

Exploring CS Entrants' Expectations of Friendship in their First Year Studies

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Abstract— This research full paper explores a cohort of Computer Science (CS) entrants' views of the role of friendship in their studies during the pandemic-affected year prior to arriving at university, their opinions regarding the importance of friendship to academic study, and their expectations of friendship during the crucial, transitional year to come. The aims of the study are to present friendship as one of the possible factors in engagement and persistence in first year, and to report CS students' views of the role and value of friendship in their own words.

The study's context is the persistently high drop-out rate of CS1 students compared with other subjects. Related research topics include academic resilience and persistence; students' sense of belonging and their learning and social networks; the "loner" stereotype associated with CS students; and the impact of online teaching necessitated by the pandemic on students' learning networks.

Data collection was by questionnaire at the start of September 2021, with a mixture of Likert-type items and open-ended questions, yielding responses from 68 participants embarking on a range of CS-focused degrees. Exploratory analysis was done using Nvivo 20 to identify the themes emerging from their responses.

Keywords—computer science, first year, student experience, persistence, study group

I. INTRODUCTION

The purpose of this study is to explore a group of CSI entrants' expectations and understanding of the role of friendship in academic studies. Our study's context is of persistently high first year drop out in CS1 courses in the UK, around 9.2% averaged across all institutions and entry qualifications, the highest of all university subjects [1]. The problem of non-progression to second year in CS is widely reported around the world: for example, in the US, Europe and Australia [2], in Germany [3] and in Estonia [4]. There is consequently a large and long-standing body of research into improving engagement amongst CS first years [5].

Given the chronic problem of non-continuation, recent studies understandably focus on students' engagement with their course [6] or specific computing subjects, especially programming [7]; or highlight innovations in teaching to improve engagement, such as gamification [8] and active learning events [9]. While some studies have included relationships between students as a factor, notably in collaborative learning [10] and pair programming [11], the role of friendship in sustaining CS students in their crucial, transitional first year is rarely the focus for research. The main

research question explored in this study is whether, despite the disruption to their social networks in the period before university, our respondents have positive expectations that on-campus friendship will play a beneficial role in their studies.

II. RELATED WORK

Tinto's academic and social integration theory [12] has been the basis for much later research into student retention across many subject areas, institute types and student background [13]. The theory proposes that two core constructs, academic integration and social integration, are key drivers of student retention; and that for students to persist with their studies, they need to integrate themselves into the formal and informal learning communities in their institution. Chrysikos, Ahmed, & Ward applied Tinto's theory to a cohort of first year computing students, finding that social integration constructs can indeed have an influence on student retention processes and persistence in their field [14]. Further, some studies of persistence make an explicit link between students' sense of belonging and continuation on their course [15] [16]. Much research on the social relationships involved in persistence focuses on improving the sense of belonging of groups under-represented in CS such as female students [17] [18] and students of color in the US [19], and on broadening the range of students persisting on courses [20].

A. Students' Learning and Social Networks

Prickett, Walters, Yang, Harvey, & Crick discuss the strong relationship between attendance in CS1 and resilience [21]. Woolf, Zemits, Janssen, & Knight argue for curriculum content that nurtures emotional resilience by being considerate of first year students' stresses, recognizing their diversity, and providing "emotional supports for difficult times" [22]. Salguero, Griswold, Alvarado, & Porter, too, see the reasons for lack of engagement and attendance in the myriad stress factors and obstacles in their respondents' environments and social lives. Interestingly, Salguero & al suggest a relationship between students' sense of belonging and their perception of their learning network, namely, the students with whom they would feel comfortable studying [23].

An insightful study [24] analyzing students' peer and social influences on their studies finds that their interviewees are motivated by wanting to belong, that they learn better by talking about their work, and don't want to disappoint their peers. Cabo & Satyanarayana find that first year CS students' relationships with classmates are important in determining class attendance and performance [25]. Heron's findings [26] suggest a connection between friendship and attendance at teaching sessions. Green, Plant, & Chan go so far as to

conclude if social bonds between the CS students in their study had been stronger, fewer students would have dropped out at the end of the academic year [27].

