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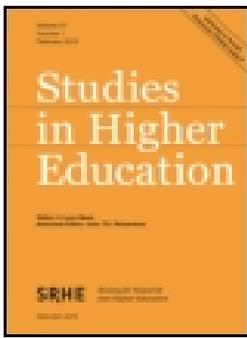
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# How and why do students' career interests change during higher education?

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## ABSTRACT

With increasing emphasis on employability in higher education (HE), there is an urgent need to understand how HE influences students' career interests. Vocational psychological interest literature has assumed that career interest is stable from adolescence to adulthood. Newer conceptions of interest, drawn from developmental-educational perspectives, instead emphasise the mutability of interest and the ways in which the environment can support its development. This study makes a novel contribution by extending a developmental-educational theory of interest to illuminate how students' career interests develop during university and influences on those career interests, suggesting ways to enhance development. We surveyed the 2019 bachelor's graduating class ( $n = 663$ ) at a mid-ranked UK university offering both applied and pure programmes. Graduates indicated whether their career interests had changed during university, described their career interests 'when they started university' and what they were 'now', and explained what had affected their career interest during university. Most (61%), regardless of pure or applied studies, reported that their career interests had changed. Consistent with interest theory, the most common type of change was refinement within a Standard Industrial Classification (30%), followed by shifts to a different SIC (19%), becoming more decided (12%), or rejecting a plan, leaving them unsure (5%). The most common influences on career interests were the curriculum (46%), placements (14%), work experiences (7%), and co-curricular activities (6%). We conclude that career practitioners and academics need to consider the central role of disciplinary curricula in career learning and emphasise opportunities for work experiences in and outside the curriculum.

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Career development; college; interest development; employability; career exploration

## Introduction

With universities increasingly being held accountable for students' graduate outcomes (Jackson and Bridgstock 2018), educators urgently need to understand how to support students' career development during higher education (HE). Yet, understanding of career development in HE sits between two different research traditions, making it difficult to build a coherent body of evidence to guide practice. Students' career interest is central in both traditions, but they make different assumptions about what interest is and how malleable it is (Su 2018). Students' career interest matters because

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interest is an important factor in contemporary students' career decision-making and satisfaction, as well as associated with a wide range of positive educational and occupational outcomes (Quinlan and Renninger 2022; Renninger and Hidi 2022).

On the one hand, vocational interest scales have long been used to match individuals' skills to careers (e.g. Holland 1997; Su 2018). This vocational psychological research has treated vocational interest like a personality trait that does not change after adolescence (Low et al. 2005; Xu and Tracey 2016), typically relying on quantitative measures of Holland's pre-determined interest codes. Only recently, through within-person research methods, has this stability been questioned (Schultz et al. 2017). Thus, with rare exceptions (e.g. Feldman, Smart, and Ethington 2004), little evidence of career interest change exists in this tradition.

A competing view of career interest in HE is rooted in a developmental psychological framework that underpins American student development theories that guide student services professionals, including career advisors (Patton et al. 2016). In this paradigm, HE is seen as fostering holistic development that broadens students' horizons, challenges their received identities and world-views, and enables students to grow as people (Quinlan 2011). From this perspective, changes in career interest are seen as a natural outcome of education. Yet few studies (e.g. Rosenzweig et al. 2020; Quinlan et al. 2021) have investigated career interest change in HE from this perspective, though there is considerable research on career exploration, particularly its psychological antecedents (Jiang et al. 2019).

Our study draws on interest theory (Hidi and Renninger 2006; Renninger and Hidi 2016, 2022) to investigate how students' career interests develop during higher education (HE). We document UK students' perceptions of whether and how their career interests have changed and the nature of and influences on those changes.

### ***Context: understandings of change and its implications in UK HE***

There is growing attention to understanding students' perspectives on employability-related issue (Dalyrimple et al. 2021). Recent research and practice in career development in UK HE, where this study is set, has focused on students' career decidedness, because having a clear career plan is associated with getting a graduate-level job after university (Shury et al. 2017). Career (in)decision scales, used since at least the 1980s (Brisbin and Savickas 1994), are resurfacing in HE through a 'careers registration' process (Cobb and Winter 2018) that tracks students' work readiness by surveying students' decidedness annually. Such studies show that UK students report considerable changes in career decidedness during HE (e.g. Cobb and Winter 2018; AGCAS 2017; Shury et al. 2017). Yet, among various limitations, career (in)decision scales are unidimensional, treating change as a linear progression from undecided to decided. To address that criticism, we investigate the *nature* of changes in career interest during HE and influences on those changes.

