, G. (2014). Psychometric Properties of the Flourishing Scale in a New Zealand Sample. *Social Indicators Research*, 119(2), 1031–1045.
- Hughes, G., Panjwani, M., Tulcidas, P., & Byrom, N. (2018). *Student Mental Health :The Role and Experiences of Academics*.
- İlhan, T. (2012). Loneliness among university students: Predictive power of sex roles and attachment styles on loneliness. *Educ. Sci.*, 12, 2387–2396.
- Jandrić, P. (2022). Alone-Time and Loneliness in the Academia. *Postdigital Science and Education*, 4(3), 633–642. <https://doi.org/10.1007/s42438-022-00294-4>
- Janson, A., Howard, L., & Schoenberger-Orgrad, M. (2004). The odyssey of PhD students becoming a community of practice. *Business Communication Quarterly*, 67(2), 168–181. <https://doi.org/10.1177/1080569904265421>
- Janta, H., Lugosi, P., & Brown, L. (2014). Coping with loneliness: A netnographic study of doctoral students. *Journal of Further and Higher Education*, 38(4), 553–571. <https://doi.org/10.1080/0309877X.2012.726972>
- Kawachi, I., & Berkman, L. F. (2001). Social ties and mental health. *Journal of Urban Health*, 78(3), 458–467. <https://doi.org/10.1093/jurban/78.3.458>
- Klusmann, U., Richter, D., & Lüdtke, O. (2016). Teachers' emotional exhaustion is negatively related to students' achievement: Evidence from a large-scale assessment

study. *Journal of Educational Psychology*, *108*(8), 1193–1203.

<https://doi.org/10.1037/edu0000125>

Kurina, L.M., Knutson, K.L., Hawkey, L.C., Cacioppo, J.T., Lauderdale, D.S., & Ober, C. (2011). Loneliness is associated with sleep fragmentation in a communal society. *Sleep*, *34*, 1519–1526.

Labrague, L.J., De los Santos, J.A.A., & Falguera, C.C. (2021). Social and emotional loneliness among college students during the COVID-19 pandemic: The predictiv role of coping behaviors, social support, and personal resilience. *Perspectives in Psychiatric Care*, *57*, 1578-1584.

Lewis, J. & Stiebahl S. (2024). *Student mental health in England: Statistics, policy, and guidance* (8593). House of Commons Library.

<https://researchbriefings.files.parliament.uk/documents/CBP-8593/CBP-8593.pdf>

Lim, M.H., Eres, R., & Vasan, S. (2020). Understanding loneliness in the twenty-first century: An update on correlates, risk factors, and potential solutions. *Social Psychiatry and Psychiatric Epidemiology*, *55*, 793–810.

Lindsay, E. K., Young, S., Brown, K. W., Smyth, J. M., & David Creswell, J. (2019).

Mindfulness training reduces loneliness and increases social contact in a randomized controlled trial. *PNAS*, *116*(9), 3488–3493. <https://doi.org/10.1073/pnas.1813588116>

Livermore, T., & Gallagher, J. (2015). *Should PhD students be classed as employees?* The Guardian.

Malakcioglu, C. (2024). Emotional loneliness, perceived stress, and academic burnout of medical students after the COVID-19 pandemic. *Frontiers in Psychology*, *15*.

<https://doi.org/10.3389/fpsyg.2024.1370845>

Mann, F., Wang, J., Pearce, E., Ma, R., Schlieff, M., Lloyd-Evans, B., & Johnson,

