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Guest Editorial

Vol 1 Issue 1 – Welcome to the issue

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Welcome to this, the inaugural edition of *Northumbria Psychology Bulletin*, where we showcase some of the outstanding research conducted by our undergraduate and postgraduate students (both campus-based and distance learning). Our goal is to provide a platform for innovative research that might help launch the careers of the next generation of professional and academic psychologists. I have always been impressed by the diversity and quality of research that our students carry out in the completion of their programmes of study under the exceptional supervision of our academic team. The continuing approach adopted by the Department of Psychology to support and facilitate the research ideas generated by the students is something that delivers an excellent opportunity for their development of research skills and steps towards independence. The continued student engagement with the process of writing for publication and the ongoing guidance of their supervisors is particularly impressive given that it extends beyond the completion of their degree programmes and is purely voluntary. I think it demonstrates the commitment of both parties to success beyond the classroom as well as the potential contribution our graduates can make to academic research. This issue (*Issue 1)* features articles including a qualitative investigation of the impact of COVID-19 on the experience of higher education (McGlynn *et al.,* 2024), and adult attachment, psychosomatic symptoms and emotion regulation (Medlej & Greer, 2024). I invite readers to engage with these thought-provoking studies and look forward to the future success of this journal.

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Research Article

‘COVID sucked the soul out of all things decent’: A qualitative exploration of student experiences of online education in the context of the COVID-19 pandemic.

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Abstract

The COVID-19 restrictions had a significant impact on higher education in the UK, with the majority of teaching moving to online delivery. We conducted semi-structured interviews with 16 students who were studying at universities across the United Kingdom in order to explore student experiences of digital teaching in the wider context of the COVID-19 pandemic restrictions. Thematic analysis was used to analyse the results. Two key themes with associated themes were identified. The first theme explored students’ experiences of the move to e-learning, the support that was offered, and the perceived impact on their academic performance. The second theme explored the wider impact on students, in relation to opportunities for work experience, social relationships, future prospects, and mental health. The results illustrated that the sudden move to online learning left many students feeling disengaged from their learning; worried about their future prospects, socially isolated and experiencing poorer mental health. Implications for the provision of online education are discussed.

Keywords: COVID-19; students; online education; qualitative

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Introduction

The COVID-19 pandemic resulted in the introduction of 'Lockdown' measures across the globe, in an attempt to reduce the spread of the coronavirus and its associated devastating health consequences. In the United Kingdom (UK), restrictions on unnecessary social contact were first introduced on the 26th of March 2020 (UK Government, 2020) and people were only able to leave their homes for essential activities, including exercise and work. Subsequent lockdowns were introduced at national and local levels throughout 2020 and 2021, with the main restrictions ending in England in July 2021. In December 2021, guidance to work from home where possible was re-introduced in England.

Higher education was also significantly impacted. All but essential workplaces were closed meaning that opportunities for university facilitated work experience and placements were significantly curtailed. In addition, most university teaching moved to online delivery. Online education can afford valuable opportunities for innovative, creative, and engaging ways of teaching (e.g., Bayne et al., 2020). It can offer greater flexibility, convenience, cost-effectiveness, wider learning opportunities, and opportunities for students to pace their work (e.g., Serhan, 2020). Achieving these benefits, however, assumes access to suitable technologies and infrastructure, and a level of digital literacy in staff and students. It also requires time for a level of thought, preparation, and scaffolding that wasn't always available to academic staff who had to quickly pivot to online education during a global crisis. While many academic staff have had experience of using some limited forms of online education, the move from predominantly face-to-face teaching to e-learning was sudden and unexpected. The change frequently required an extensive redesign of the delivery of course materials, within a short time period, and by staff who did not necessarily have expertise in online education (see Daumiller et al., 2021) or an understanding of the ways in which different mediums create and constrain the pedagogical approaches that can be developed (Cousins, 2005).

In this context, it is perhaps unsurprising that research, conducted during the COVID-19 pandemic, has indicated that students have not always responded positively to the transition to online learning. While the benefits of e-learning, such as flexibility, and self-paced learning were highlighted by some students (e.g., Bączek et al., 2021), many believed that online learning was less enjoyable, resulted in a less valuable learning experience and as a result, reduced their motivation to engage with it (e.g., Garris & Fleck, 2020; Serhan, 2020). Some of the factors that contributed to a poor online learning experience in the context of the pandemic included problems with technology and connectivity, feelings of social isolation, and compromised learning environments (e.g., Adnan & Anwar, 2020; Rotas & Cahapay, 2020). Poor mental health was also common, with students experiencing increased levels of stress and anxiety (Husky et al., 2020) and loneliness (Bu et al., 2020).

Much of this research, however, relates to specific universities or to specific subject areas. A broader picture emerged from the 2021 Student Academic Experience Survey, conducted in the UK (Neves & Hewitt, 2021). This surveyed over 10,000 undergraduate students who were studying at UK universities and found a picture that was largely consistent with research from other countries. In particular, the responses highlighted that many students considered that their university education, during the COVID-19 restrictions, represented less value for money due to reduced in-person contact and teaching; lost opportunities to engage in practical elements, such as placements; and a sense that the quality of online teaching was lower than that offered by face-to-face delivery.

The broad picture drawn from the survey requires further in-depth exploration, particularly as digital education is often viewed in isolation from the wider context in which it is situated. As Bayne et al. (2020) argue, teaching and learning are multifaceted, contextual processes that bring together 'people, digital technologies, curricula, work and study spaces, and artefacts of assessment' (p16). The COVID-19 restrictions offered an opportunity to explore student experiences of digital teaching in a context where they had not chosen this mode of learning and where the wider academic, economic, and social contexts within which they were being taught had radically shifted. For this reason, the present study adopts a qualitative approach to explore student experiences of digital teaching in the wider context of the COVID-19 pandemic restrictions.

Method

A qualitative approach was used for the study, with data being obtained from semi-structured interviews (conducted between January and April 2021) with university students. The context of the research was the experiences of students moving to online learning at higher education institutions in the UK during the COVID-19 restrictions. The study received ethical approval from Northumbria university ethics committee and all participants provided informed consent.

Participants

Participants were aged 18 years or older and were studying, or had been studying, at a UK university during the initial COVID-19 restrictions. Sixteen people participated, of whom 4 were male and 12 were female. Not all participants provided all of the demographic information requested. Based on those who did, ages ranged from 21 to 24. Eight were in their final year of an undergraduate degree and 1 was completing a one-year Master's degree. The topics being studied included Psychology, Law, Art, Psychology and Criminology, Criminology, and Education. Only one participant (P3) had originally chosen an online distance learning programme. Participants were

studying at universities across the UK, in the South and North-East of England and in Scotland.

Procedure

Participants were recruited online through social media websites, student forums, university student groups and emails. A study advert provided a brief overview of the research and a link to an online site where more detailed information was provided, including researchers' email addresses, to enable potential participants to contact them with any questions. Those who wished to take part were asked to record their consent and provide contact details to enable a suitable interview time to be arranged with them. Interviews were conducted via video conferencing software, or phone according to participants' preferences. The interviews were digitally recorded and later transcribed by the interviewer. Potentially identifying information was removed or altered during the transcription process.

An interview schedule was developed to structure the interview, while allowing flexibility in exploring topics that appeared relevant to particular participants. This was designed to explore students' experiences and perceptions of the move to online education, including benefits and drawbacks, and the impact of this transition. The topics that were explored were based on areas that had been identified in previous research as potentially being important, and included sources of support, the impact on academic performance, future plans, and mental health.

The interviews were conducted by CM and LF, both of whom are psychology graduates from Northumbria University. The combined data were analysed by KM. The researchers adopted a constructivist approach to the data.

Data analysis

The interview transcripts were analysed using thematic analysis, based on the guidance provided by Braun and Clarke (2006, 2020). This is a flexible method of analysis, that does not dictate a particular theoretical approach, and which can allow the researcher to synthesise and interpret multiple, subjective perspectives of participants, in order to identify relevant themes (Braun & Clarke, 2020; Nowell et al., 2017).

As a first step, each transcript was read in detail before being combined with the others to form a single dataset. All transcripts were then re-read and related sentences and phrases across the dataset were collated and labelled with the same codes as an initial step to developing potential themes. These coded extracts were subsequently grouped together as themes and subthemes, which identified areas which were relevant across the dataset. The final analysis was shared with the wider research

team, to ensure that it reflected the content of the interviews and that the themes were relevant, internally coherent, and consistent. The themes and subthemes were then supported by illustrative quotes from the transcripts. Grammatical errors and colloquialisms in the quotes have been left uncorrected.

Results

The analysis resulted in two main themes. The first ('Structure! I would love structure!)' explored the participant experiences of the move to online learning, the support offered by their universities and the perceived impact on their academic performance. The second theme ('COVID sucked the soul out of all things decent') explored the wider impact on participants, in terms of work experience, social contact, employment prospects and mental health (see Table 1 for themes and associated subthemes).

Table 1: A brief description of the two main themes and their associated sub-themes

Theme	Subthemes	Brief description
Structure! I would love structure!	'Decided it wasn't for me'	The focus here is on how the students engaged with e-learning and its associated advantages and disadvantages.
	'I'm just doing everything from my room'	This explores the impact of the restricted access to the physical campus in the context of the wider social restrictions imposed as a result of COVID-19.
	'I literally could not do it'	This reports on the impact on students' motivation, concentration, and academic performance.
	'It was obviously not going to be a smooth road'	The focus here is on the way in which the move to online education was introduced and supported by the students' universities.
COVID sucked the soul out of all things decent	'It is not the same as talking in person'	This subtheme explores the impact on the participants' social support, relationships, and interaction.
	'I am not going to be able to put that on a CV'	This explores the impact of the move to e-learning and the COVID-19 restrictions on the future plans of participants.
	'It's a lot more stress, more constant'	This explores the largely detrimental impact of many of the areas which were identified in the previous subthemes on the students' mental health.

Theme 1: "Structure! I would love structure!"

The first theme explores the ways in which the students experienced the change to online learning, in the context of the wider restrictions that resulted from the COVID-19 pandemic. The associated subthemes are described in more detail below.

Subtheme 1: "Decided it wasn't for me"

This subtheme highlights the ways in which the students engaged with e-learning and some of the associated benefits and difficulties that they experienced. There were mixed views about the move to online learning. There were a number of benefits which were identified, including the opportunity to engage with external experts: "*we've had lots of extra-curricular stuff, which is with external people and that's been good*" (P13), to learn in more independent and flexible ways: "*erm I think that it is quite nice you can go at your own pace, like if today you wanted to do a different lecture to the timetable that's fine*" (P11) and in a context with fewer distractions than usual: *"…probably fewer distractions to be fair cause there's times in lectures like me and my friends have a chat sometimes and miss some of the things that is going on*" (P1).

In general, however, the online learning during the pandemic was viewed as being less structured, which had a negative impact on motivation: "*structure! I would love structure…like I set myself up but then I just sit there and do nothing for hours"* (P15), and productivity: "[the work] *doesn't really get done because there's no proper structure"* (P12). The reduced structure also resulted in worse time management for some students: "*I think probably time management more than anything because [you] are really left on your own"* (P11).

There were also particular aspects of e-learning that many students disliked. Some found the online materials and formats less engaging: "*I did* [attend online workshop] *once because I thought I had to, but it was just, like, boring"* (P16), and preferred in-person lectures: "*I'd prefer face-to-face lectures, it's easier to engage with rather than sitting and listening to someone's voice over a PowerPoint"* (P11). Others disliked the impersonal nature of the online contact: "*I think it's the de-faceless communication, you're not speaking to someone, you feel like you're speaking at something*" (P10). This was particularly the case when the format required them to interact with people that they didn't know: "*I was just like in a chat with these randoms. It just wasn't for me. Like, I'm not shy, but that's just, like, weird."* (P16).

Problems with technology and a lack of structured ways to help the cohort connect were seen as making the situation worse:

"*When you go for a drink or meet as a group you find a way to break the ice, but online it's very hard to get a grasp of people and it's just really awkward, when connection breaks or you interrupt people, etc*." (P13).

Having to interact online with strangers caused many of the participants to feel anxious: "*I think* [breakout rooms] *personally for me make me feel really nervous because no one wants to be put on webcam with random people they don't know, and I think erm it's just nerve wracking because its people you just don't know"* (P9). This anxiety was exacerbated when expectations about participation were unclear: "*I feel like I get anxious every time before a seminar online because I don't really know what to say, what they are expecting me to say"* (P12).