Doing so is intended to help career advisors to personally tailor services to different groups of students (Dalyrimple et al. 2021). UK students, who begin specialising from age 16, may clarify their career interests relatively early and experience little change during HE, particularly if they choose vocationally oriented undergraduate subjects (e.g. law, engineering, journalism). If their interests change, they may experience distress because UK HE offers little flexibility to change programmes without needing to start again. These issues are starker in continental Europe where study programmes and careers are more tightly connected.

### ***Theoretical framework: interest development***

We take a developmental-educational perspective, drawing particularly on the theoretical framing of the Four-Phase Model of Interest Development (Hidi and Renninger 2006; Renninger and Hidi 2016, 2022). This theory conceptualises interest as a tendency or desire to engage with some content or object, involving interaction between a person and the environment, consisting of both cognitive

and affective dimensions, and having a physiological/neurological basis connected to reward circuitry. It proposes that interest develops over phases (Hidi and Renninger 2006; Renninger and Hidi 2016, 2022). Learners with less well-developed interest need more support than those with more well-developed interest, who will re-engage with their interest independently, voluntarily, frequently, and with knowledge and understanding (Renninger and Hidi 2016). Thus, a person's interest is not seen as a stable personality trait. Instead, interest can change depending on how well the environment supports it. Interest theory emphasises the situational factors that influence interest development, a key focus of our study. While most research using this framework focuses on students' engagement with an academic subject (e.g. biology, math, music) (Renninger and Hidi 2016), our study is unique in examining students' perspectives on their *career* interest and influences on its development.

### ***Factors that influence career learning and interest development***

Research on career development interventions in HE has shown that mentoring, vocationally oriented curricula, work experience and one-to-one career counselling support career learning (Bimrose, Barnes, and Brown 2005). A recent review offers evidence that placements, work-integrated learning, authentic assessment and transnational education support 'employability' (Dalrymple et al. 2021). Family and friends also are influential in career planning of HE students (Greenbank 2011; Khampirat 2020), as are self-esteem/self-perceived competency (Khampirat 2020) and lecturers (Jiang et al. 2019). We expect students will mention these influences.

Inspiring, supportive teachers play an important role in HE students' subject interest development (Quinlan 2019; Rotgans and Schmidt 2011). The curriculum influences students' desire to continue in a field (Quinlan and Renninger 2022), either sustaining their interest, disenchanting them, or attracting them to new fields (Rosenzweig et al. 2020). Students also actively explore curricular opportunities that allow them to combine their interests (Vulperhorst et al. 2018; Vulperhorst, Rijst, and Akkerman 2020), enabling them to build their own 'lines of practice' (Azevedo 2015). Thus we expect students will refer to teachers, curricula and co-curricular resources as influential in affecting changes in career interests, too. Our research questions are:

RQ1) To what extent and how did students say their career interests changed during UK higher education?

RQ2) What demographic and programme factors were associated with reported changes in career interest?

RQ3: What factors did students think influenced, shaped or prompted their changes in career interest? This question is particularly useful in identifying implications for practice.

## **Methods**

### ***Participants and study context***

We surveyed the graduating class of 2019 bachelor's level students at a mid-ranked UK university. A total of 663 graduates (400 Female; 457 White) completed the survey. Reflecting the university population, 84% of students were eighteen or nineteen at their entry to university, 5% were aged 20 and 10% were 21 or older. Students represented fields in arts/humanities (28%), social sciences (42%), and sciences (30%). Sixty percent (60%) of participants studied pure subjects (e.g. history, English) while 40% studied applied subjects (e.g. architecture, accounting, law) according to Biglan's (1973) classification.

### ***Procedure***

With ethics approval, graduates were surveyed two months after completing their final exams, shortly after marks had been awarded. The study questions were qualitatively pilot tested with 10 students before being incorporated into a larger online exit survey.

### *Career decidedness at the start of university and now*

Participants responded on a 5-point Likert scale (strongly disagree = 1 to strongly agree = 5) to two questions: (a) 'When I started at [this university] I knew what I wanted to do for a career' and (b) 'I now know what I want to do for a career'. Students' retrospective judgments of starting career decidedness were subtracted from their current career decidedness to create a change score from -4 to +4. For example, a student with a change score of -4 strongly agreed that they knew what they wanted to do when they started university (5), but strongly disagreed upon completion (1). Positive scores mean the students became more decided. While the focus of this study is on students' retrospective reports of changes in career interests, not simply career decidedness, we report briefly on decidedness to contextualise the data on changes in career interest. Career decidedness at the start of university is also included as a predictor in the logistic regression addressing RQ2.