S. (2022). Loneliness and the onset of new mental health problems in the general

- population. *Social Psychiatry and Psychiatric Epidemiology*, **57**, 2161–2178.
- Marais, G. A. B., Shankland, R., Haag, P., Fiault, R., & Junipter, B. (2018). A survey and a positive psychology intervention on French PhD student wellbeing. *International Journal of Doctoral Studies*, *13*, 109–139.
- Marias, D. (2015). *Grad student guilt*. Inside Higher Ed.
- Margolis, S., Schwitzgebel, E., Ozer, D. J., and Lyubomirsky, S. (2019). A New Measure of Life Satisfaction: The Riverside Life Satisfaction Scale. *Journal of Personality Assessment*, *101*(6):621-630.
- Marks, N. A., Cordon, C., Aked, J., & Thompson, S. (2008). Five Ways to Wellbeing. *New Economics Foundation*, 1–23. <https://doi.org/10.7748/ns2013.04.27.34.29.s38>
- Masi, C. M., Chen, H. Y., Hawkley, L. C., & Cacioppo, J. T. (2011). A meta-analysis of interventions to reduce loneliness. *Personality and Social Psychology Review*, *15*(3), 219–266. <https://doi.org/10.1177/1088868310377394>
- McGinty, E.E., Presskreischer, R., Han, H., & Barry, C.L. (2020). Psychological distress and loneliness reported by US adults in 2018 and April 2020. *JAMA*, *324*, 93–94.
- Metcalfe, J., Wilson, S., & Levecque, K. (2018). *Exploring wellbeing and mental health and associated support services for postgraduate researchers* (Issue May). <http://journal.frontiersin.org/article/10.3389/fncir.2013.00156/pdf>
- McIntyre, J.C., Worsley, J., Corcoran, R., Harrison Woods, P., Bentall, R.P. (2018) Academic and non-academic predictors of student psychological distress: The role of social identity and loneliness. *J. Ment. Health*, *27*, 230–239
- Milicev, J., McCann, M., Simpson, S. A., Biello, S. M., & Gardani, M. (2021). Evaluating mental health and wellbeing of postgraduate researchers: Prevalence and contributing factors. *Current Psychology*, 1–14, <https://doi.org/10.1007/s12144-021-02309-y>.
- Moran, H., Karlin, L., Lauchlan, E., Rappaport, S., Bleasdale, B., Wild, L., Dorr, J. (2020).

- ‘Understanding research culture: What researchers think about the culture they work in’, *Wellcome Open Research*, 5, p. 201. doi:10.12688/wellcomeopenres.15832.1.
- Morrish, L. (2019). Pressure Vessels: The epidemic of poor mental health among higher education staff. *Higher Education Policy Institute*, 20, 1–76. www.hepi.ac.uk
- O’Brien, T., & Guiney, D. (2019). *Staff Wellbeing in Higher Education A research study for Education Support Partnership*. 1–20.
https://www.educationsupportpartnership.org.uk/sites/default/files/staff_wellbeing_he_research.pdf
- O’Grady, T., & Beam, P. S. (2011). Postdoctoral scholars: A forgotten library constituency? *Science & Technology Libraries*, 30(1), 76–79.
- Office for Students. (2018). *Mental health and wellbeing: A priority*.
- Oswalt, S. B., Lederer, A. M., Chestnut-Steich, K., Day, C., Halbritter, A., & Ortiz, D. (2020). Trends in college students’ mental health diagnoses and utilization of services, 2009–2015. *Journal of American College Health*, 68(1), 41–51.
- Park, C. L., Finkelstein-Fox, L., Sacco, S. J., Braun, T. D., & Lazar, S. (2021). How does yoga reduce stress? A clinical trial testing psychological mechanisms. *Stress and Health*, 37(1), 116–126. <https://doi.org/10.1002/smi.2977>
- Pascoe, M. C., & Bauer, I. E. (2015). A systematic review of randomised control trials on the effects of yoga on stress measures and mood. *Journal of Psychiatric Research*, 68, 270–282. <https://doi.org/10.1016/j.jpsychires.2015.07.013>
- Pascoe, M. C., Thompson, D. R., & Ski, C. F. (2017). Yoga, mindfulness-based stress reduction and stress-related physiological measures: A meta-analysis. *Psychoneuroendocrinology*, 86(August), 152–168.
<https://doi.org/10.1016/j.psyneuen.2017.08.008>
- Patil, A., Gouda, U. & Kamle S. (2016), Adjustment and Happiness of Post Graduate