As a result of their discomfort, many participants disengaged. Some did not participate fully in the session, being reluctant to ask questions: "*when you are sat in your house alone and things aren't being explained properly, obvs you can ask question on zoom or whatever, but it's a lot more scary because you just don't know each other and things like that*" (P11), or respond verbally to questions: "*I find the online stuff so awkward, like I usually pretend my mic is broken so I can just like type my answers"* (P15).

Others avoided sessions altogether, for example, by cutting off communication about when they would take place: "*I didn't know when we even really started to be honest. I like turned me notifications off on my emails because they were getting on me nerves*" (P16), or by simply not attending: "*to be honest I have stopped going to some, but that's because I'm like too nervous to go on"* (P12). This was despite recognising the importance of the sessions for their learning:

"*Well, in all honesty, I just don't attend them. I know they are important and that, but I just can't bring myself too. I think I've attended like one all year and decided it wasn't for me".* (P14).

Subtheme 2: "I'm just doing everything from my room"

The second subtheme explores the impact of the restricted access to physical campus facilities, such as libraries, on the students. Many participants reported having a less-than-ideal study environment. While many universities had library facilities open, the associated procedures for accessing them put many students off: "*the library has too many restrictions"* (P12). These restrictions and the associated uncertainty about access, meant that many participants simply stayed in their home, and often their room, to study: "*I think you can go to the library, but I'm not too sure erm, but I'm just doing everything from my room"* (P14). This created a sense of being trapped and there being no distinction between study, work, and home life: "*So, I sit at my dining table because I don't actually have a desk in my room and I do my work for my job in the same place, which makes me feel like I am constantly sat here"* (P11).

Many participants experienced stress as a result of their study environment: "*knowing you can't leave the environment to go somewhere else after to de-stress makes it more stressful*" (P9). For some, however, the option to move home improved their study environment:

"*When the pandemic first started like a year ago now, I think it really helped me because I went from my student accommodation to back home which I think for me is a lot better study space. I was doing all my assignments and like my exams in a space that I feel like I thrive in more academically*" (P12).

Subtheme 3: "I literally could not do it"

The third subtheme reports on the students" experiences in relation to their perceived motivation, concentration, and academic performance, in the context of the pandemic and move to e-learning. Most reported some reduction in motivation: "*it was fine at the start but now I am getting a bit sick of everything, no motivation to do anything"* (P12) and concentration: "I start doing something and I just like cannot concentrate" (P6). There was a sense of being disconnected from the university as an institution: "*it just feels like I am not at uni. It is like I am just watching these videos*" (P2) and the related expectations: "*I just feel like there's no motivation because, like, if it's on the computer you can just put it off till like never"* (P9). Some participants also missed the motivation that they obtained from being taught in person by enthusiastic lecturers:

"*It has just made it a bit difficult to actually learn anything or get the motivation to learn anything per say, like for instance like um face-to-face teaching you receive the energy of the teacher you can stay concentrated because there is no other distractions*". (P6)

By contrast, a few participants identified aspects of e-learning that helped to improve their motivation, such as pacing the release of materials and structuring the content:

"*When the lecturers are doing things like seminars and Q+A's it gives you a bit more motivation to keep up and you understand the lecture ready for the Q+A as opposed to releasing all the content and being like "there you go.*"" (P9).

Most participants felt that their academic performance had been weaker as they studied during the pandemic: "*I was not getting any work done and I had to ask for extensions because I literally could not do it"* (P2).

Some felt that their development had been put on hold during the pandemic:

"*I just personally do not feel like I have learnt a lot in the past year or improved. I think that has really put me out of focus and I just like do not have the drive anymore, I guess*". (P8).

Some explicitly attributed this to the move to online learning: "*I would say I'm more productive and proactive when I'm not online, which has actually reflected in my grades"* (P10).

There was also a sense that the quality of teaching had reduced during the pandemic: "*the quality of education has gone down so much this year, like I am constantly worrying about how well I am doing and if I am putting enough in"* (P8) and that online teaching was poorer, as compared with face-to-face teaching: "*the teaching isn't as*

great as what I would've expected from face-to-face." (P11). As a result, many felt that they were having to put in extra effort to maintain their progress: "*I have been putting in a lot more effort to try and compensate for the decreased quality. Which is just more stress on my end*" (P12).

Subtheme 4: "It was obviously not going to be a smooth road"

The fourth subtheme reports on the students" experiences of the way in which the move to online education was introduced and the support that was available to them during the process. The sudden and unexpected nature of the changes meant that many of the students felt unprepared for the change to online learning. There was a general sense that the universities could have supported the students better:

"I feel like it was just so abrupt that it was obviously not going to be a smooth road. It was like attending actual uni was just cut off. I would say considering how long they had over summer to sort of organise themselves it could have been a bit better". (P14).

Many students, however, also acknowledged that universities had put policies in place to try to mitigate the negative impact of COVID-19:

"*I think like last year the "no detriment policy" put a lot of people's minds at ease because then you aren't going to get the same grades as learning face-to-face but the policy takes the stress off having to achieve normal expectations*." (P9).

Individual support was provided by academic staff: "*the lecturers are quite supportive, and you can speak to them whenever"* (P12) and additional information was available, for example in relation to student wellbeing: "*I think they do offer mental health support*" (P13) and careers advice: "*well, they do send out a lot of emails about these employability things, right?*" (P6).

There were, however, a number of barriers identified to accessing this help. This might be due to timing issues: "*it's like all these employability things for long-term, like actual careers, just seem to be like at quite awkward times for me"* (P6), or difficulties with motivation:

"*You have to find it [support] on your own and email people and when your mental health is suffering you can't really be bothered to go through all that. So, I mean the help is there, but I don't have the motivation to seek it out*". (P13).

Many participants also viewed themselves as people who found it difficult to ask for help: "*I think the help is out there if I seeked it, but I'm not really the type to ask*" (P14), or to accept it, when offered: "*I mean I know the help is there, like. I don't think I'll ever like use it like… not me personally like. I don't really like to use the help anyways*" (P16).

There was also an acknowledgement from some participants that the pandemic was unprecedented, and that the negative consequences were frequently out with the

control of staff: "*well, I suppose it's not really their fault I can't work elsewhere*" (P14). Staff were seen as making attempts to keep students updated with information:

"*I mean they are doing the best they can aren't they? I mean like they are trying, I got like an email everyday telling me what the current situation was in terms of like COVID*." (P15).

In general, staff were seen as doing their best: "*I think there's not much they can do given what's going on… but I do think they are doing the best they can"* (P13).

Theme 2: "COVID sucked the soul out of all things decent"

This theme explores the wider impact of the pandemic and move to online education on the participants. The subthemes explore this in terms of their social interaction, opportunities for work experience, employment prospects, and mental health.

Subtheme 1: "It is not the same as talking in person"

This subtheme explores the impact on participant social relationships and interaction. In many cases, the move to online education, in tandem with COVID-19 restrictions, meant loss of social contact and a sense of social isolation: "*I'm like withdrawn from like normal life…I do feel just so, like, isolated"* (P15). Technology offered some ways of providing social contact but was seen as inferior to face-to-face contact: "*I think maybe, just, I feel really isolated and like it has been good for things like Zoom and FaceTime like, I am still able to talk to people, but I would just say it is not the same as talking in person*" (P1). The opportunities for informal social contact that campus facilities offered were lost: "*obviously we can't go and attend lectures in person. Personally, I find it a lot more motivating to be like around the people who also do the course rather than just sitting in my room"* (P1).

Even when facilities, such as libraries, were open, the changed circumstances meant that students were not motivated to use them, and lost social support as a result: "*I would say I'm quite a social person… I would be seeing my friends or at the library, which now going to the library is a bit of a chore"* (P10).

Subtheme 2: "I am not going to be able to put that on a CV"

This subtheme explores the ways in which the participants future plans were impacted as a result of the pandemic. For some, the experience of online education led to a decision to no longer pursue an advanced educational qualification because they viewed it negatively: "*I was thinking about doing a Master's* [degree] *after I completed third year, but I just needed a break from online learning*" (P2). For others, concern about the lack of employment opportunities led to the decision to undertake additional

study: "*I feel quite scared about going out into the world and getting a job…it just seems safer to go with a Master's* [degree] *because I think there's just less opportunities out there"* (P8), even if this meant further online education: "*like I have already done two years of corona learning, what is another year?*" (P6).

A significant concern for participants in relation to their future prospects was the impact of the move to online education on opportunities for work experience, such as placements and internships. In many cases, these were cancelled: "*I've had, like, opportunities kind of taken away or cancelled that would have really added to my CV"* (P7), or no longer being offered by external organisations: *"they will not accept work experience because of the whole COVID situation and I feel very negative about the future"* (P2).

Participants were worried about these lost opportunities and that it would reduce their value in the employment market:

"*opportunities that I possibly would have had, like say an internship, I am not going to be able to put that on a CV and that's kind of worrying for me…I feel like I would not blame a future employer if they saw that a year of my university was just online, I would just throw out my CV at this point. Like, the quality of uni has decreased so much this year, like, I do not think I'd be as employable as someone who graduated a year or two earlier*" (P12).

There was also concern that the lack of placement opportunities would make the participants less attractive candidates for postgraduate study: "*when I first found out I was not able to do the placement or could not get one, I kind of did worry about whether I'd be able to get onto a post graduate course without having any experience"* (P5).

Some participants took the opportunity to gain experience in the context of the restrictions, by volunteering online: "*I am a digital volunteer: I talk to people who just want to talk or want advice in support services"* (P2). Online opportunities for experience, while welcome, were, however, seen as being of less benefit than in-person experience:

"*I applied for a placement um… and I can definitely say that has helped, but it would have been a lot more beneficial if I could have done it in person. I think that would have made me a lot more employable*" (P1).

Subtheme 3: "It's a lot more stress, more constant"

This subtheme explores the impact of many of the areas which were identified in the previous subthemes on the mental health of participants.

Many experienced a sense of social isolation and loss of their social support, whether family (if remaining in university accommodation), or friends, if they had moved back home: "*I do live with my parents, but they are both key workers, so I am spending a*

lot of time on my own and obviously not seeing my friends and things like that, so I think that's the hardest part" (P5). This loss of in-person contact and support had a significant negative impact on the mental health of many participants:

"*I think mentally I have really struggled with the lack of social…I obviously was not seeing anyone because it was lockdown and I really missed like my friends, who I see at least twice a week, I really struggled (laughs). God, it was awful*" (P3).

The situation also placed strain on existing relationships because people were living in such close proximity with a limited group of people: "*I would have a go at my friends just for the little things like leaving crumbs on the table*" (P2).

Engaging in multiple activities in a restricted environment was experienced as stressful and oppressive: "*I feel as though I am struggling with the sort of stress… like work wise, sleep wise, relaxation wise, I'm just in my room and sometimes it's just impossible to switch off from thinking about uni work"* (P14).

Concern about lost opportunities, poorer academic outcomes and reduced employment prospects also impacted negatively on some students" mental health:

"*As the year goes on it is something I am worrying about more and more and I guess just missing out on those opportunities I could have had, it has just made me worried about my career as a whole*" (P8).

There was a sense of trepidation and uncertainty about academic attainment and how this would impact on the future prospects: "*it is just like hoping I will end up graduating with the grades I want and stuff, um but yeah it is kind of scary with graduation looming and like the job prospects and everything like that being uncertain and the next steps being uncertain"* (P7).

Discussion

The changes to the environment in which the students in this study were taught, because of COVID-19 restrictions, offered the opportunity to have a greater focus on the wider contextual factors that influenced their experience of digital education. Bayne et al. (2020) note that the multi-faceted nature of digital education offers many opportunities to get it right and allows multiple routes to good practice. The results of the study, however, suggest that, despite the many benefits and opportunities that teaching online can offer, the sudden and unanticipated need to move to digital education because of the COVID-19 restrictions, was largely experienced negatively by the students in this study. The results also have a number of implications for practice, which may be particularly relevant, given the possibilities of future campus closures as a result of a resurgence in COVID-19 cases.