### *Career interests at the start of university and now*

To address RQ1, graduates were asked (1) 'Did your career interests change during higher education? (yes or no)' and (2) 'What were your career interests when you started and what are they now?' Using an open-ended question allowed us to get 'inside' students' experiences of career interest, describing and defining their career interest in their own terms. This format allowed us to identify other kinds of changes in interest beyond decidedness. This question generated a corpus of 10,805 words. Responses ranged from 0 words (98 participants) to 81 words. Among the 565 who answered, the average length of response was 19 words. Answers were thematically analysed (Braun and Clarke 2006) according to the type of change reported (Table 1). The categories developed were 'No change', 'Rejected plans/now unsure', 'More decided', 'Change within Standard Industrial Classification (SIC)', 'Change of SIC' and 'Other'. We used the broadest category of the UK's Office for National Statistics' (2007) SIC hierarchy when coding types of career interest ([https://onsdigital.github.io/dp-classification-tools/standard-industrial-classification/ONS\\_SIC\\_hierarchy\\_view.html](https://onsdigital.github.io/dp-classification-tools/standard-industrial-classification/ONS_SIC_hierarchy_view.html)).

### *Influences on career interests*

To address RQ3, graduates were also asked, 'What has affected your career interest during university? In particular, if your interest or plans have changed, what aspects of your university experience influenced those changes?' Responses totalled 10,429 words, ranging from 0 words (139 participants) to 83 words. Among the 524 who responded, the average response was 20 words. Answers were thematically coded (Braun and Clarke 2006) starting with codes that were closely related to students' words (e.g. volunteering, paid work experience). Related codes were then merged into broader themes (e.g. the theme of work experience merged paid and volunteer work experiences), drawing on categories from the literature review.

### *Demographics*

Administrative data provided students' gender, age, race, the programme on which they studied, and their final marks, allowing us to determine sub-group differences on RQ1 and run logistic regression for RQ2. The programme of study was coded as either pure or applied using Biglan's (1973) classification. Because applied programmes are more closely connected to particular careers, students in those subjects may develop their career interests earlier and be less likely to change.

## **Results**

### *Context: career decidedness*

As shown in Table 2, only 40% agreed or strongly agreed that they 'knew what they wanted to do for a career' when they started university. As expected, students on applied programmes ( $M = 3.26$ ;  $SD =$

**Table 1.** Codes of types of career interest change with descriptions and examples.

Description	Example responses to: <i>What were your career interests when you started and what are they now?</i>
<b>No change.</b> If they reported no change on the previous 'yes/no' question, this open-ended response was often left blank.	<i>English:</i> Something in the city that is creative, i.e. a junior creative role for a social media company or a runner for a media company to get my foot on the ladder. something out of office and with flare. That is all I know, my career interests haven't changed. <i>Engineering and Digital Arts:</i> I still want to be an electronic engineer. <i>European Culture and Languages:</i> to become a lawyer and they are still the same <i>Physical Sciences:</i> Not a clue for both
<b>Rejected plans/now unsure.</b> Started with an interest or plan that was then rejected and has not been replaced.	<i>Law:</i> I wanted to be a Solicitor but I'm not sure now <i>Politics/International Relations:</i> Security or intelligence analysis. Now I'm not sure. <i>Social Sciences:</i> At start, criminal justice system. Now unsure.
<b>Change in decidedness.</b> Did not report specific interest at the beginning (e.g. not sure, didn't know, didn't have any) but now report an interest.	<i>European Culture and Languages:</i> Didn't have any. Want to become an archaeological scientist after a masters. <i>Anthropology and Conservation:</i> I had no idea. Now I want to be an audiologist.
<b>Clarification within SIC.</b> Changes occurring within a single Standard Industrial Classification (at broadest level). Typically they reported some general interest that was refined or a shift in focus within a broad area aligned with their degree subject.	<i>Arts:</i> I started out wanting to be a cameraman but working on set made me realise I was stronger in the editing suite. <i>Biosciences:</i> Medicine to medicine or physician associate or something in healthcare <i>Computing:</i> Something in IT. Now Web Development. <i>Economics:</i> Investment banking – M&A Now – asset management – investment side
<b>Change of SIC.</b>	<i>Anthropology and Conservation:</i> I wanted to be a zookeeper, but now I would like to become a teacher <i>Biosciences:</i> ... medical research, however, I now would like to start a career in healthcare. <i>Computing:</i> Technology/development in the financial sector. Now, creative video production and advertising. Documentary filmmaking. <i>English:</i> Teaching originally, now publishing or civil service. <i>Business:</i> Accounting but now marketing <i>Physical Sciences:</i> to work in industry and i now want to be a secondary chemistry teacher
<b>Other responses.</b>	<i>Economics:</i> Do anything to make money, now they are to enjoy what I do. <i>Politics/International Relations:</i> I aim to be in a career that I enjoy and care about; I do not wish to be another cog in the machine.