- Students In Relation To Loneliness, *International Journal of Indian Psychology*, Volume 3(4). <https://doi.org/10.25215/0304.181>
- Piper, R., & Emmanuel, T. (2019). *Co-producing mental health strategies with students: A guide for the higher education sector*.
https://www.studentminds.org.uk/uploads/3/7/8/4/3784584/cpdn_document_artwork.pdf
- Prasad, L., Varrey, A., & Sisti, G. (2016). Effect of Yoga and Meditation on Medical Students' Stress Levels & Sense of Well Being Prior to Exams. *Obstetrics & Gynecology*, 127, 52S. <https://doi.org/10.1097/01.AOG.0000483861.40946.89>
- Purohit, S. P., Pradhan, B., & Nagendra, H. R. (2016). Yoga as a preventive therapy for loneliness in orphan adolescents. *Indian Journal of Health and Wellbeing*, 7(1), 121–124.
- Richardson, H. (2019). *University counselling services “inundated by stressed academics.”* BBC News.
- Richardson, T., Elliott, P., & Roberts, R. (2017). Relationship between loneliness and mental health in students. *Journal of Public Mental Health*, 16, 48–54.
- Riva, E., Lister, K., & Jeglinska, W. (2024). *Student and staff mental well-being in European higher education institutions*. Luxembourg: Publications Office of the European Union.
DOI: <https://data.europa.eu/doi/10.2766/933130>.
- Roberti, J. W., Harrington, L. N, Storch, E. A. (2006). Further psychometric support for the 10-item version of the perceived stress scale. *Journal of College Counseling*, 9(2):135–47.
- Roeser, R. W., Schonert-Reichl, K. A., Jha, A., Cullen, M., Wallace, L., Wilensky, R., Oberle, E., Thomson, K., Taylor, C., & Harrison, J. (2013). Mindfulness training and reductions in teacher stress and burnout: Results from two randomized, waitlist-control field trials. *Journal of Educational Psychology*, 105(3), 787–804.

<https://doi.org/10.1037/a0032093>

Ross, A., Bevans, M., Friedmann, E., Williams, L., & Thomas, S. (2014). “I am a nice person when I do yoga!!!”: A qualitative analysis of how yoga affects relationships. *Journal of Holistic Nursing*, 32(2), 67–77. <https://doi.org/10.1177/0898010113508466>

Royal Society for Public Health. (2020). *RSPH calls for more mental health support for young people in lockdown*. Available from: <https://www.rsph.org.uk/about-us/news/rsph-calls-for-more-mental-health-support-for-young-people-in-lockdown.html> [last accessed 18 March 2024].

Schmidt, M., & Hansson, E. (2018). Doctoral students’ wellbeing: a literature review. *International Journal of Qualitative Studies on Health and Wellbeing*, 13(1). <https://doi.org/10.1080/17482631.2018.1508171>

Schmidt, M., & Umans, T. (2014). Experiences of wellbeing among female doctoral students in Sweden. *International Journal of Qualitative Studies on Health and Wellbeing*, 9(1). <https://doi.org/10.3402/qhw.v9.23059>

Shackle, S. (2019). *‘The way universities are run is making us ill’: Inside the student mental health crisis*. The Guardian.

Shellito, N., & Velasco Roldan, N. (2019). Walking away from loneliness: The mediating role of social isolation. *Innovations in Aging*.

Silva, A. J., & Caetano, A. (2013). Validation of the flourishing scale and scale of positive and negative experience in Portugal. *Social indicators research*, 110, 469-478.

Singh, B., Olds, T., Curtis, R., Dumuid, D., Virgara, R., Watson, A., Szeto, K., O’Connor, E., Ferguson, T., Eglitis, E., Miatke, A., Simpson, C. E. M., & Maher, C. (2023). Effectiveness of physical activity interventions for improving depression, anxiety and distress: An overview of systematic reviews. In *British Journal of Sports Medicine*. BMJ Publishing Group. <https://doi.org/10.1136/bjsports-2022-106195>

- Skead, N. K., & Rogers, S. L. (2016). Running to wellbeing: A comparative study on the impact of exercise on the physical and mental health of law and psychology students. *International Journal of Law and Psychiatry*, *49*, 66–74.
<https://doi.org/10.1016/j.ijlp.2016.05.012>
- Spruin, E., Dempster, T., Islam, S., & Raybould, I. (2021). The effects of a therapy dog vs mindfulness vs a student advisor on student anxiety and well-being. *Journal of Further and Higher Education*, *45*(5), 588–600.
<https://doi.org/10.1080/0309877X.2020.1804535>
- Stoliker, B.E., & Lafreniere, K.D. (2015). The influence of perceived stress, loneliness, and learning burnout on university students' educational experience. *Coll. Stud. J.*, *49*, 146–160.
- Storrie, K., Ahern, K., & Tuckett, A. (2010). A systematic review: Students with mental health problems—A growing problem. *International Journal of Nursing Practice*, *16*, 1–6. <https://doi.org/10.1111/j.1440-172X.2009.01813.x>
- Stubb, J., Pyhältö, K., & Lonka, K. (2011). Balancing between inspiration and exhaustion: PhD students' experienced socio-psychological wellbeing. *Studies in Continuing Education*, *1*, 33–50. <https://doi.org/https://doi.org/10.1080/0158037X.2010.515572>
- Sumi, K. (2014). Reliability and validity of Japanese versions of the Flourishing Scale and the Scale of Positive and Negative Experience. *Social Indicators Research*, *118*, 601–615.
- Tang, N.K., McEnery, K.A., Chandler, L., Toro, C., Walasek, L., Friend, H., Gu, S., Singh, S. P., & Meyer, C. (2022). Pandemic and student mental health: Mental health symptoms among university students and young adults after the first cycle of lockdown in the UK. *BJPsych Open*, *8*, e138.
- The Organisation for Economic Co-operation and Development. (2013). OECD guidelines on