The students identified both individual and structural factors that contributed to their negative experiences of online learning, including the nature of the teaching materials,

the structure and delivery of the teaching, their wider study and support environment, and the reduced or lost opportunities to obtain practical experience through internships, volunteering or placements. The results from the UK 2021 Student Academic Experience Survey (Neves & Hewitt, 2021) suggests that student dissatisfaction with their digital education experience was relatively widespread. This both related to the poor quality of the digital content and limitations of processes, such as the timing of assignments.

Our own research highlighted the important role of teachers in digital education. Rather than just facilitating student use of digital technologies, they have a crucial role as subject experts who use their professional, educational skills to engage, motivate, challenge, and inspire students (see Bayne et al., 2020). The loss of in-person interaction, with both teachers and fellow students, led many students to feel socially isolated. It seems that, despite there being many ways to scaffold and support a sense of online identity and community (e.g., Mulrooney & Kelly, 2020), these approaches seem to have largely been absent. This may have been due to the hurried, widespread transition to digital education during the COVID-19 pandemic. It may also reflect limited skill development for academics in teaching online prior to the pandemic, which meant many were likely to be ill-equipped to understand the constraints and possibilities of differently mediated interactions, let alone to fully utilise them to best "perform" that charismatic, inspiring version of themselves they might in person.

Students (and staff) may also hold an idealised image of face-to-face learning compared with e-learning. Research has indicated that e-learning students use the concept of the 'campus imaginary' – imagined, positive aspects of the experience of attending the physical campus - as a way of attributing the challenges they face with their learning to being online students (Ross & Sheil, 2017). This is despite many of these challenges also being present for students who receive face-to-face teaching.

This may lead to the comparison of a homogenised "online" versus an idealised homogenised "offline" learning environment. This misses the more nuanced understanding that technology and pedagogy co-produce the educational experience, both online and face-to-face. Different technologies and materialities open up and close down different enactments of education. A lab or tutorial space is very different from a lecture theatre, likewise asynchronous forum posts are very different from a blog, or a video conference. A failure to understand how the social and the material contexts influence education and the view of e-learning as a re-versioning of the face-to-face experience can lead to the use of technology in ways which can undermine pedagogical intent.

Bayne et al. (2020) argue that good digital education can embody the same values that are present in in-person education, such as the provision of good quality engagement and interaction, but they are enacted differently online. Providing all staff with support in how to embody key principles of good quality teaching in their online

courses and how to maximise the particular opportunities that e-learning affords may help to improve student perceptions of this mode of learning.

Many students in the present study also experienced low levels of motivation, difficulty engaging with the online materials and with their time management. Despite this, many were reluctant to seek help. These experiences are not unique to the COVID-19 (Rasheed et al., 2020) or e-learning contexts (see Bornschlegl et al., 2020). A recent systematic review explored the challenges faced by students specifically in relation to the online component of their learning. Rasheed et al. (2020) found that students who voluntarily undertook this type of learning had similar difficulties to those experienced by students in our own study. Previous research has suggested that the development of academic skills, such as motivation, good self-discipline, and time management skills are important requirements for successful learning (e.g., Khan et al., 2019). This suggests a need for all students to have access to support with the development and application of these skills.

The demonstration of such skills, are however, context-dependent. Bayne et al. (2020) argue that a focus on such individual characteristics can ignore the structural constraints or facilitators on the individual exercising such characteristics and the active and interactive role that technology plays in shaping and changing teaching.

Many of the students described feeling disengaged from their studies and their universities. A number of issues raised by them can be mapped on to the four key aspects of student 'belonging' identified by Ahn and Davis (2019): academic and social engagement, surroundings (e.g., living space) and personal space (e.g., life satisfaction, personal interests). As all four areas were constrained by the COVID-19 restrictions, it is perhaps unsurprising that our participants expressed a reduced sense of belonging. This is consistent with the results found by other researchers (e.g., Mulrooney & Kelly, 2020) and highlights a need to address this in the online environment. O'Shea and Dozier (2014) describe the creation (pre-COVID-19) of a virtual dissertation festival to create a sense of shared space and belonging for online students who were based in disparate locations. Such approaches may also have helped to promote a feeling of belonging and engagement during the COVID-19 restrictions.

Many of the students felt that their educational experience had been devalued and lacked authenticity compared with their expectations of campus-based, in-person teaching. 'Campus envy' has been found even in students who have elected to engage in digital education and are happy with their choice, perhaps because of the mechanism of the 'campus imaginary,' described previously (Ross & Sheil, 2017). There is a need to challenge the view that digital education is inherently second class and for academics to develop ways of enabling students who are being taught online to move beyond the physical structure of the campus as being "a guarantor of the authenticity of academic experience" (Bayne et al., 2014, p577).

Many of our participants also felt, however, that their education would be viewed as inferior by potential future employers, reducing their chances of obtaining graduate level jobs at the end of their studies. There has been an increasing perception of education as a means of promoting societal and personal economic growth, with digital education often being seen as contributing to this process by enhancing the digital skills of the prospective workforce (see Bayne et al., 2020). While our participants largely appeared to endorse the instrumental and economic view of education, many viewed their experience of online teaching as detrimental to, rather than enhancing, their future prospects.

In this context, student concerns appear valid, with COVID-19 being reported to have disrupted the career progression for those at an early career stage, and many graduates putting off entering the employment market (Powell & Francis-Devine, 2021). This suggests that universities may need to work with students and future employers to promote the value and benefits of digital learning.

This also highlights the need for a post-digital way of thinking, one where a holistic understanding of educational activities and practices encompasses "the digital and non-digital, the material, and the social" (Fawns, 2018, p.132). Acknowledging that all learning occurs in a wider social and material context with practices co-produced both on- and off-line could help break down the unnecessary, and sometimes obstreperous, distinctions between modes of learning. A recognition and enactment of a post digital perspective opens up possibilities in teaching, policy and investment in technology.

The study had a number of limitations. The digital teaching that was experienced by the students in our study during the COVID-19 restrictions cannot be directly compared to planned online curriculum that they might have undertaken by choice. Despite this, the unusual context in which the teaching was developed and delivered has enabled some important structural issues to be highlighted. A second limitation is, that while qualitative research does not aim to represent all members of a particular group, the experiences of students who were more familiar with digital education may have been different from our own participants. A final limitation was that the interviews took place between January and March 2021, after two main periods of lockdown. Participants may have reported different experiences if the interviews had taken place at a different phase of the restrictions.

In conclusion, the study explored student experiences of online learning and how these were situated in the wider contextual changes that resulted from the COVID-19 restrictions. The results illustrated that the unplanned and hurried nature of the change to online learning resulted in students largely feeling unprepared, de-motivated, and disengaged from their learning; concerned about their future prospects, and socially isolated. This, in turn, led to many experiencing mental health difficulties.

Data availability statement

The interview transcripts on which the study is based are not publicly available in order to protect the anonymity of the participants.

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Research Article

The role of emotional intelligence and emotion recognition ability in romantic relationship satisfaction of adults varying in autistic-like traits

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Abstract

Research suggests that emotional intelligence is important for relationship satisfaction. Some people face challenges with both romantic relationships and aspects of emotional intelligence, for example, autistic people. There has, however, been very limited research into these factors with non-clinical participants with varying levels of autistic-like traits. This research aimed to investigate the extent to which both general emotional intelligence and the specific component of emotion recognition mediated the relationship between autistic-like traits and satisfaction with romantic relationships, using a general population sample in two studies (Study 1, *n* = 139; Study 2, *n* = 183). The results of our studies found that emotional intelligence, but not emotion recognition, mediated the relationship between autistic-like traits and relationship satisfaction. This research provides novel insights into how emotional intelligence and autistic-like traits influence romantic relationship satisfaction and has implications for potential interventions.

Keywords: romantic relationships, autistic-like traits, emotional intelligence, emotion recognition.

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Introduction

Being in a satisfying romantic relationship can have a number of benefits for both physical (Markey *et al.,* 2007) and mental health (Braithwaite & Holt-Lunstad, 2017). Individual differences in, for example, emotional intelligence, can influence the nature of, and satisfaction with these relationships (Malouff *et al.,* 2014). Emotional intelligence has been defined as "*the ability to perceive and express emotion, assimilate emotion in thought, understand and reason with emotion, and regulate emotion in the self and others*" (Mayer *et al.,* 2000, p. 396). Research suggests that emotional intelligence is important in developing and sustaining satisfactory relationships. A systematic review by Schutte and colleagues (2001) found that those with higher emotional intelligence had higher scores in empathic perspective taking and self-monitoring; scored higher in social skills; exhibited more cooperative responses towards their partner; reported more close relationships; had higher scores for marital satisfaction and reported greater satisfaction in relationships. A later meta-analysis found a significant association between high emotional intelligence and romantic relationship satisfaction, with a medium effect size (Malouff *et al.,* 2014).

Researchers have also explored the role of emotion recognition as a specific component of emotional intelligence, in the context of interpersonal relationships. Much of this research has focused on the relationships of children, rather than romantic relationships, but it does indicate that, in general, emotion recognition skills are positively associated with peer status and friendships (see Wang *et al.,* 2019).

Some individuals, such as those with autism, are less likely to be romantically involved than their typically developing peers, even though many desire a romantic partner (Strunz *et al.,* 2017). One suggested reason for this is that autistic people have difficulties with a number of emotional intelligence related skills which are important in initiating and maintaining close interpersonal relationships. These include social communication, interacting with others, emotion recognition, and perspective-taking (See Strunz *et al.,* 2017). Indeed, many autistic people have been found to score significantly lower on some measures of emotional intelligence (Petrides *et al.,* 2011) and to be less accurate on emotion recognition tasks (Harms *et al.,* 2010) compared with individuals without autism. They may also have difficulty with areas that are linked to relationship satisfaction, such as understanding and responding to their partner's needs (Reis, 2007). The extent of these difficulties may relate to the severity of their condition, with one study finding a negative association between the self-reported relationship satisfaction of wives and the severity of their husband's autism (Renty & Roeyers, 2007).

People with a diagnosis of autism are considered to represent those with more extreme autistic-like traits. Such latent traits are considered to be distributed throughout the population to different degrees (Constantino & Todd, 2003), and constructs that are used to describe autistic traits in those with a clinical diagnosis, can be applied to those without an autism diagnosis (Murray *et al.,* 2014). Research has indicated that those

with higher levels of autistic-like traits may also experience relationship-related difficulties, such as more interpersonal problems (Wainer *et al.,* 2011).

There is, however, only limited research into romantic relationships and autistic-like traits. Jobe and White (2007) recruited a non-clinical sample and found that, while those who had more autistic-like traits were just as likely to be in a romantic relationship as those with fewer traits, they tended to report more general loneliness, potentially indicating that the relationships were less fulfilling for them. Pollmann *et al.,* (2010) also found similar indications of relationship dissatisfaction in a non-clinical sample, but these were gender specific. In their study of 195 married couples, higher levels of autistic-like traits in males, but not females, were related to lower relationship satisfaction. Partners of those with higher autistic-like traits (whether male or female) were not less satisfied with their relationship than partners of those with lower levels of autistic-like traits. The authors found that the association between autistic-like traits and satisfaction with the marital relationship was mediated by relationship-related factors, including trust in, intimacy with, and responsiveness towards, their partner. A similar result was found by Beffel *et al.,* (2021) who reported that higher levels of specific autistic-like traits were associated with greater dissatisfaction with romantic relationships, mediated by avoidance and/or anxiety in college students. Pruitt *et al.* (2018) found that relationship satisfaction mediated the association between autistic-like traits and mental health in mothers of children with a diagnosis of autism.

This small body of research indicates that autistic-like traits can be associated directly and indirectly with levels of relationship satisfaction. None of these studies, however, have looked at the role of emotional intelligence and emotion recognition in this context. The aim of the present study, therefore, is to investigate the extent to which autistic-like traits, emotional intelligence in general and emotion recognition in particular, influence romantic relationship outcomes in a non-clinical sample. It is hypothesised that emotional intelligence (Study 1) and emotion recognition (Study 2) will mediate the relationship between autistic-like traits and relationship satisfaction.

Method

The research questions were explored in two related studies. Study 1 explored whether the relationship between autistic-like traits and relationship satisfaction was mediated by emotional intelligence. Study 2 explored whether the relationship between autistic-like traits and relationship satisfaction was mediated by emotion recognition.

Participants

A convenience sample of adult volunteers were recruited using an online advert posted on social media and online psychology research websites. Interested participants

were provided with detailed participant information and the opportunity to record their informed consent. The research received full ethical approval from the Department of Psychology Ethics Committee of Northumbria University. Table 1 illustrates the demographic information of the participants in Study 1 (*n* = 139) and Study 2 (*n* = 183).