**Table 2.** Frequency and percent of respondents who 'know what I want to do for a career'.

Response	When I started university			Now		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Strongly disagree	107	16	16	31	5	5
Disagree	187	28	45	89	13	18
Neither	100	15	60	114	17	36
Agree	181	27	87	233	35	71
Strongly agree	86	13	100	193	29	100
Total	661 (2 missing)	100		660 (3 missing)		

Note: Percents may not total to 100 due to rounding.

1.242,) reported significantly higher decidedness at the start of their studies than students on pure programmes ( $M = 2.70$ ;  $SD = 1.31$ ) ( $t = -5.512$  [587]  $p < .001$ ,  $d = .433$ ). Black, Asian or Minority Ethnic (BAME) students were also significantly more likely to be enrolled on applied courses than White students ( $\chi^2 = 15.805$ ,  $p < .001$ ,  $Cramer's V = .154$ ). and, logically, were more likely to report significantly higher career decidedness at the start of university ( $M = 3.18$ ,  $SD = 1.244$ ) than White students ( $M = 2.81$ ,  $SD = 1.325$ ) ( $t = -3.303$  [646]  $p < .01$ ,  $d = .285$ ).

By the time of graduation, the majority of graduates (64%) agreed or strongly agreed that they 'knew what they wanted to do for a career', while only 18% disagreed or strongly disagreed. Students in applied programmes ( $M = 3.95$ ;  $SD = 1.04$ ) were again more decided than those on pure programmes ( $M = 3.55$ ;  $SD = 1.21$ ) ( $t = -4.505$  [658]  $p < .001$ ,  $d = .359$ ). However, there were no longer any significant differences on decidedness between White ( $M = 3.72$ ;  $SD = 1.15$ ) and BAME students ( $M = 3.66$ ;  $SD = 1.20$ ). The mean scores for students' decidedness at the end of university ( $M = 3.71$ ;  $SD = 1.16$ ;) were significantly higher ( $t = -14.168$  [657]  $p < .001$ ,  $d = .552$ ) than at the start of university ( $M = 2.93$ ;  $SD = 1.31$ ).

To explore what was happening at the individual level, we analysed change scores for each student by computing the difference between their current decidedness one month after completing their bachelor's programme and the degree of decidedness when they started. The experience of HE was associated with changes in decidedness (whether toward greater or less decidedness) in 65% of students; 53% were *more* decided, 12% were less decided. About one-third (35%) reported the same level of decidedness 'now' compared to when they started.

RQ1) To what extent and how did students say their career interests changed during UK higher education?

The analyses of decidedness above ('knowing what they want to do for a career') reflects only a single dimension of change in career interest, obscuring other potential changes in students' interests during university. On a simple 'yes' or 'no' question, 61% percent reported that their career interests had changed.

As shown in Table 3, when asked to describe *how* their interests changed, 41% of graduates either said there was no change (31%) or gave no response (10%). These figures were consistent with those who reported no change in career interest on the yes/no question (39%). Discrepancies can be explained by lower response rates on open-ended questions.

Of those responding, 5% described having a plan but then rejecting it, leaving them still unsure about their career interest. Some students (12%) indicated that they had become more decided or confident about their plans. More commonly (30%) graduates described having clarified their interests within a Standard Industrial Classification (SIC). A further 19% of students made a more radical change, shifting their interests to a different broad SIC category. Each category of change is described and illustrated in Table 1.

RQ2) What demographic and programme factors were associated with reported changes in career interest?