Chrysikos et al. identify peer group interactions as the informal, social element of students' university experience. Their study finds that "computing students believe that when they participate in small to medium study groups their academic experience is improved" [14]. Jerez, Orsini, Ortiz, & Hasbun concur, suggesting that encouraging student-student interaction helps overcome the limitations associated with the large size of many CS1 classes [28]. Lin, Connors, Lim, & Hott categorized group interactions on their algorithms course into three types: instructional, i.e., giving help only; assistance, i.e., asking for help only; and collaboration, or mutual help [29]. When given free rein to work alone or in a group, students on the course who worked alone did less well than those who collaborated.

Even within groups, students who are less confident or less articulate when interacting about the subject can be misconstrued. The CS students in Höhne & Zander's study feel excluded and their sense of belonging diminished if they know other students are meeting and talking about coursework without them [30]. In their study of group dynamics on a software engineering project module, Isomöttönen & Ritvos suggest that some students are inhibited from contributing their fair share of work and are branded social loafers [31] because they lack "communication courage" [32]. On the other hand, classroom interaction brings the opportunity to foster friendships, which some studies suggest may reduce the likelihood of a student dropping out. Heron, for example, listening to pairs of university friends talk about student life, discovered that, despite the importance of online friends from gaming, particularly to males [33], "close friendships are central to student experience" [26], and are especially important in gaining confidence when new to the university. Friendships confirm students' social role [34], which underlies their sense of self. What these studies have in common is that often their results contradict the stereotype of the CS student as a solitary [35] "nerd-genius" [36] who avoids collaborative study [24].

B. Impact of the Covid-19 Pandemic on Students' Learning and Social Networks

Most UK entrants in September 2021, when our study took place, encountered restricted access to university buildings and curtailed campus-based "freshers' week" events, disrupting their creation of a "sense of place", which Parsons argues is a factor in sense of belonging and persistence [37]. Some students were denied extra-curricular activities such as sports and social clubs. Lippke, Fischer and Ratz [38] make explicit the link between friendship, loneliness and physical activity during the first, transitional year at university. The restrictions took place at the very point when they were new to university and seeking friends (Cabo & Satyanarayana, 2018) and when university uniquely affords them "time and freedom" for socializing [39].

The opportunity for time together is central to the making of friends. According to Hall in his widely-cited study of first year undergraduates [40], "good friendship can develop after spending 120–160 hours together over 3 weeks [but] 200+ hours is likely needed over 6 weeks for friends to become good/best friends".

Students have experienced loss of the classroom activities designed to create a sense of belonging because CS educators have moved experiential, in-person activities online [41]; educators have attempted to foster engagement through interactive learning events, again online [42]. However, Hadi Mogavi & al report students admitting to feeling unengaged, and being distracted during even active online sessions by social media, YouTube and online games [43]. Riese & Kann asked students to compare their pre-pandemic campus education with the fully online education during the pandemic, on a number of aspects such as stress, procrastination, and motivation. Whilst the students reported advantages in increased flexibility, increased accessibility and less commuting, the lack of social interaction was described as boring, causing decreased motivation, and poorer concentration and study discipline [44]. Lurking behaviour increases with class size in the large online events typical of many CS1 courses [45].

Sense of belonging has long been considered a vital constituent of mental health [46]. The potential for the pandemic to disrupt the establishment of sense of belonging was predicted early on in the spread of the virus [47]. Mooney & Becker cite a university-wide survey of their students where 50% ranked "Covid-related stress and anxiety" as "extremely challenging" or "very challenging" [48]. Interestingly, their own study's results of CS students studying remotely find that those who experienced the largest significant drop in sense of belonging were men, though this contradicts the finding, for example by Prowse & al [49], that female students have been more severely affected.

Lack of access to their social network disrupts students' social role [50]. Many studies, for example Copeland & al [51] and Lischer, Safi, & Dickson [52], report anxiety amongst students learning purely remotely. Some of Riese & Kann's students responded that isolation at home was causing mental health issues such as depression [44]. Some educators have even proposed the use of chatbots to simulate human, individual support for isolated or lonely students [53].