Measures

All participants were asked to provide demographic information, as summarised in Table 1.

Table 1: Demographic information of participants in Study 1 and 2

	Study 1			Study 2		
	Mean	**SD**	**Range**	**Mean**	**SD**	**Range**
Age	27.6	12.5	18-63	41.4	10.4	18 - 71
Gender						
(male / female; *n* / %)	37 (26.6) / 102 (73.4)			18 (9.8) / 165 (90.2)		
Ethnic origin						
(white/British / other; *n* / %)	122 (89.1) / 15 (10.9)			175 (95.6) / 8 (4.4)		
Occupation						
(Employed / Student / Unemployed / other (e.g. retired); *n* / %)	45 (32.4) / 90 (64.7) / 3 (2.2) /1 (0.7)			137 (74.9) / 10 (5.5) / 9 (4.9) / 27 (14.8)		
Relationship status						
(Married or with long-term partner / Single / Separated/divorced or other (e.g. widowed) / In relationship (not with long-term partner); *n* / %)	32 (23.0) / 53 (38.1) / 6 (4.2) / 48 (34.5)			127 (69.4) / 20 (10.9) / 11 (6.0) / 25 (13.7)		

The Autistic Spectrum Quotient (AQ; Baron-Cohen *et al.,* 2001) was used to assess autistic-like traits. This includes 50 items scored on a Likert scale from 1 (definitely disagree) to 4 (definitely agree) in which the individual responds in accordance to how much they agree with the statement. In the present study, participants were asked: "*indicate to what extent you agree with each statement*". Responses were allocated a score of 0 or 1 (range 0-50), with a higher total score indicating more autistic-like traits. The AQ has previously been found to successfully measure autistic-like traits in non-clinical populations (Murray *et al.,* 2014) and to have moderate-to-high internal consistency (Baron-Cohen *et al.,* 2001). Participants also completed the Couples Satisfaction Index (CSI; Funk & Rogge, 2007). This contains 32 items which measure romantic relationship satisfaction. Participants responded to a series of items and

questions on varying Likert scales. Scores range between 0 – 161, where higher scores indicate a higher romantic relationship satisfaction level. The CSI has shown strong convergent and construct validity compared to other measures of relationship satisfaction, as well as providing greater power in smaller sample sizes (Funk & Rogge, 2007) and has very high internal consistency (Graham *et al.,* 2011). Only those who were currently in or who had previously been in a relationship completed the CSI.

Study 1

The short-form Emotional Intelligence Questionnaire (TEIQue-SF; Petrides, 2009) was used to measure emotional intelligence. It consists of 30 statements to which participants respond on a Likert scale in relation to how much they agree with the statement, with a higher score indicating a higher level of emotional intelligence. The TEIQue-SF has good psychometric properties, including very good precision across the majority of the latent trait range, and high internal consistency (Cooper & Petrides, 2010).

Study 2

Emotion recognition ability was assessed using a measure originally developed by McKenzie *et al.,* (2001), which was subsequently updated (see McKenzie *et al.,* 2020). The measure contains 27 stimuli depicting nine emotions (worried, sad, happy, surprised, disgust, bored, angry, scared, and neutral), each with three levels of contextual information. Contextual cues varied from limited (just depicting the face), to appropriate cues (e.g., a couple looking happy at their wedding). The participants were asked to type the emotion that they thought was being depicted in the items. Correct responses were allocated 1 point (possible range 0-27). A higher score indicates more accurate emotion recognition. This measure provides a reliable measure of emotion recognition ability over different ranges of ability (McKenzie *et al.,* 2020) and has high internal reliability (Scotland et al., 2016).

Procedure

The procedure was the same for Study 1 and Study 2. Participants who consented were then asked to provide demographic information (as shown in Table 1) and complete the measures outlined above, which were relevant to the study that they were participating in. The questionnaires were hosted using an online survey platform (Qualtrics, Provo, UT).

Data analysis

The normality of continuous data was assessed. Descriptive statistics were obtained for the main key variables of interest in each study. Two mediation analyses were then carried out using the PROCESS macro (version 4.0) for SPSS. The indirect effects and 95% confidence intervals were calculated for 5000 bootstrapped samples, using a heteroscedasticity consistent standard error and covariance matrix estimator. In both studies, the predictor variable was autistic-like traits (as measured by AQ score), and the outcome variable was relationship satisfaction, measured by CSI scores. In Study 1, the mediator was emotional intelligence score and in Study 2, it was emotion recognition score. Analyses were conducted using SPSS (version 26).

Results

Table 2 provides descriptive statistics for the key variables used in the study.

Table 2: Summary of study measures

	Study 1			Study 2		
Measure	**Mean**	**SD**	**Range**	**Mean**	**SD**	**Range**
AQ	16.6	7.2	4 - 34	17.1	7.7	0 - 41
CSI	125.8	28.9	44 - 161	116.5	23.8	52 - 191
Emotion Recognition	-	-	-	15.7	3.0	6-26
TEIQue-SF	145.3	25.9	75 - 196	-	-	-

Abbreviations: AQ: Autistic Spectrum Quotient; CSI: Couples Satisfaction Index; TEIQue-SF: Emotional Intelligence Questionnaire (Short-Form)

Mediation Models

Study 1

The result of the mediation analysis is shown in Table 3. This shows a significant negative effect of autistic-like traits on emotional intelligence (p <.001) and a significant effect of emotional intelligence on relationship satisfaction, controlling for autistic-like traits (p = .03). There was no significant direct effect of autistic-like traits on relationship satisfaction (p = .58). There was a significant negative indirect effect of autistic-like traits on relationship satisfaction. As such, it can be concluded that emotional intelligence is a significant mediator of the relationship between autistic-like traits and relationship satisfaction in Study 1.

Table 3: Results of the mediation model for Study 1

	AQ as predictor of TEIQue-SF		**AQ as predictor of CSI**		**TEIQue-SF as predictor of CSI**		**95% CI**	
	β	*p*	*β*	*p*	*β*	*p*	Lower	Upper
CSI	-2.0	<.001	.33	.58	.37	.03	-1.45	-.07

Abbreviations: AQ: Autistic Spectrum Quotient; CI: confidence interval; CSI: Couples Satisfaction Index; TEIQue-SF: Emotional Intelligence Questionnaire (Short-Form)

Study 2

Table 4 shows the results of the mediation analysis. A significant negative effect of autistic-like traits on emotion recognition (p = .03) and a significant positive effect of emotion recognition on relationship satisfaction (p = .04), was found, controlling for autistic-like traits. There was no significant direct (p = .47) or indirect effect of autistic-like traits on relationship satisfaction. As such, it can be concluded that emotion recognition is not a significant mediator of the relationship between autistic-like traits and relationship satisfaction.

Table 4: Results of the mediation model for Study 2

	AQ as predictor of Emotion Recognition		**AQ as predictor of CSI**		**Emotion Recognition as predictor of CSI**		**95% CI**	
	β	*p*	*β*	*p*	*β*	*p*	Lower	Upper
CSI	-.06	.03	-.17	.47	1.36	.038	-.23	.00

Abbreviations: AQ: Autistic Spectrum Quotient; CI: confidence interval; CSI: Couples Satisfaction Index

Discussion

The purpose of the current study was to investigate the extent to which autistic-like traits, emotional intelligence, and emotion recognition, as a specific component of emotional intelligence, influenced satisfaction with romantic relationships. No significant direct relationships were found between autistic-like traits and relationship satisfaction in either study. Study 1, however, found that emotional intelligence was a significant mediator of the relationship between autistic-like traits and relationship satisfaction. Previous research with autistic people (Harms *et al.,* 2010; Petrides *et al.,* 2011) has indicated that they may have greater difficulty with some of the emotional intelligence and emotion recognition skills that are important components of good interpersonal relationships (e.g. Malouff *et al.,* 2014; Schutte *et al.,* 2001; Smith *et al.,* 2008). The results of Study 1 are also consistent with those of Pollmann *et al.,* (2010),

who found that factors, such as responsiveness towards their partner, mediated the association between higher levels of autistic-like traits in males, and reduced satisfaction with their relationships.

No such relationship was found in Study 2, however, when emotion recognition was included as the mediator. This may be because the stimuli that were used in the study were static, whereas emotion recognition in day-to-day situations is generally based on dynamic, fleeting stimuli and a range of contextual cues. Research using more dynamic stimuli has found that a lack of contextual cues and high levels of autistic-like traits were associated with lower accuracy in emotion recognition (Martin *et al.,* 2019). Future research using more dynamic emotion recognition tasks may help identify if this specific aspect of emotional intelligence acts as a mediator between autistic-like traits and relationship satisfaction.

The results of the study have some practical implications. There is some research that interventions can improve emotional intelligence and, in turn, improve relationships (see Malouff *et al.,* 2014). Our findings suggest that emotional intelligence interventions could be used in relationship counselling with those with high AQ scores, making adjustments as required to take account of autistic-like traits (Jodra, 2021), with the aim of improving romantic relationship satisfaction and decreasing the chances of relationship breakdown. As secure and satisfying romantic relationships have been found to be associated with better mental health (Braithwaite & Holt-Lunstad, 2017), this might also be expected to positively influence psychological wellbeing.

Our study adds to the limited existing literature on the nature of emotional intelligence, emotion recognition, autistic-like traits and satisfaction with romantic relationships. It did, however, have limitations. Research suggests that sex differences (Kret & De Gelder, 2012), the nature of the relationship with the person being observed, the emotional attention that is paid to facial expressions, and the emotion being displayed (see Zhang & Parmley, 2015) can all influence emotion recognition. There are also sex differences in the manifestation of autistic-like traits (Ratto *et al.,* 2018). Some or all of these factors, may have influenced the results, particularly as the participants were predominantly female in both studies. In addition, the research relied on individual self-report. While this may have allowed participants to express dissatisfaction with their relationship in a more open way, future research which assesses participants as part of a couple, may provide additional insights (Pollmann *et al.,* 2010). A further limitation is that the AQ has been found to perform less well when measuring more extreme (both high and low) levels of autistic-like traits (Murray *et al.,* 2015). Participants in Study 2, in particular, had a wider range of autistic-like traits, from 0-41, which may have influenced the results.

In conclusion, the results of our studies found that emotional intelligence, but not emotion recognition, mediated the relationship between autistic-like traits and relationship satisfaction.

Data availability statement

The authors confirm that the data supporting the findings of this study are available within the article and/or its supplementary materials.

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Research Article

The association between subjective sleep and stress in recreational athletes

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Abstract

Subjective sleep and stress are strongly associated, at multiple levels, and the current body of evidence highlights a bi-directional association. Previous research has highlighted that issues with sleep can impact on several stress responses. On the other side of this relationship, research has shown that stress-inducing factors can significantly impact sleep. The present study examined this association in a sample of recreational athletes, a population that has received little to no research focus to date Recreational athletes are defined as individuals who exercise >4 hours per week for health, fitness, or unofficial competitions. Recreational athletes (n = 34) completed online measures of subjective sleep, subjective stress, subjective anxiety/depression and training load (PSQI, PSS, HADS and DALDA). Pearson correlations were carried out to examine associations between variables. There was a significant positive correlation between subjective sleep quality and subjective stress. There was a significant positive correlation between subjective stress and training load. There was a significant positive correlation between subjective sleep quality and training load. The positive associations between sleep, stress and training load are consistent with previous research, but the present study adds to the literature by highlighting the associations in recreational athletes. Recreational athletes should proactively manage their sleep and stress, as due to the bi-directional relationship, improving sleep may benefit stress, and improving stress may benefit sleep quality. This is also likely to benefit overall mood and reduce the likelihood of overtraining in recreational athletes.