There were no differences by gender on whether students reported their career interests changing; 61% of men and 61% of women responded 'yes'. However, there were significant differences by ethnicity ( $X^2 = 10.345$ ,  $p < .01$  Cramer's  $V = .126$ ). Sixty-five percent of White students reported that their career interests changed compared to 53% of BAME students. Although graduates who had studied pure subjects were slightly more likely to report a change in career interests than graduates of applied programmes, this difference was not statistically significant. On logistic regression (Table 4), only ethnicity and decidedness at start of university were significant predictors of career interest change when controlling for other demographic variables.

**Table 3.** Frequency and percent of respondents reporting each type of career interest change.

Code	Frequency	Percent of those responding ( $n = 600$ )	Percent of those experiencing change ( $n = 395$ )
No response	63		
No change	205	34	
Rejected plans, now unsure	29	5	7
More decided	71	12	18
Clarification within SIC	177	30	45
Change of SIC	115	19	29
Other	3	<1	<1

Note: Percents may not total to 100 due to rounding.

**Table 4.** Logistic regression of demographic and administrative variables as predictors of career interest change.

Variables	<i>B</i>	S.E.	Sig	Odds ratio
Applied (0) or Pure (1) subject	-.050	.184	.785	.951
Age on entry	.013	.090	.882	1.013
Good degree awarded (0 = Yes; 1 = No;)	.338	.297	.255	1.402
<b>Ethnic Group (0 = BAME; 1 = White;)</b>	<b>.388</b>	.190	.042*	1.407
Gender (1 = M; 0 = F)	-.020	.179	.911	.980
<b>Decidedness at start of university</b>	<b>-.538</b>	.071	.000***	.584

Note: 'Good degree' refers to earning a 1<sup>st</sup> class or upper second class degree.

BAME students and those who were decided at the start were less likely to report career interest change.

RQ3: What factors did students think influenced, shaped or prompted their changes in career interest?

The codes for influences on career change are described and illustrated in Table 5. As shown in Table 6, about one-third (33%) of students either did not respond to this open-ended question or gave answers too vague to be coded, consistent with the 39% of students who said their interests had not changed and were not expected to answer this question. Thus we focus on those who gave a substantive response, since only those graduates' interests changed.

Table 6 splits the students according to the type of career interest change, highlighting in boldface where an influence is stronger for a given subgroup than others. Overall, nearly half of those who responded (46%) indicated that the curriculum influenced their change in career interest, with it being more often cited by students who clarified their interest. Research projects, although part of the curriculum, were treated as a separate category and were cited by a further 3%, usually in connection with growing interest in research careers. The second most common influence (14%) was a placement or internship. Work experiences were cited by 7%. Co-curricular activities followed closely at 6% and were more commonly cited among those who became more decided. Lecturers (5%) and various people with whom they networked (4%) were also influential. Activities organised by careers services staff were cited by 4%. Four percent (4%) of students also referred to some aspect of their competency, such as whether they thought they were good at a particular role or not. Competency was cited more frequently by students who changed SIC codes. Personal factors such as work preferences or special needs were mentioned by 3% of graduates as shaping their career interests and were cited more often by those who were still unsure.

In relation to the curriculum, placements and work experiences, graduates reported examples of both attraction and disenchantment. An example of attraction was 'Taking the specific modules made me realise that I want to work in these areas'. An example of disenchantment was, 'Mostly I learned what I didn't want to do. For example, I learned that while conflict studies is interesting, I'm not interested in working in that field'. Examples of both attraction and disenchantment are included in Table 5. Because many of the comments were not classifiable as either attraction or disenchantment, we were unable to code all comments as attraction or disenchantment. Nonetheless, we noted that lecturers were generally described as attracting students to a particular interest. Competency was generally cited as discouraging or detracting them.

## Discussion

Most students (61%) reported experiencing changes in their career interests during their time in university, which supports a developmental-educational perspective on career interest development. Changes were equally likely for men and women and for students in applied versus pure programmes and less likely for BAME students and those who were decided at the start.