III. RATIONALE FOR THE STUDY

Having reviewed the recent research on the mental health impacts on university students arising from loss of interactions on campus [48] [44], we were motivated to hear the views on their social networks of our entrants, who would be arriving at university almost 18 months after the sudden move to "emergency remote teaching" [54]. We weren't sure how much importance our entrants would attach to "real-life" friends, in comparison with online ones [33]. These students had already endured a long period of mainly remote learning at school or college during which their social role was disrupted [50]. Evidence was already emerging of the deleterious impact on anxiety [55] and the "social and emotional aspects of learning" [56] among older school students. Once at university, their classes would be subject to the same distancing regulations [57] requiring most learning events to take place online, with the potential loss of propinquity for making friends [40] and limiting their opportunities for establishing learning networks [25] with their coursemates.

IV. ATTITUDE TO FRIENDSHIP STUDY

Our survey took place in the first week of teaching, September 2021. Data gathering consisted of a paper questionnaire with Likert scales and open-ended questions.

Our study passed the ethical review process of our University Research Integrity Committee. The design of the data gathering element involved a series of compromises. We aimed for a high response rate and opted for administering it in person rather than online, which would have yielded fewer responses [58], especially as many entrants were not yet fully familiar with the university's system. Face-to-face administration also mirrored the mode of delivery of that particular class [58]; on the other hand, we wished to avoid encroaching heavily on class time and to minimise physical contact. We also anticipated that more students would be willing to commit 15-20 minutes of class time to a questionnaire than would agree to participate in online interviews.

A. Participants

Our participants were a purposive sample of recent first year entrants to a range of CS-related degrees in the Computer Science department of Scottish university. They were all enrolled on the same introductory information systems module in which lectures and labs were delivered online, but the four tutorials took place socially distanced in classrooms, with a group size of around 24. Of the 92 students enrolled on the module, a number of international students missed the data gathering because they were in quarantine having newly arrived in the UK; some were in isolation having contracted Covid-19; and several declined when offered the form. Therefore, 68 students completed all or part of the questionnaire.

We felt there was a slight chance some respondents might feel that friendship was a sensitive topic. Therefore, we emphasized to each tutorial group, verbally and in writing, that participation was entirely voluntary and that non-participation would have no effect on assessment, though we were aware this might depress the response rate. In addition, before a copy of the questionnaire was handed to each student in turn by the researcher, who was not teaching the class, she asked, "Would you like to answer the questionnaire? You don't have to" (several students declined the proffered form). We also showed PowerPoint slides reproducing the consent form attached to the front of the questionnaire, and explained pseudonymization and data protection.

B. Questionnaire

We began the questionnaire by asking respondents "Where did you make the important friendships you currently have?" and asking them to tick all that applied from: School; College; Work; Sport; Gaming; Other (please specify). Despite the first three environments being largely out of bounds during the pandemic, we wanted to gain some idea of whether our respondents were accustomed to making friends in school or college, and where else friendships were formed. Lippke & al's link [38] between friendship, loneliness and physical activity encouraged us to include sport, also heavily curtailed, as a place for making friends. We were also interested in finding the proportion of our students who deemed friendships arising from gaming [33] of importance.

C. Likert-type items

The main part of our survey comprised six Likert-type items followed by four open-ended questions. Likert-type scaling was selected because of its wide use in educational and social science studies, the relative ease of analysis to gain valid and supportable results [59], and its likely familiarity to participants, obviating the need for extensive explanation.