Keywords: Sleep, Stress, Athletes, Recreational Athletes, Recovery

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Introduction

Sleep has an essential role in human health, due to its vital role in physical and cognitive performance, as well as physical and mental well-being (Kolling *et al.,* 2016; Simpson *et al.,* 2017). Sleep has been previously reported as the most important recovery tool at the disposal of elite, sub-elite and recreational athletes (Venter, 2012). The growing body of research literature suggests that sleep is the new frontier in performance enhancement among an athletic population (Leeder *et al.,* 2012). Despite the self-reported importance of sleep, the athletic population appears to sleep poorly when compared to gender and age matched, non-athletic or non-exercising control groups (Gupta *et al.,* 2017). Poor sleep is reflected by shorter sleep durations, elevated wake after sleep onset (WASO) and lower levels of sleep efficiency (Tuomilehto *et al.,* 2017). It is evident from the current body of literature that athletes consistently report high levels of sleep inadequacy due to sport-specific and lifestyle factors. Such factors explaining this clear sleep inadequacy are high training loads, evening competitions and early morning training start times, as well as lifestyle sacrifices in order to complete training. For these reasons, it is likely that athletes may have a higher need for physical and mental recovery when compared to non-athletes (Walsh *et al.,* 2021).

There is a large amount of literature which has assessed elite and sub-elite athletic populations, but there is a lack of research pertaining to recreational athletes. In elite sport, balancing competing time demands and making personal sacrifices are common psychological stressors (McKay *et al.,* 2008). However, less is known about the considerable time investment and sacrifices which have been made by recreational athletes. Recreational athletes have been previously defined as individuals who exercise >4 hours per week for health, fitness, or unofficial competitions (McKinney *et al.,* 2019). In recreational athletes, stressors include time demands and lifestyle sacrifices. In a study by McCormick *et al.,* (2018), the stressor of time demands emerged as the main theme of psychological stress, as participants estimated that they trained for an average of 11 hours per week. The researchers noted that this is a considerable amount of time invested in training for individuals who train and compete recreationally, as opposed to professionally in an elite or sub-elite division of sport (McCormick *et al.,* 2018). These findings are consistent in other studies which also highlight that recreational athletes dedicate a considerable amount of time to training, and this is prioritised over other interests such as family time or socialising with friends (Appleby & Dieffenbach, 2016; Simpson *et al.,* 2014). The schedule of recreational athletes including training and lifestyle demands can negatively affect their sleep and recovery, and the repetitive demands of training can also place stressful demands on the individuals physiological and psychological capacities, which further highlights the value of quality sleep (Tuomilehto *et al.,* 2017).

The term ‘stress’ refers to one’s experiences that are deemed to be a psychological or physiological demand or ‘stressor’. Stress also refers to the adaptative response which involves multiple physiological systems (Elder *et al.,* 2023; Lo Martire *et al.,* 2020; McEwen, 2007). Stress is consistently associated with disturbances to both

subjective and objective sleep (Elder *et al.,* 2020). Athletes are subjected to stress for a variety of different reasons such as training and lifestyle demands. Stressors such as acute and residual fatigue may occur due to the demands of training schedules (Borresen & Lambert, 2009). The general consensus in comprehensive reviews (e.g. Gupta *et al.,* 2017; Youngstedt, 2005) is that physical exercise positively influences sleep, and this is expressed as longer sleep durations, reduced sleep onset latencies, reductions in WASO, fewer sleep stage disruptions and an increase in consistency in rapid eye movement (REM) to non-REM transitions. However, there is also strong evidence that shows the training demands of athletes and individuals who partake in regular physical exercise can negatively impact sleep (Gupta *et al.,* 2017). Specifically, increases in the intensity of exercise has been shown to worsen sleep quality and sleep quantity, expressed as increases in wakefulness and decreased REM sleep (Driver & Taylor, 2000).

Subjective sleep and stress are strongly associated, at multiple levels, including biological, psychological, behavioural, and social contexts (Martire *et al.,* 2020) and the current body of evidence highlights a bi-directional association between sleep and stress (Kalmbach *et al.,* 2018). Several studies have highlighted that stress-inducing factors can significantly impact the sleep-wake cycle. On the other side of the relationship, researchers have highlighted that issues with sleep can affect several stress responses, biological pathways and overall quality of life (Martire *et al.,* 2020). Recent research has begun to present evidence of the bi-directional relationships between subjective sleep and stress in an athletic population. Research from Hrozanova *et al.,* (2020) showed that increases in sleep onset latency were significantly associated with a subsequent increase in mental strain. Previous studies have found that individuals from an athletic population are poor sleepers, which among other maladaptive responses, leads to negative stress (Biggins *et al.,* 2018). However, Hrozanova *et al.,* (2019) note that very few studies have examined the direction of the sleep-stress relationship. Hrozanova *et al.,* (2019) investigated how emotional and cognitive reactions to perceived stress contributed to the quality of sleep in a large sample of 632 athletes. The researchers note that even though the evidence of insufficient sleep in an athletic population is well-known, there is a lack of research aimed at explaining the reasons for this finding. The researchers found that perceived stress was negatively associated with sleep quality. The researchers concluded that the capacity of athletes to manage perceived stress and worry is important to enhance their sleep quality and subsequent performance.

Research from Biggins *et al.,* (2018) examined the sleep profiles of Gaelic Athletic Association (GAA) athletes and to compare wellbeing measures such as stress between self-reported good sleepers and poor sleepers. They found that self-reported poor sleepers reported significantly higher levels of stress when compared to self-reported good sleepers. The researchers also found significant associations between poor sleep and subjective health concerns. Levels of inadequate sleep quality among athletes may be attributed to the many features of the stress response, including the reaction and evaluation of stressors. Previous research from Drake *et al.,* (2014) suggests that the important mechanism may involve sleep reactivity. Sleep

reactivity refers to the predisposition to exhibit sleep disturbances in response to stress. Sleep reactivity is the trait-like degree to which stress disrupts sleep, which leads to issues around falling asleep and remaining asleep. Individuals who present with a reduction in total sleep time, increased WASO, or difficulty in falling asleep when stressed are considered to have high sleep reactivity while individuals who present with uninterrupted sleep when stressed are considered to have low sleep reactivity (Kalmbach *et al.,* 2018).

Previous research has highlighted that an athlete's sleep may be negatively impacted by training load increases (Kolling *et al.,* 2016) and the stressor of scheduling of training in the early morning (Sargent *et al.,* 2014). However the literature is contrasting with some research studies finding no significant associations between training load and sleep (Knufinke *et al.,* 2018; O'Donnell *et al.,* 2019; Lastella *et al.,* 2020) while other research studies highlight that an increase in training load leads to a subsequent reduction in subjective sleep efficiency (Teng *et al.,* 2011) and sleep duration (Kolling *et al.,* 2016) presenting a significant association between training load and sleep. Despite some of the findings presented above, overall, the body of research examining the bi-directional association between training load and sleep is small and presents contrasting findings. The current study aims to add to the existing body of research that highlights the association between sleep and stress in athletes by examining an unexplored population of recreational athletes. This may help recreational athletes manage their sleep and stress, which are likely to be closely associated, benefit overall mood and reduce the likelihood of overtraining.

The overall aim of this study is to examine the association between subjective sleep quality and subjective stress levels in recreational athletes. The secondary aims of this study are to examine associations between subjective stress and training load, and between subjective sleep quality and training load. It is hypothesised that there will be a positive correlation between subjective sleep and subjective stress. It is also hypothesised that there will be a positive correlation between subjective stress and training load, and a positive correlation between subjective sleep and training load.

Method

A cross-sectional non-experimental study was carried out. Participants took part in an online study delivered using Qualtrics XM (Qualtrics, Provo, UT).

Participants

A total of 40 individuals participated. To determine the sample size for this study, an *a priori* power analysis was conducted using G*Power (Faul *et al.,* 2007). A large effect size was used ($r = 0.5$) at 80% power. This showed that a minimum sample size of 29 individuals was needed.

The sample group consisted of both male and female recreational athletes, which in the present study was defined as individuals who exercise >4 hours per week for health, fitness, or unofficial competitions (McKinney *et al.,* 2019), who were aged over

18. Participants were recruited using social media and the Northumbria University Sona System. There were no exclusion criteria for this research study. This study was ethically approved by the Northumbria University Faculty of Health and Life Sciences ethics committee (Reference: 2044). All participants provided electronic informed consent.

Measures

The Pittsburgh Sleep Quality Index (PSQI; Buysse *et al.,* 1989) was used to measure subjective sleep quality. This provides a global score of between 0-21 with higher scores indicating lower subjective sleep quality. The Perceived Stress Scale (PSS; Cohen *et al.,* 1983) was used to measure subjective levels of stress. PSS scores range from 0-40 with higher scores indicating higher levels of subjective stress. The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) was used to measure subjective mood. The HADS assesses subjective anxiety and depression and higher HADS scores represent greater levels of subjective anxiety and depression. The Daily Analysis of Life Demands for Athletes tool (DALDA) (Rushall, 1990) was used to measure training load. Responses to the DALDA are: "*worse than normal*", "*normal*" or "better *than normal*". High frequencies of " *worse than normal*" responses indicate high levels of overtraining.

Procedure

Participants provided demographic information (self-reported age and gender) and the PSQI, PSS, HADS and DALDA. Upon completion, participants were debriefed and thanked. Participation took approximately 15 minutes.

Data analysis

A total of 6 participants had not fully completed the study and were excluded from the final data set. Data were analysed using SPSS. Data were visually examined for normality. In order to examine associations between variables (PSQI, PSS, HADS Anxiety/Depression and DALDA), a series of Pearson correlation tests were used.

To assess the main aim, a Pearson correlation test examined between subjective sleep quality (PSQI) and subjective stress (PSS). To assess the secondary aims, Pearson correlation tests examined the association between subjective stress (PSS) and training load (DALDA), and between subjective sleep quality (PSQI) and training load (DALDA).

Results

The final data set was comprised of 34 participants. On the basis of the PSQI, 67.6% (*n* = 23) of participants were good sleepers (PSQI scores < 5) and 32.3% (*n* = 11) were classified as poor sleepers (PSQI scores ≥ 5). Males accounted for 55.9% (*n* = 19) of participants and females for 44.1% (*n* = 15) of participants (Table 1).

Table 1: participant demographic and summary data (n = 34)

	Mean	**SD**
Age	31.06	5.78
Male / female (*n* / %)	19 (55.9) / 14 (44.1)	
PSQI	5.35	3.68
Good / poor sleepers (PSQI; *n* / %)	23 (67.6) / 11 (32.3)	
PSS	14.56	7.26
HADS Anxiety	6.68	4.24
HADS Depression	2.71	3.13
DALDA	5.41	6.14

Abbreviations: DALDA: Daily Analysis of Life Demands for Athletes; HADS: Hospital Anxiety and Depression Scale; PSS: Perceived Stress Scale; PSQI: Pittsburgh Sleep Quality Index; SD: Standard Deviation

There was a significant positive correlation between subjective sleep quality (PSQI) and subjective stress (PSS) ($r(32) = .35$, $p < .05$). These results show that better sleep quality is associated with reduced subjective stress. There was a significant positive correlation between subjective stress (PSS) and training load (DALDA; $r(32) = .66$, $p < .001$). These results show that higher subjective stress is associated with higher training load / level of overtraining. There was a significant positive correlation between subjective sleep (PSQI) and training load (DALDA) ($r(32) = .47$, $p < .01$). These results show that better sleep quality is associated with a reduced training load / level of overtraining.

Discussion

In line with the primary research aim, an association was found between subjective sleep quality and subjective stress. These results indicate that recreational athletes who report better subjective sleep quality also report lower levels of stress. The association between sleep and stress has previously been described as bi-directional (Kahn *et al.,* 2013; Kalmbach *et al.,* 2018) which suggests that an individual's exposure

to stressors may develop a reciprocal cycle between sleep and stress. The association between subjective sleep and subjective stress is consistent within the literature examining an athletic population. Research from Biggins *et al.,* (2018), who had a similar proportion of good sleepers (50%) in their study, found that GAA athletes who reported poor sleep quality and quantity also reported significantly higher levels of perceived stress. On the other side of the relationship, athletes who reported good sleep quality and quantity reported significantly lower levels of perceived stress (Biggins *et al.,* 2018).

One possible mechanism that may explain the association between subjective sleep and stress which was outlined in previous research by Drake *et al.,* (2014) is sleep reactivity. Sleep reactivity is an individual's predisposition to exhibit sleep disturbances in response to stress. Sleep reactivity is the trait-like degree to which stress disrupts sleep, which leads to issues around falling asleep and remaining asleep. Individuals who are considered to have low sleep reactivity present with uninterrupted sleep when stressed (Kalmbach *et al.,* 2018). Previous research efforts are consistent in their findings of a bi-directional association between sleep and stress in a variety of different populations, including an athletic population. However, the present study adds to the body of literature, by highlighting the association in recreational athletes, a population which has received little to no attention in this research area.