**Table 5.** Themes for influences on career change.

Theme and Description	Examples
<b>No specific response:</b> Left the question blank (121) or wrote in 'nothing', 'no', 'n/a' (61) or described something too vaguely (39).	<ul style="list-style-type: none"> <li>- Not being fully aware of opportunities available</li> <li>- Mostly just the gradual understanding that I needed to make a decision, and so I made an effort to find out what I enjoyed.</li> <li>- University life and freedom allowing me to see alternative careers</li> </ul>
<b>Curriculum:</b> Lectures, labs, seminars, modules or subjects, degree content, interest/enjoyment or lack thereof in subject	<ul style="list-style-type: none"> <li>- The finance subjects made me think that accounting may not be the only option, as I enjoyed the finance module more than I expected.</li> <li>- Studying journalism taught me what the job was, and I realised that it wasn't for me.</li> <li>- Certain modules have pushed me towards career paths I didn't know existed</li> </ul>
<b>Placement:</b> placement, year in industry, internship or work-study experience provided by the university.	<ul style="list-style-type: none"> <li>- My degree</li> <li>- My year in industry</li> <li>- My placement year was the main factor driving the change. I was a data analyst on my placement year and found it to be something I want to pursue long term</li> <li>- ... the year in industry was key in changing my view of what I wanted to do. I spent a year in the Civil Service and although I thoroughly enjoyed my time, I didn't feel challenged and so ... I [subsequently] steered away from those areas ...</li> </ul>
<b>Work experience:</b> Other work experiences, voluntary or paid.	<ul style="list-style-type: none"> <li>- ... the work experience I took over the summer between my 2nd and 3rd year ...</li> <li>- Applying for jobs and getting work experience made me understand what the roles I was interested in actually looked like in practice.</li> <li>- Setting up my own social media business ...</li> <li>- Working part-time jobs whilst at university has had the most profound impact on my career ...</li> </ul>
<b>Co-curricular:</b> student societies, clubs, taking non-credit modules.	<ul style="list-style-type: none"> <li>- Volunteering in the heritage sector</li> <li>- Experience leading a society</li> <li>- Computing society talks by external speakers</li> <li>- I was involved with Model United Nations for 2 years ... which exposed me to some more problems and I got to meet students studying law, politics, and international relations ...</li> </ul>
<b>Lecturers:</b> Specific reference to lecturers or academic advisors who were inspiring or gave advice.	<ul style="list-style-type: none"> <li>- Passion from the lecturers</li> <li>- Supervisor support</li> <li>- Speaking to the lecturers about viable career opportunities</li> <li>- Certain teachers have really inspired me ... This encouraged me to develop an interest in property law and data protection.</li> </ul>
<b>Networking:</b> Connecting with, networking with, talking with, listening to, or meeting people (not lecturers).	<ul style="list-style-type: none"> <li>- Meeting with people who are highly respected in their fields was a wonderful experience. They were also open to questions and happy to help with career options.</li> <li>- Meeting in-house lawyers</li> <li>- Speaking to different people and reading more</li> </ul>
<b>Careers service:</b> Career events or career advisors.	<ul style="list-style-type: none"> <li>- Going to the job fairs organised where I got more information</li> <li>- The placements team and careers office played such an important part in my employability development ...</li> </ul>
<b>Competency:</b> Better appreciating their own strengths and weaknesses in relation to particular career options.	<ul style="list-style-type: none"> <li>- My grades, if I got a bad grade I'd feel less confident in myself career-wise</li> <li>- Realising my strong areas</li> <li>- The lack of experience in filming and using the cameras meant that my plans were unrealistic. However, I learned that I have a skill in graphic design and research when taking on these tasks at university, and I enjoy them, so this changed my plans.</li> </ul>
<b>Personal factors:</b> Their own personal preferences, values or needs that shaped their career decision-making.	<ul style="list-style-type: none"> <li>- Work life balance</li> <li>- Location. Staying near a big city for work</li> <li>- My own mental well-being changes while at university so that has slightly altered my career interest</li> <li>- Too competitive</li> <li>- I want to focus on sustainability</li> </ul>

*(Continued)*

**Table 5.** Continued.

Theme and Description	Examples
<b>Research project:</b> A research project, typically a final year project.	<ul style="list-style-type: none"> <li>– Doing my final year project has really helped me enjoy 3D modelling</li> <li>– The third year lab project introduced me to real practical work in research, this is what inspired me to continue in the field</li> <li>– Writing my dissertation helped me realise I want to pursue a career in research</li> </ul>
<b>Other:</b> Includes a collection of codes with fewer than 10 responses each, including the nature of the work (8); financial (7) friends (4), and their own research into careers (3).	<ul style="list-style-type: none"> <li>– Understanding what my original career plans would require and spending time in a laboratory made me unsure if I would want to do it long-term</li> <li>– I realised forensics is tedious and poorly paid for what you do</li> <li>– Realising the pay differences between the two roles ...</li> <li>– ... I was told by a friend shortly before graduation that there are prospects in project management ...</li> <li>– My own personal research</li> </ul>

The changes students described in career interest were not just changes in decidedness about a pre-determined career plan, though that described 12% of students. Rather, the most common type of change in interest was clarification within a single Standard Industrial Classification (SIC). These changes were often relatively minor and still within the same general area covered by their degree course, yet students experienced them as meaningful enough to describe in an open-ended comment. In the language of the Four-phase Model of Interest Development (Hidi and Renninger 2006), these changes are consistent with increasing interest in a field insofar as the process of learning in HE enabled them to gain knowledge and define their career interest more precisely.