On a scale where 1 = Strongly disagree and 5 = Strongly agree, participants were asked to rate the following statements:

1. The friends I made at school/college were important to me in my academic studies before coming to university
2. The friends I will make at university will be important to me in my academic studies during first year
3. I enjoy studying with friends
4. My feelings towards my studies are influenced by my friends
5. I think friendship is best kept out of academic study
6. At university, I think it will be easy to make friends

All the statements were geared towards capturing views on learning networks [23], but because of the unfamiliarity of this specialized term we substituted the words 'friends' and 'friendship'. Items 1 and 2 arose from the literature relating sense of belonging and academic success [14] [15]. Item 3 was intended to check if respondents were answering randomly by being almost contradictory of Item 5; it arose out of the stereotype of CS students preferring to study alone [24]. Item 4 was seeking support for Cabo & Satyanarayana's [25] and Green, Plant, & Chan's [27] suggestion that relationships with classmates influence attendance and performance. Finally, Item 6 stemmed partly from Parks' reflection [39] that the start of university offers unique time and freedom for socializing, at least in non-pandemic times, and partly to gauge the pessimism or optimism amongst our entrants regarding the likelihood that they would make friends.

D. Open-ended questions

We would have preferred to encourage more discursive answers and to enrich our data by supplementing the Likert-type items with face-to-face interviews or focus groups, but these methods were inaccessible owing to Covid-19 restrictions on students attending campus in person, and online interviews might yield fewer participants. We therefore compromised by adding the following four open-ended questions to the paper questionnaire:

7. Think back to your personal experience during the past year. Do you think friends and friendship was a factor in your academic achievement, and if so, in what ways?
8. Think now of your thoughts regarding the coming year: Do you think friends and friendship will be a factor in your personal wellbeing at university, and if so, in what ways?
9. Do you think friends and friendship will be a factor in your personal development at university, and if so, in what ways?
10. Do you think friends and friendship will be a factor in your academic success at university, and if so, in what ways?

Question 7 is worded to ease the respondent into talking personally and reflectively, and is based on research linking membership of learning networks to attendance and success [25]. Question 8 aimed to elicit entrants' own perceptions of whether being a member of their social network, and consequently being isolated from it, would impact on their mental health [44]; however, we used the phrase "personal wellbeing" to avoid planting the term "mental health". If we had used "mental health", we would not be able to ensure it

had arisen spontaneously in responses. Question 9 arose from research on the relationship between collaborative learning and self-efficacy [10]; we used the term “personal development” to avoid planting the word “confidence”. Like Question 7, the final question originates from the research on social integration and academic outcomes [12], but here the wording focuses not on past achievement but on how friendship might feature in future success.

E. Coding of Open Question Responses

We began open coding by first transcribing the handwritten answers from paper questionnaires into Excel and importing them into Nvivo 20. Using Nvivo alone instead of a more involved manual, paper based or combined software and paper method [60] risked a mechanistic, utilitarian approach to coding, rather than allowing the themes to emerge over a lengthy relationship with the data. However, we were alert to this risk and balanced it against the benefits of more organised and comprehensive analysis, and much greater speed. We used Nvivo to assign new codes as they emerged from the open question data, resulting in 31 separate codes.

As this study had a sole author, a fellow researcher in CSI education in the same department participated in reviewing the coding and emergent themes. Occasional differences of opinion occurred during interpretation of responses, specifically when deciding whether the nebulous concept or feeling encapsulated in a phrase could be assigned to an existing code or whether it was sufficiently distinct to merit a new one. We embarked on a second stage of grouping the codes thematically but stopped when it resulted, predictably, in loose categories mirroring the original topics of the four open questions, rather than yielding further information.

V. RESULTS AND DISCUSSION

The response rate differed according to the type of question. When asked where they had made their important current friendships, all 68 respondents ticked at least one option. The six Likert-type items were also completed by all 68 respondents. However, ten declined to answer any open questions, two answered only three, and 56 respondents answered all four.

A. Source of Current Friendships

The most common sources of current friends were school, with 51 responses, and gaming, with the relatively high total of 30, unsurprising given the prevalence of boys and young men in gaming [33] and female students comprising only 10% of the cohort. Given that for much of the year to September 2021 unrestricted socializing was banned indoors, most of the gaming will have taken place online. Nine students cited college as a source of friends; given the general age profile of the cohort, these are most likely to be older entrants. The large number of respondents who selected both school or college and gaming as a source of important current friendships, totalling 26 out of 68 respondents, suggests that, while many entrants had minimal attendance at school and studied mainly remotely during the previous year [56], they maintained their existing social network of schoolmates and other friends, or made new friends, partly through gaming during the pandemic. Sport was a source of friends for 14 respondents, reflecting, perhaps, that while formal team sport was mainly banned [57], informal outdoor activities such as a few friends playing football in the park remained possible. Only eight students cited work as a source of important friendships, reflecting perhaps the dearth of usual part-time work

opportunities in retail, hospitality and volunteering during the previous pandemic year. Eleven respondents answered “Other”, citing variously scouting, church, through friends, travelling, and charity work, while two cited “online community” as the only source of their current friendships.