Numerous studies have consistently found links between poor sleep and psychological concerns, including symptoms of anxiety, depression, anger and psychological distress (Freeman *et al.,* 2017; Ramsey *et al.,* 2019). In the present study, PSS scores were relatively low. A possible explanation for these low scores in the present study is that most participants (67.6%) were classified as 'good sleepers' and previous research has consistently highlighted the role of good quality sleep in the management and reduction of stress (Thun *et al.,* 2015).

In line with the secondary research aim, a positive association was found between subjective stress and training load. These results indicate that recreational athletes who report better subjective stress scores also report lower training load levels. These findings are consistent with previous research: researchers monitored training load and stress levels in competitive athletes and found that higher scores which indicate overtraining were associated with worsening levels of stress (Gomes *et al.,* 2013). A significant positive association was found between subjective sleep quality and training load. These results indicate that recreational athletes who report better subjective sleep scores also report lower levels of overtraining. Previous research has shown that increases in training loads and levels of overtraining can negatively impact athlete sleep (Kolling *et al.,* 2016). Recreational athletes in particular may have the additional stressor of having to schedule training in the early morning (Sargent *et al.,* 2014) which further highlights how the stressor of training itself can negatively impact sleep quantity and quality. Sleep quality has been found to be a key component of the management of training load and in reducing the likelihood of maladaptive training responses such as overtraining syndrome (OTS) (Hooper *et al.,* 1995). OTS is a

maladaptive response to excessive training without adequate rest, which leads to negative effects on multiple physiological systems (neurological, endocrinological, immunological) coupled with psychological effects such as mood disturbances (Kreher & Schwartz, 2012) Despite the positive association found in the present study between subjective sleep quality and overtraining, the research examining the bi-directional association between sleep and training load is small and presents contrasting findings.

The positive association between subjective sleep quality, perceived stress, and levels of overtraining in this study highlight the importance of consistent quality sleep for recreational athletes. These findings may begin to inform educational content for a group that have previously received little research focus. Individualised sleep hygiene practices tailored to the constraints of recreational athletes who must balance their training with other life stressors may enhance their quality of sleep, which is critical for physiological and psychological recovery. Sleep hygiene interventions, although only having recently been applied in an athletic setting, have been shown to improve sleep quality and sleep quantity, in a variety of samples and contexts (O'Donnell *et al.,* 2018). To our knowledge, this is the first study to specifically examine if there is an association between subjective sleep quality and subjective stress in recreational athletes, with the majority focusing on elite and sub-elite athletes. Recreational athletes have similar demanding training schedules to elite and sub-elite athletes and often compromise on sleep to fit their training schedule into lifestyles that may already include other competing responsibilities such as work, school and family. The initial novel findings presented in this study may provide justification for future research in this area. Studies that are longitudinal in their design may be able to explore the bi-directional relationship between sleep, stress, mood and training load over a longer period and include interventions aimed at improving these key health variables.

The current research study does present some methodological limitations that need to be acknowledged. Firstly, the present research study used a cross-sectional design, therefore the direction of causality cannot be reliably inferred. It is likely that the association between sleep and stress observed is bi-directional due to the consistent evidence of sleep affecting stress and stress affecting sleep. However, this is the first study of its kind to find an association between subjective sleep and stress in a population of recreational athletes. Although the PSQI is validated as a reliable measure of sleep quality, the use of sleep diaries may have provided further information regarding the cause of good or bad sleep.

The positive associations between sleep, stress and overtraining levels found in this study are supported by previous research but the present study adds to the body of literature by highlighting the associations in recreational athletes, a population that has previously not been explored in this area. Recreational athletes should strive to proactively manage their sleep and stress. This is also likely to benefit mood and reduce the likelihood of overtraining. The bi-directional interaction between these variables is still not fully understood and further research into this area is needed.

Data availability statement

The authors confirm that the data supporting the findings of this study are available within the article and/or its supplementary materials.

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Research Article

The association between insecure adult attachment and psychosomatic symptoms as mediated by emotion regulation

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Abstract

Adult insecure attachment encompasses both anxious and avoidant attachment. Previous research links anxious attachment to maladaptive emotion up-regulation, and avoidant attachment to maladaptive emotion down-regulation. Research suggests that both insecure attachment and maladaptive emotion regulation contribute to psychosomatic symptoms. Therefore, this study aims to investigate whether the increased susceptibility to psychosomatic symptoms in insecure individuals is mediated by maladaptive emotion regulation. A general population sample (*n* = 157) completed an online survey comprising measures of attachment, emotion regulation, psychosomatic symptoms and perceived stress. Perceived stress levels were controlled for due to their recognised impact on psychosomatic symptoms. Four simple mediations were conducted using the PROCESS macro for SPSS. The results revealed that emotion down-regulation negatively mediated the relation between attachment avoidance and psychosomatic symptoms while emotion up-regulation did not mediate the relation between attachment anxiety and psychosomatic symptoms. These findings suggest that emotion regulation emerges as a predictor for psychosomatic symptoms in avoidant but not anxious attachment. Future studies should explore the emotional influences of emotion regulation in insecure attachment across diverse contexts.

Keywords: Insecure attachment, emotion up-regulation, emotion down-regulation, psychosomatic symptoms, perceived stress.

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Introduction

Psychosomatic symptoms are physical symptoms that lack clear medical explanations and are often associated with psychological factors like stress, anxiety and depression (Escobar *et al*., 2010; McBride *et al*., 2022). Examples of psychosomatic symptoms include headaches, back pain, shortness of breath, and digestive problems (Allen *et al*., 2017). Although the aetiology of psychosomatic symptoms is little understood, they can be distressing and persistent (Rask *et al*., 2015). Noticing psychosomatic symptoms as outcomes of mental health difficulties is crucial for addressing both the symptoms and their underlying psychological roots (Fink *et al*., 2007).

Emotion regulation includes the ability to acknowledge, understand, and modulate one's emotions in a given situation (Gross, 2015). Difficulties in regulating emotions in response to stresses may contribute to psychosomatic symptoms (Lewczuk *et al*., 2021). Some emotion regulation strategies such as rumination, catastrophising, and expressive suppression are considered less adaptive than others and have been associated with psychological and physiological problems (Appleton *et al*., 2013; Martin & Dahlen, 2005). Rumination is defined as the repetitive thinking about one's negative moods and experiences with no direction towards their resolution (Nolen-Hoeksema *et al*., 2008) while catastrophising is characterised by an exaggerated perception of negative experiences and their consequences (Gellatly & Beck, 2016). Rumination and catastrophising are up-regulatory emotion regulation strategies and can result in increased and prolonged experiences of negative affect (Martin & Dahlen, 2005). In contrast, expressive suppression is a down-regulatory strategy that involves inhibiting the outward expression of an emotional state (Appleton *et al*., 2013). Nevertheless, expressive suppression may not be successful in decreasing internal arousal (Gross, 2001), so individuals who use emotion suppression tend to experience more negative and less positive affect (Raymond *et al*., 2019). Thus, expressive suppression might reduce the experience of positive but not negative emotions (Gross & John, 2003). In relation to physical symptoms, research shows that rumination and catastrophising of pain- and non-pain-related distress predict physical symptoms, severe pain, and poorer medical outcomes (Sansone & Sansone, 2012). Similarly, emotion suppression has been associated with psychosomatic symptoms, inflammation and cardiovascular disease (Appleton *et al*., 2013; Appleton *et al*., 2014; Schnabel *et al*., 2022). Since maladaptive strategies of emotion regulation induce negative emotional states, they might influence disease progression by affecting the body's physiological stress response (De Gucht, 2002).

Parallel trends in physiological arousal and physical symptoms have been observed in individuals exhibiting attachment insecurity (LaBelle *et al*., 2020). Attachment is an affectionate bond that is first formed between a child and their primary caregiver based on the responsivity of the parent to the child's needs (Ainsworth & Bowlby, 1991). Attachment relationships construct internal working models about self-worth and the availability of close others in times of distress (Bowlby, 1988; Gillath *et al*., 2016). In

adulthood, attachment patterns affect the quality of people's close relationships such as those with partners, friends, or parents (Fraley, 2007). Ideally, attachment figures must serve as a safe haven and a secure base that provides a sense of trust and comfort (Sable, 2008). Failing to approach an attachment figure to relieve distress and communicate discomfort indicates attachment insecurity (Maunder *et al*., 2006). Although internal working models in adults can be influenced by later experiences, affect regulation in adulthood is significantly shaped by emotion regulation strategies developed through childhood attachment relationships (Fraley & Roisman, 2019).

Importantly, individuals with an insecure attachment style are more likely to use maladaptive emotion regulation to serve their attachment needs (Brenning & Braet, 2013). Insecure attachment is characterised by high levels of attachment anxiety, attachment avoidance, or both (Bartholomew & Horowitz, 1991). Securely attached individuals are low on both traits. Individuals who receive responsive care throughout childhood become securely attached and learn to regulate their emotions adaptively (Cassidy, 1994). Therefore, they are comfortable with emotional closeness and support-seeking in times of distress (Hazan & Shaver, 1987). In contrast, anxiously attached individuals often feel unworthy of love because their attachment needs would have been inconsistently met (Hazan & Shaver, 1987). Thus, they learn to up-regulate their emotions in times of need to draw attention and keep their attachment figures available (Brenning & Braet, 2013). For instance, it is shown that anxious individuals are more likely to use catastrophising and rumination in response to negative situations as they are constantly worried about being abandoned (LaBelle *et al*., 2020). Similarly, avoidantly attached individuals exhibit interpersonal mistrust because their attachment needs would have been constantly faced with rejection (Hazan & Shaver, 1987). Therefore, they tend to down-regulate their emotions and suppress their feelings in stressful situations to avoid unwanted closeness (LaBelle *et al*., 2020).

As such, because insecure individuals are more likely to use maladaptive emotion regulation, they might experience more psychosomatic symptoms (LaBelle et al., 2020). For instance, attachment insecurity has been linked to chronic pain and poor adjustment to pain (Meredith *et al*., 2008) and to greater physiological reactivity to stress (Schulz *et al*., 2023). Additionally, anxious attachment was related to symptom reporting in psychosomatic patients regardless of their reported levels of distress (Badaye *et al*., 2021). In parallel, avoidant attachment was related to psychosomatic symptoms but only when moderated by low distress levels. Thus, it is possible that avoidant individuals who reported lower distress levels are more likely to suppress emotions of distress resulting in greater psychosomatic symptoms (Diamond *et al*., 2006). Also, a study showed that sensory sensitivity mediated the relationship between anxious attachment and the severity of physical symptoms (Le *et al*., 2020). This suggests that rumination and pain exaggeration might initiate symptom magnification in anxious individuals (Ghorbani *et al*., 2017; Sansone & Sansone, 2012).

Although the association between insecure adult attachment and psychosomatic symptoms is evident (Payne & Brooks, 2019), the mediatory role of maladaptive emotion regulation in these relationships is under-researched. Also, most studies focused on the role of emotion regulation in linking adult attachment to mental rather than physical illness (e.g. Mortazavizadeh & Forstmeier, 2018). Some studies revealed that negative affect and difficulties in emotion regulation related to greater symptom reporting in anxious but not avoidant attachment (Feeney & Ryan, 1994; Lewczuk *et al*., 2021; Wearden *et al*., 2005). Additionally, avoidant attachment has been associated with reduced physical and mental well-being through increased control of negative emotions (Kotler *et al*., 1994). Finally, research demonstrated that subjective levels of stress reported by insecure individuals might not reflect their actual levels of physiological arousal (Maunder *et al*., 2006). Individuals with different attachment styles may perceive stress differently because of their different emotion regulation strategies (Diamond & Fagundes, 2010). Anxious individuals might perceive higher stress levels and over-report stress while avoidant individuals might perceive less stress and under-report it (Kidd *et al*., 2011).

The aforementioned studies confirm the impact of emotion regulation on the physical health of insecurely attached individuals. However, they do not emphasise the role of employing specific up-regulatory and down-regulatory strategies (e.g. rumination, catastrophising, and suppression) that appear to relate distinctively to anxious and avoidant attachment, respectively (Girme *et al*., 2021). Therefore, this study aims to understand if emotion up-regulation increases psychosomatic symptoms in anxious attachment and if emotion down-regulation increases psychosomatic symptoms in avoidant attachment. Since perceived stress levels are shown to affect physical symptom reporting (Schulz *et al*., 2023), self-reported stress will be controlled for in the present paper as this was not considered in previous studies.