A notable minority (19%) changed their interests from one SIC to another SIC, suggesting more substantial changes. More substantial changes in the object of interest (e.g. from one industry or job title to another) would be expected to arise in educational situations as students are exposed to new knowledge and experience and interact with lecturers and professionals (Renninger and Hidi 2016). That is, students may encounter new areas of interest and be attracted toward those new possibilities (Rosenzweig et al. 2020). Alternatively, educational environments may fail to support students'

**Table 6.** Frequency and percent of responses for each career change influence theme.

Theme	Frequency	Percent of total (n = 663)	Percent of those giving response (n = 442)	Percent of those reporting now unsure (n = 29)	Percent of those reporting more decided (n = 71)	Percent of those reporting clarify w/in SIC code (n = 177)	Percent of those reporting change of SIC code (n = 115)
No specific response	221	33		<b>28</b>	16	7	10
Curriculum	202	31	46	31	32	<b>44</b>	36
Placement	60	9	14	0	13	12	12
Work experience	29	4	7	3	4	4	8
Co-curricular	29	4	6	0	<b>10</b>	5	4
Lecturers	24	4	5	7	3	3	6
Networking	18	3	4	0	<b>9</b>	3	4
Careers service	16	2	4	3	3	3	3
Competency	16	2	4	0	0	5	<b>11</b>
Personal factors	15	2	3	<b>10</b>	4	5	9
Research project	11	2	3	0	1	3	1
Other	22	3	5	0	1	1	<b>4</b>

Note: Percents may not total to 100 due to rounding and missing data.

interests, leading students to become disenchanted with their original career interest (Rosenzweig et al. 2020). In these cases, students may have started with weaker career interests which were vulnerable to being extinguished in the face of unsupportive environments. Examples of both disenchantment and attraction were found.

When describing their career interests, students generally referred to industries (e.g. marketing), job titles (e.g. solicitor, sports journalists) or specialties within a subject area (e.g. clinical vs forensic psychology). The way recent graduates characterised their career interests, then, is quite different from the categories used in much vocational psychology literature (e.g. Holland 1997). Thus they may report changing their career interest even if career assessment codes might not capture a change. Students' language may or may not match the way course topics or specialties are structured, requiring effort to align their career interests with subject interests (Quinlan and Renninger 2022; Quinlan et al 2021).

The most frequently cited influences on career interests were the curriculum (46%), placements (14%), work experiences (7%) and co-curricular activities (6%). These findings corroborate other studies on effective career interventions, which point to the effectiveness of vocationally-oriented curricula and work experience in promoting career learning (Bimrose, Barnes, and Brown 2005; Dalrymple et al. 2021). However, it is notable that 60% of the respondents studied pure subjects, rather than applied programmes associated with professions. Changes in career interest and attributions to the curriculum for those changes were evident among graduates of both pure and applied programmes; neither group was more likely to report a change in career interest during university. This finding suggests that 'pure' as well as vocationally-oriented curricula play an important role in students' career interest development.

Changes in career interest were also attributed to interactions with people such as lectures and career services staff, but less frequently than first-hand experiences with curricula, work and co-curricular activities. Previous findings have shown that influential people, such as teachers and mentors, play a key role in supporting career learning (Bimrose, Barnes, and Brown 2005; Jiang et al. 2019) and students' interest development (Quinlan 2019; Rotgans and Schmidt 2011), so we expected more students would reference these people than they did.

Graduates who completed the survey rarely mentioned friends and family as influential in their career interest development during university. Rather, some of the respondents emphasised the increased freedom they enjoyed in HE to explore and test out new experiences. The lack of reference to family members contradicts other studies with HE students (Greenbank 2011; Khampirat 2020). Given that almost 40% of students did not experience changes in their career interests and, therefore, did not describe influences on career interests during university, those students may have been more heavily influenced by family earlier in their educational process (Quinlan et al. 2021). It is also possible that families continue to play a role in students' career interest development, but students would prefer not to admit it or take it as a given.