B. Likert-type Items

The data from this method, while limited in theme, do offer some interesting insights. None of the 68 respondents has chosen the same point on the scale for all six items, thereby reducing, though not eliminating, the possibility that anybody answered at random.

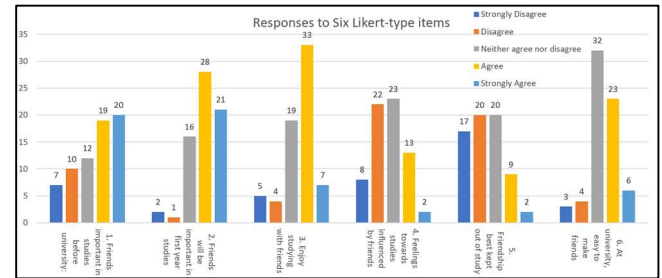


Fig. 1. Responses from 68 students to six Likert-type statements.

Students giving a low score for statement 1, that friends were important to their pre-university studies, were more likely to agree with statement 5 that “friendship is best kept out of academic study”. Unsurprisingly, the 11 students who scored 4 or 5 to statement 5 do not enjoy studying with friends; they scored 1.4 less than the cohort average response (3.5) on statement 3 “I enjoy studying with friends”. The negative statement 5 thus also fulfilled its purpose of checking for automatic responses. Statement 6 asked students to rate how easy it will be for them to make friends at university. This garnered the biggest neutral score, at 32, of all six statements, reflecting perhaps the simple fact that students were being asked to predict something fairly unknowable after only a few days in the institution. Interestingly, five of the 11 individuals who think friendship is best kept out of academic study still agree that the friends they make at university will be important to their studies in first year (statement 2), indicating ambivalence or simply doubt about future social relationships.

As figure 1 shows, there were far more positive than negative scores; given the previous year’s restrictions on interactions at school and college [50], this indicates quite an optimistic view of the ease of making friends. At the time of data collection there had admittedly been some loosening of lockdown regulations compared to the year before; but conditions were still starkly different from the busy social experience of freshers in non-pandemic years.

C. Open Questions

Responses seldom repeated key phrases from the questions, which reassured us that our efforts to avoid implanting words were largely successful.

1) HelpMentHealthFut

This NVivo short code denotes “[friendship or friends will] help my mental health in the future”, and was the most frequently occurring theme in the open question data. Respondents mentioned friendship or friends helping with or supporting mental health in response mainly to Question 8 regarding personal wellbeing at University. Its frequent occurrence may be attributed to recent experience of stress or mental ill-health [55] arising from not being able to be with

friends, and might not have been cited had this study taken place prior to the Covid-19 pandemic:

“I think having friends and being able to meet socially will improve my mental health.”

“As socialising is important to having good mental health, and may get people outside to socialise, which is also of great importance.”

This student was emphatic about the centrality of friendship to their wellbeing:

“I think that it will affect my personal well-being full stop, in and out of uni. Because you need people to talk to, who understand your point of view, for your mental health.”

Codes	
Name	References
HelpMentHealthFut	31
NotImpAcAc	25
NotImpAcSu	22
MutHelpFut	18
PersGrowthFut	14
InfByFriendsFut	14
EnjoyFut	13
AmbivFut	12
HelpWorkFut	11
MotivAcAc	10

Figure 2: Nvivo 20 screen showing the ten most frequently occurring of 31 encoded themes.