- measuring subjective wellbeing. In *Report*. <https://doi.org/10.1787/9789264191655-en>
- Thoits, P. A. (2010). Stress and Health: Major Findings and Policy Implications. *Journal of Health and Social Behavior*, *51*(S), S41–S53.
<https://doi.org/10.1177/0022146510383499>
- Tulloch, A., Bombell, H., Dean, C., & Tiedemann, A. (2018). Yoga-based exercise improves health-related quality of life and mental wellbeing in older people: a systematic review of randomised controlled trials. *Age and Ageing*, *47*(4), 537–544.
<https://doi.org/10.1093/ageing/afy044>
- UK Research Innovation, & King's College London. (2019). *Student mental health research network*.
- Vera-Villaruel, P., Cells-Atenas, K., Pavez, P., Lillo, S., Bello, F., Díaz, N., & López, W. (2012). Money, age and happiness: Association of subjective wellbeing with socio-demographic variables. *Revista Latinoamericana de Psicología*, *44*(2), 155–163.
<http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2012-26590-012&site=ehost-live%5Cnpaljlo.vera@usach.cl>
- Verlie, B., Emery, S., Osborn, M., Beasy, K., Coleman, B., Kezabu, K., & Nicholls, J. (2017). Becoming Researchers: Making Academic Kin in the Chthulucene. *Australian Journal of Environmental Education*, *33*(3), 145–159.
<https://doi.org/10.1017/aee.2017.24>
- von Haaren, B., Haertel, S., Stumpp, J., Hey, S., & Ebner-Priemer, U. (2015). Reduced emotional stress reactivity to a real-life academic examination stressor in students participating in a 20-week aerobic exercise training: A randomised controlled trial using Ambulatory Assessment. *Psychology of Sport and Exercise*, *20*, 67–75.
<https://doi.org/10.1016/j.psychsport.2015.04.004>
- Ward-Griffin, E., Klaiber, P., Collins, H. K., Owens, R. L., Coren, S., & Chen, F. S. (2018).

- Petting away pre-exam stress: The effect of therapy dog sessions on student wellbeing. *Stress and Health*, 34(3), 468–473. <https://doi.org/10.1002/smi.2804>
- Watson, D., & Turnpenny, J. (2022). Interventions, practices and institutional arrangements for supporting PGR mental health and wellbeing: reviewing effectiveness and addressing barriers. *Studies in Higher Education*, 0(0), 1–23. <https://doi.org/10.1080/03075079.2021.2020744>
- Wawera, A. S., & McCamley, A. (2020). Loneliness among international students in the UK. *Journal of Further and Higher Education*, 44(9), 1262–1274. <https://doi.org/10.1080/0309877X.2019.1673326>
- Weale, S. (2019, March). Levels of distress and illness among students in UK “alarmingly high.” *The Guardian*.
- Weiss, R. S. (1973). *The experience of emotional and social isolation*. Cambridge: MIT Press.
- Wellcome Trust (2020). What Researchers Think About the Culture They Work In, available at: <https://wellcome.org/sites/default/files/what-researchers-think-about-the-culture-they-work-in.pdf> (accessed 21.01.2025).
- WONKHE. (2019). *Only the Lonely – loneliness, student activities and mental wellbeing at university*. Available from: https://wonkhe.com/wp-content/wonkhe-uploads/2019/03/Only-the-lonely-8-Page_v2-003.pdf [last accessed 18 March 2024].
- Yang, C.C. (2016). Instagram use, loneliness, and social comparison orientation: Interact and browse on social media, but don’t compare. *Cyberpsychol. Behav. Soc. Netw.*, 19, 703–708.
- Zhang, N., Fan, F.M., Huang, S.Y., & Rodriguez, M.A. (2018). Mindfulness training for loneliness among Chinese college students: A pilot randomized controlled trial. *International Journal of Psychology*, 53, 373–378.