### ***Implications for research and next steps***

Most students' changes in career interest were broadly consistent with Hidi and Renninger (2006) Four-Phase Model of Interest Development, supporting its novel use in this context. First, a major feature of interest development is growth in an individual's level of knowledge about the object of that interest. The most common type of career interest change was a clarification of career interest within the same broad subject of study, suggesting greater knowledge of the subject area and related career options. The experiences to which graduates attributed their career interest changes also suggested a process of learning more about their interest. Thus, the results are consistent with Renninger and Quinlan (2022) who found that creating learning environments that support students' interest in their academic subject also support students' career interest development.

Second, well-developed interest is associated with independent, voluntary and frequent engagement with an object, which is suggested by participants' reports of being influenced by the

curriculum, their placements/internships, work experiences and co-curricular activities rather than interactions with key people. In the earlier stages of interest development, people such as parents and teachers play particularly important roles in structuring and nurturing young people's interests.

Although most standardised measures of interest ask students to comment on a broad area (e.g. science or math) (e.g. Quinlan 2019; Renninger and Hidi 2022), these findings suggest that a more nuanced approach should be taken to understand interest development over time. That is, as HE students gain more knowledge of their field, they refine their interests within it. Understanding interest development requires appreciating how students clarify specific interests within a field and how they blend various interests (Vulperhorst, Rijst, and Akkerman 2020) to, perhaps, build their own individual lines of practice (Azevedo 2015). Simply comparing students' responses to surveys on their interest in the field *in general* over time may not reveal changes associated with refinements in the focus of their individual interest within that general field. Such changes, though, were important enough in students' subjective experiences to warrant describing them on a survey.

This study was limited in using a retrospective survey. Qualitative research and longitudinal, within-person research exploring how students' career interests develop over time are needed to better characterise the process of interest development. Given the importance students attributed to the curriculum, it would be helpful to probe its effects more deeply with students. What aspects of the curriculum are most influential? Is the curriculum more influential at some stages of study than at others? Are some curricular activities more useful to students? How do students actively use the curriculum and other resources to develop their interests (Quinlan et al. 2021)?

### **Practical implications**

Increasingly, HE career practitioners are tracking students' career decidedness at registration each academic year and tailoring services and communication to students according to their decidedness (Cobb and Winter 2018; Daubney 2019). We show that career (in)decision scales alone do not capture other changes in career interest that students may experience. These results allow career practitioners to reassure students that change is normal and advise on how others have used resources in the curriculum, co-curriculum and work experiences to become more decided, to clarify their interests, and to change directions (Quinlan et al. 2021).

A small subset of students reported having and then rejecting a career interest and still being unsure. Because those students may be particularly at risk of a crisis and poor graduate outcomes, identifying them and providing timely support may be especially important. Thus, this report offers evidence for reconsidering the linear 'Career Registration' process to identify such students. Those students cited personal factors more often than other groups. Students who made changes across industries also were more likely to cite competency. More substantial changes, then, seem to be associated with increasing realism about the day-to-day work rhythms, settings, expectations and challenges of particular careers (Quinlan et al. 2021). Thus more attention might be paid to helping students learn about and reflect on the day-to-day realities of certain career choices in relation to their own strengths and values.

Much career education occurs outside regular, disciplinary curricula (Farenga and Quinlan 2016). Yet, this study shows that students are most reliant on their curricula in clarifying their career interests, not interactions with career services staff. Hence careers practitioners and academics might rethink how to support students' career learning through disciplinary curricula itself, such as by presenting examples of use of concepts in different career settings, creating authentic assessments that highlight career applications, or integrating mini-placements or work experiences as core components of every student's programme. Horn (2009, 9) highlighted less conventional ways in which the tools or content of disciplines could be linked to careers thinking such as 'developing the students' interest in and analysis of ethical, social or political issues in work and society'.

## Conclusion

We need to understand the factors that influence how students' career interests develop during HE to design learning environments that best support students. Until recently, much of the vocational interest literature has assumed that career interest is stable and trait-like (Schultz et al. 2017). In contrast, educational interest theories emphasise the mutability of interest and focus on situational factors that stimulate, maintain and deepen interest (Hidi and Renninger 2006; Renninger and Hidi 2016). This study has filled a significant gap by focusing on how students' career interests develop during university and the influences on those career interests.

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