It is hypothesised that when controlling for perceived stress:

1. Emotion up-regulation (via catastrophising and rumination) will positively mediate the relationship between attachment anxiety and psychosomatic symptoms.
2. Emotion down-regulation (via expressive suppression) will positively mediate the relationship between attachment avoidance and psychosomatic symptoms.

Method

Participants

The sample consisted of 162 participants. To determine the sample size, an *a priori* power analysis was conducted using G*Power 3.1 (Faul *et al.,* 2007), on the basis of a linear multiple regression with medium effect sizes ($f^2 > .15$) at a .05 significance level and 95% power. This recommended a sample size of 107 participants.

Participants were aged 18+ years and self-categorised as healthy. Participants were recruited online using social media and using the Northumbria University Department of Psychology research participation pool management software (Sona Systems; www.sona-systems.com). There were no exclusion criteria for this research study. The study was approved by the Faculty of Health and Life Sciences Ethics Committee at Northumbria University (ref: 0010). All participants provided electronic informed consent.

Measures

The Attachment Style Questionnaire-Short Form (ASQ-SF; Karantzas *et al.,* 2010) was used to measure two dimensions of attachment insecurity (attachment anxiety and attachment avoidance). Attachment anxiety was assessed using 14 items (e.g. "*it's important to me that others like me*") and attachment avoidance was assessed using 15 items (e.g. "*I worry about people getting too close*") using a six-point Likert scale (ranked from 1 ("*totally disagree*") to 6 ("*totally agree*")). The score for each subscale was calculated separately. Higher scores were indicative of higher levels of attachment anxiety and attachment avoidance. Cronbach's alpha for the present study was α = .90.

To assess emotion up-regulation, participants completed two subscales (rumination and catastrophising) from the Cognitive Emotion Regulation Questionnaire-Short Form (CERQ-Short; Garnefski & Kraaij, 2007). Rumination was measured using two items (e.g. "*I dwell upon the feelings the situation has evoked in me*") and catastrophising was measured using two items (e.g. "I continually think how horrible the situation has been") using a five-point Likert scale (ranked from 1 ("*almost never*") to 5 ("*almost always*")). The total possible score of both subscales ranged from 4 to 20. Higher scores were indicative of a higher tendency for emotion up-regulation. Cronbach's alpha for the present study was α = .88.

To assess emotion down-regulation, participants completed the Expressive Suppression subscale of the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). This consists of four items that indicate someone's tendency to suppress emotions (e.g. "*I keep my emotions to myself*") using a seven-point Likert scale (ranked from 1 ("*strongly disagree*") to 7 ("*strongly agree*")). Total possible scores ranged from 4 to 28. Higher scores were indicative of a higher capacity to down-regulate/suppress emotions. Cronbach's alpha for the present study was α = .82.

Psychosomatic symptoms were assessed using the Cohen-Hoberman Inventory of Physical Symptoms (CHIPS; Cohen & Hoberman, 1983) which lists 33 common physical complaints including sleep problems, back pain, and nausea. Participants indicated the extent to which they were bothered by each of the symptoms in the past two weeks using a five-point Likert scale (ranked from 0 ("*not bothered*") to 4 ("*extremely bothered*")). Total possible scores ranged from 0 - 32, with higher scores

indicative of more burden from psychosomatic symptoms. Cronbach's alpha for the present study was α = .91.

Perceived stress was measured using the Perceived Stress Scale (PSS-10; Cohen & Williamson, 1988), which asks respondents to rate the frequency of certain feelings and thoughts experienced during the last month (e.g. "*how often have you felt nervous and stressed?"*) using a five-point Likert scale (ranked from 0 ("*never*") to 4 ("*very often*")). Higher total scores were indicative of higher perceived stress. Cronbach's alpha for the present study was α = .87.

Procedure

Participants completed an online study using Qualtrics XM (Qualtrics, Provo, UT). Participants completed demographic details (self-reported age and gender), the ASQ-SF, CERQ-Short, ERQ, CHIPS and PSS-10. Participation took approximately 15 minutes.

Data analysis

Parametric assumptions were met for all scores and no normality issues were present. One incomplete response, one repeated response, and three outliers were excluded (n = 5). Data analysis was performed using IBM SPSS, and PROCESS v4.2 (Hayes, 2017) for mediation analysis.

Employing a regression design, four simple mediation analyses were conducted with perceived stress (PSS-10) included as a covariate. In Models 1 and 2, attachment anxiety served as the predictor and psychosomatic symptoms served as the outcome variable. Emotion up-regulation served as the mediator in Model 1, and emotion down-regulation served as the mediator in Model 2. In Models 3 and 4, attachment avoidance served as the predictor and psychosomatic symptoms served as the outcome variable. Emotion up-regulation served as the mediator in Model 3 and emotion down-regulation served as the mediator in Model 4.

Results

Data were obtained from 157 participants (range 18-53 years, M_{age} = 26.85 years, SD_{age} = 8.54 years). The sample included 74.50% females (M_{age} = 26.25 years, SD_{age} = 8.28) and 24.80% males (M_{age} = 28.59 years, SD_{age} = 9.24 years). Descriptive statistics for all variables are presented in Table 1.

Table 1: participant summary data (n = 157)

	Mean	SD
ASQ-SF Anxiety	3.55	.82
ASQ-SF Avoidance	3.73	.75
CERQ-Short	11.16	3.93
ERQ	15.56	5.21
CHIPS	29.10	18.47
PSS-10	20.92	6.80

Abbreviations: ASQ-SF: Attachment Style Questionnaire-Short Form; CERQ-Short: Cognitive Emotion Regulation Questionnaire-Short Form; CHIPS: Cohen-Hoberman Inventory of Physical Symptoms; ERQ: Emotion Regulation Questionnaire; and PSS-10: Perceived Stress Scale; SD: Standard Deviation

Mediation Analyses

Model 1: attachment anxiety, emotion up-regulation and psychosomatic symptoms

ASQ-AF anxiety significantly predicted up-regulation, but psychosomatic symptoms were not predicted significantly by neither up-regulation nor ASQ-AF anxiety. The indirect effect was non-significant, indicating the absence of mediation (*Figure 1*). The model explained 28% of the variance in up-regulation (R^2 = .28, F(2, 154) = 30.66, p <.001) and 29% of the variance in psychosomatic symptoms (R^2 = .29, F(3, 153) = 21.17, p <.001).

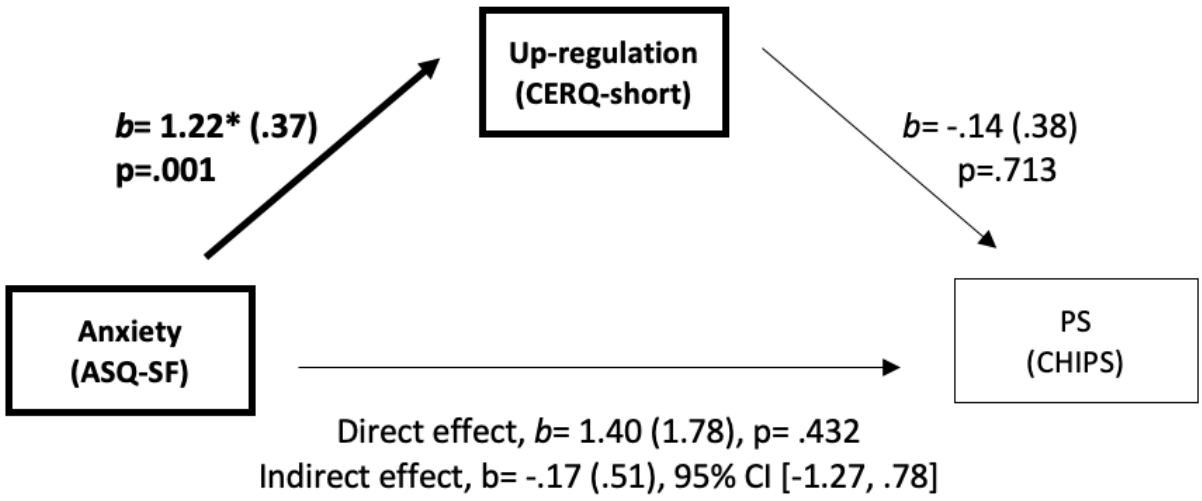

Figure 1: Model 1 mediation results (*b* = *unstandardised beta coefficients*; **p < .01)

Model 2: attachment anxiety, emotion down-regulation and psychosomatic symptoms

No mediation was present in Model 2 as all paths were non-significant (*Figure 2*). The model explained 10% of the variance in down-regulation (R^2 = .10, F(2, 154) = 8.56, p <.001), and 30% of the variance in psychosomatic symptoms (R^2 = .30, F(3, 153) = 21.34, p <.001).

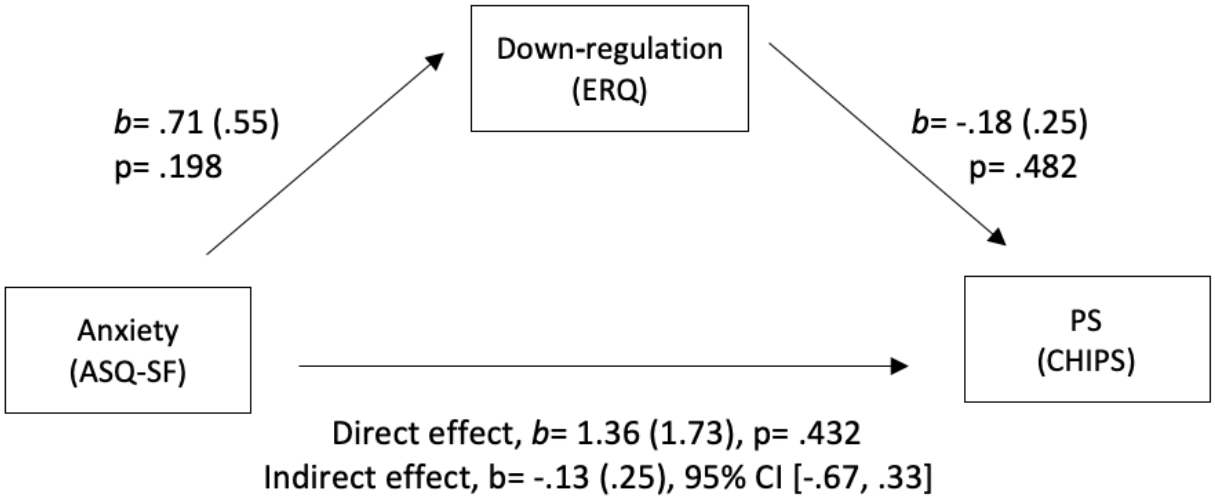

Figure 2: Model 2 mediation results (*b = unstandardised beta coefficients*)

Model 3: attachment avoidance, emotion up-regulation and psychosomatic symptoms

ASQ-AF avoidance did not predict up-regulation, and up-regulation did not predict psychosomatic symptoms. ASQ-AF avoidance positively predicted psychosomatic symptoms, but the indirect effect was non-significant, indicating no mediation (*Figure 3*). The model explained 24% of the variance in up-regulation (R^2= .24, F(2, 154) = 24.40, p <.001), and 32% of the variance in psychosomatic symptoms (R^2 = .32, F(3, 153) = 24.42, p <.001).

Model 4: attachment avoidance, emotion down-regulation and psychosomatic symptoms

All paths in Model 4 were significant (*Figure 4*). Avoidance positively predicted down-regulation, and down-regulation negatively predicted psychosomatic symptoms. Avoidance positively predicted psychosomatic symptoms, and the indirect effect was negatively significant, indicating the presence of mediation. The model explained 30% of the variance in down-regulation (R^2 = .30, F(2, 154) = 32.35, p <.001), and 34% of the variance in psychosomatic symptoms (R^2 = .34, F(3, 153) = 26.76, p <.001).

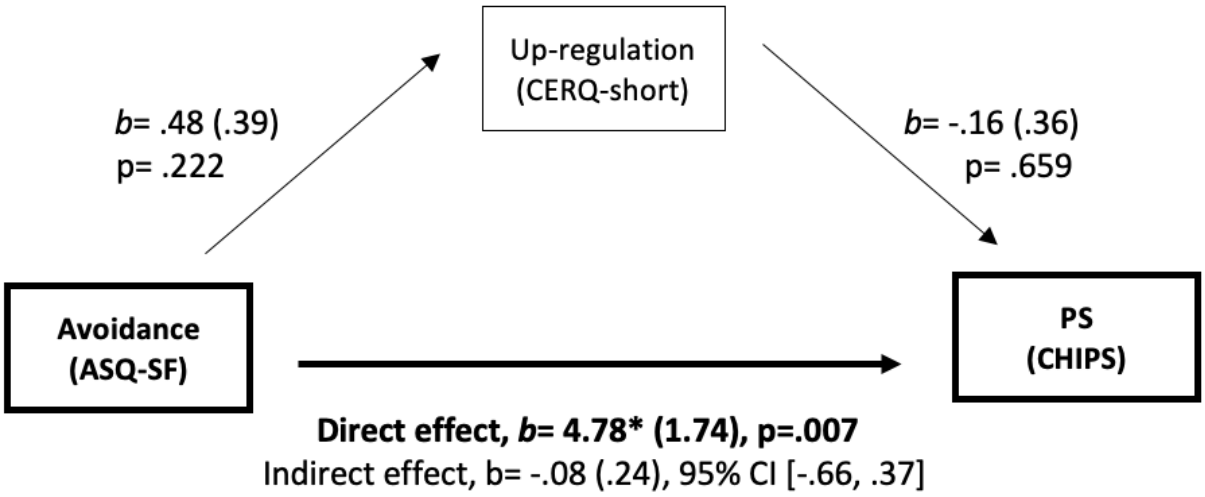

Figure 3: Model 3 mediation results (*b = unstandardised beta coefficients; **p* < .01)

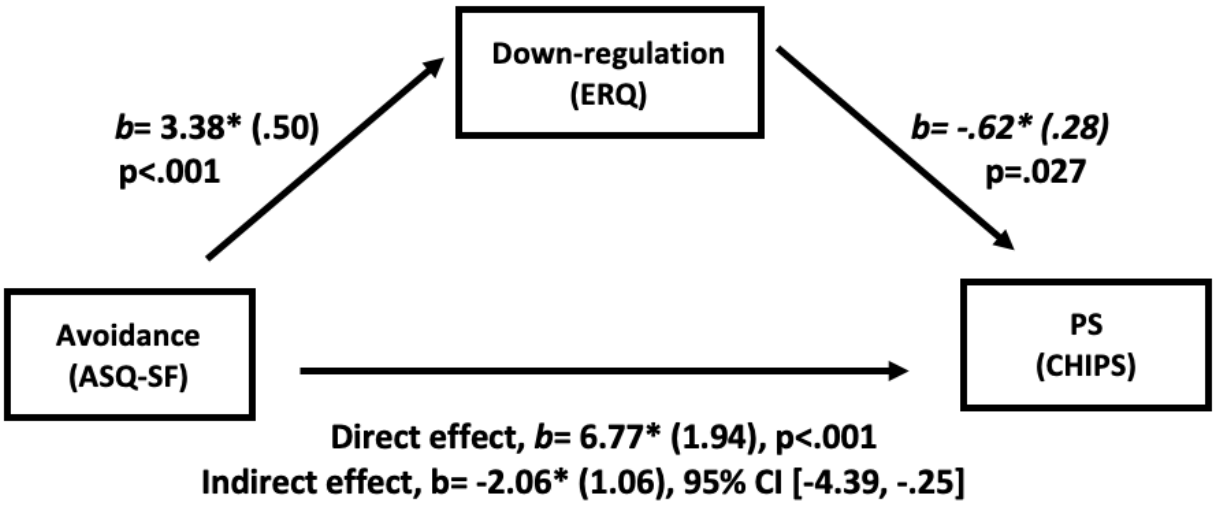

Figure 4: Model 4 mediation results (*b = unstandardised beta coefficients; *p* < .05)

Overall, these results showed that: 1) emotion up-regulation does not significantly mediate the relationship of neither attachment anxiety nor attachment avoidance with psychosomatic symptoms, and 2) emotion down-regulation partially mediates the relationship between attachment avoidance and psychosomatic symptoms.

Discussion

This study aimed to investigate the mediatory role of maladaptive emotion regulation in the relationship between insecure attachment and psychosomatic symptoms, while controlling for perceived stress. It was hypothesised that emotion up-regulation would positively mediate the relationship between attachment anxiety and psychosomatic symptoms, and emotion down-regulation would positively mediate the relationship between attachment avoidance and psychosomatic symptoms. Attachment anxiety did not predict psychosomatic symptoms, neither directly nor through emotion regulation. Emotion down-regulation partially mediated the relationship between avoidant attachment and psychosomatic symptoms, but in a negative direction.

Attachment anxiety predicted greater emotion up-regulation, confirming previous assumptions (Girme *et al*., 2021), but emotion up-regulation did not directly impact psychosomatic symptoms. Nevertheless, previous studies suggested that emotion up-regulation may amplify psychosomatic symptoms in anxious attachment (Martin & Dahlen, 2005; Wearden *et al*., 2003). In explaining the present finding, perhaps buffering factors can reduce the negative impacts of emotion up-regulation in attachment anxiety (Simpson & Overall, 2014). Although anxious individuals perceive social support differently (Stanton & Campbell, 2014b), a study showed that responding appropriately to their attachment concerns helps in resolving their attachment insecurities (Simpson & Overall, 2014). Support perception perhaps reinforces the safety of anxious individuals and alleviates feelings of rejection and abandonment (Campbell & Marshall, 2011). Thus, attachment relationships should be viewed as mutual, where emotional outcomes are influenced by both individuals in an attachment relationship (Feeney & Collins, 2001). Moreover, a greater perception of psychosomatic symptoms in anxious attachment may be particularly linked to pain-related distress which was not specifically measured in this study (e.g. Sansone & Sansone, 2012). This suggests that psychosomatic symptoms in anxious individuals may stem from increased pain perception through rumination and catastrophising, rather than from the strategies themselves (Fasakhoudi *et al*., 2022). As such, the detrimental effects of emotion up-regulation on psychosomatic symptoms may be highly context-dependent (Pietromonaco & Powers, 2015).

The absence of a relation between attachment anxiety and psychosomatic symptoms was unexpected as this has been more strongly associated with symptom reporting in previous literature (Rapoza *et al*., 2016). Controlling for perceived stress may have resulted in the absence of this relation. Research demonstrated that perceived stress might exacerbate psychosomatic symptoms in anxious attachment and suggested that reducing stress would help alleviate these symptoms (Johnson *et al*., 2021). The findings of the present study confirm these assumptions with several potential explanations. Only when under greater levels of stress, anxious individuals: may experience an amplified activation of the stress response leading to increased blood cortisol, inflammation, and physical symptoms (e.g. Stanton & Campbell, 2014a),

increase symptom reporting as an attention-seeking behaviour (Campbell & Marshall, 2011), and lastly, experience somatosensory amplification and become hypersensitive to pain cues as the nervous system becomes more attentive to danger (Benham, 2006; Köteles & Witthöft, 2017; Le *et al*., 2020). This suggests an important role for perceived stress in anxious attachment when it comes to psychosomatic symptoms.

Attachment avoidance was associated with emotion down-regulation confirming the tendency of avoidant individuals to suppress emotions (Yang *et al*., 2018). However, a negative mediation was observed through emotion down-regulation. This suggests that emotion suppression in avoidant individuals may serve to relieve rather than worsen psychosomatic symptoms. Expressive suppression has been associated with internal arousal in avoidant attachment (Maunder & Hunter, 2001), so it might be that arousal emerges because of apprehending possibilities of help-seeking and emotional vulnerability (Rifkin-Graboi, 2008). Therefore, it is likely that negative impacts of emotion suppression persist only in individuals who suppress their emotions whilst experiencing the need to express them (Appleton *et al*., 2014). Whereas for avoidant individuals, suppression might enhance self-reliance and protect against anticipated social rejection leading to stress-response recovery after the cessation of the threat (Rifkin-Graboi, 2008). These explanations suggest that the adaptability of emotion regulation not only depends on situational contexts (Gross, 1998) but also on individual differences in how people perceive the functional role of an emotion regulation strategy (Soto *et al*., 2011). Another explanation might be that in some contexts, the adverse effects of emotion down-regulation in avoidant individuals are reciprocated by employing adaptive emotion regulation strategies like positive reappraisal (Karreman & Vingerhoets, 2012). For example, a study showed that when accompanied by positive reappraisal, expressive suppression is not associated with atypical physiologic reactivity (Raymond *et al*., 2019). However, another study showed that in relationship and intimacy contexts, avoidant individuals show greater use of suppression but not positive reappraisal (Winterheld, 2016). This suggests that avoidantly attached individuals may employ reappraisal effectively in general situations, but struggle to do so in interpersonal contexts (Pietromonaco & Powers, 2015). Lastly, it is possible that with the increased tendency to suppress emotions, avoidant individuals also become more likely to suppress discomfort from psychosomatic symptoms (Rapoza *et al*., 2016). This suggests that in both anxious and avoidant attachment, modulating symptom reporting may be an attachment behaviour which serves an activating role in the first and a deactivating role in the second (Stanton & Campbell, 2014a).

The results also revealed a direct positive relationship between avoidant attachment and psychosomatic symptoms. This is in line with previous studies which suggest that attachment avoidance predicts psychosomatic symptoms (e.g. Armitage & Harris, 2006). Therefore, these symptoms might not be caused by emotion suppression but rather by other factors. For example, even though avoidant individuals are more likely to suppress emotions of sadness, they have difficulty regulating their anger which

might also lead to negative affect contributing to psychosomatic symptoms (Brenning & Braet, 2013; Teixeira *et al*., 2022). Also, because avoidant individuals are more reluctant to seek support when encountering psychosomatic symptoms, their symptoms might worsen due to ongoing neglect (LaBelle *et al*., 2020). Similarly, the avoidantly attached are less likely to experience rewarding connections in intimate relationships which leaves them with poorer mental and physical health (Stanton & Campbell, 2014a). Since stress levels were controlled for, the results indicate that avoidant individuals may still exhibit psychosomatic symptoms regardless of their reported stress levels. This finding confirms the assumption that subjective stress levels may not match physiological stress levels in avoidant individuals (Maunder *et al*., 2006).

Whilst the study demonstrates the possible consequences of maladaptive emotion regulation in different attachment orientations, it is not without limitations. For example, these results do not infer causal relationships due to the cross-sectional nature of the study. Also, although the study showed a high power for medium-sized effects, the sample size was not enough to detect small ones, so future studies could replicate the study with a larger sample size. In addition, the results are exclusive to the specific strategies of expressive suppression, rumination, and catastrophising (Garnefski & Kraaij, 2007; Preece *et al*., 2019) as currently no comprehensive scale that measures the up-regulation and down-regulation of emotions which characterises attachment styles is available (Girme *et al*., 2021). Additionally, the general tendency of individuals to use certain strategies was measured; meaning that the observed effects of emotion regulation cannot be generalised to more specific contexts like interpersonal/social and pain-related stimuli and require future investigation (Pietromonaco & Powers, 2015). Similarly, the effects of factors like reappraisal, perceived social support, cultural differences, and attachment figure responsiveness should be considered (Butler *et al*., 2007; Karreman & Vingerhoets, 2012; Pietromonaco & Beck, 2019). Since this study inferred the importance of perceived stress, the effects of emotion regulation strategies on psychosomatic symptoms under different levels of stress should be measured (Jeffries *et al*., 2016). Lastly, it may be important to explore the possible role of perceived stress in the development of somatosensory amplification particularly in anxious attachment (Le *et al*., 2020).

In conclusion, the results revealed that emotion down-regulation negatively mediated the relation between attachment avoidance and psychosomatic symptoms while emotion up-regulation did not mediate the relation between attachment anxiety and psychosomatic symptoms. The findings suggest that emotion regulation emerges as a predictor for psychosomatic symptoms in avoidant but not anxious attachment. Specifically, it seems that emotion down-regulation can serve in reducing psychosomatic symptoms in avoidant individuals when controlling for stress. Future studies should explore the emotional influences of emotion regulation in insecure attachment across diverse contexts.

Data availability statement

The authors confirm that the data supporting the findings of this study are available within the article and/or its supplementary materials.

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