2) NotImpAcAc and NotImpAcSu

NotImpAcAc, with 25 references, denotes “[friendship or friends were] not important in my academic achievement”, mainly in response to Question 7 about the previous year’s experience. It pairs interestingly with the next most frequently-occurring theme, NotImpAcSu “[friendship or friends will] not be a factor in my academic success at university”. However, many students qualified the negative response by anticipating friends’ *indirect* role in future academic success by providing a positive context for study [25]:

“It didn’t directly change how I performed. However, it made the experience of being in sixth form more enjoyable as a whole.”

“Not the major reason why I can or cannot be successful, but I do believe that having friends helps a lot.”

“I think the grades I achieved at school were not influenced by my friends. However, they did make being at school better.”

“They won’t directly influence my results. However, they’ll make the experience more enjoyable.”

These students cited their own responsibility, also influenced by the greater requirement for independence at university:

“No, I think that’s up to me from now on.”

“I don’t think so. My academic achievement is my own responsibility, and if I do well or not is down to me.”

“Yes, because the tutors will not always be available to clear things up.”

“Maybe, as surely will be more independent at uni compared to school or college.”

There was some evidence of remote learning disrupting normal study networks [50]:

“I don’t think so. Almost everything was remote, so we haven’t met with my mates much.”

3) MutHelpFut

Contrasting with the previous theme, there were 18 references to respondents and friends helping one another [29], including being able to discuss their studies [24], largely in response to Question 10 “Do you think friends and friendship will be a factor in your academic success at university?”

“Yes, as friends help each other build their strong points.”

“Yes, because we can provide support to each other.”

“Having friends on the same course means I’ll have someone else to talk to about the work (either for help or to help).”

“We push each other and support each other in our studies.”

Respondents also mentioned the benefits of finding friends they would feel comfortable to study with as a factor in future academic success [23], in this case, a small group [14] :

“Yes, I believe if I have a small group of close friends I will be happier and study should be easier.”

4) PersGrowth Fut

This code denoted “Friends or friendship will help me grow as a person, or grow up”. There were some heartfelt and quite personal responses to Question 9, reflecting the centrality of friendships to students [26]:

“I’m hoping to meet new people and learn from them. Meeting new people and friends helped me grow and develop into who I am to-day.”

“Yes, as the people you associate with turn you into the person you are. They can introduce new things and activities to me.”

“Yes, the people who surround me will influence my personal growth, my interests and how I spend my time.”

These students focused on how friends would help with expressing themselves [32]:

“Yes, as they will make me less shy and more outgoing.”

“I do, as it will help with my communication and confidence skills.”

These students touched on the role friends can play in feeling a sense of belonging [16] at university:

“Yes, as it can be difficult to feel “at home” without a support network.”

“Yes, as it will help me feel connected and part of something.”

“Yes, I do, because if I’m able to make friends here I will be happier and more comfortable at university.”

“Having someone by your side to navigate the world makes it less scary.”

5) *InfByFriendsFut*

We recorded 14 references to the theme of “Friends will be important because I am influenced by them” in response variously to Questions 8,9 and 10. Here were the clearest indications that having friendships might affect students’ academic success [14] and even progression [15], for example:

“Yes, they help keep me motivated and help me study.”

“Yes, on how much I enjoy living away from home, to the extent of if I want to continue at uni.”

“Without them, I would fail.”

6) *EnjoyFut*

A key emergent theme was enjoyment and happiness. The code *EnjoyFut* denoted “Friends will help me enjoy the coming year or university or make me happier”; whilst happiness can be defined as a state of mind [60], we were keen to differentiate it from the theme of mental health. Here we hear students explain the value of friends in simply helping them to enjoy university, including specific assignments, and make them happy:

“Definitely, I’m in Uni for four years. Therefore, if I make good friends, then they’ll make the experience more enjoyable and would make me happier in general.”

“Yes, as I enjoy meeting friends, which makes me enjoy my time here more.”

“Yes, group projects are way more fun than working alone.”

“Yes, because it’s nice to have friends.”

“Yes, just general happiness.”

7) *AmbivFut*

Responses here were to all three questions about the year ahead at university, with the code denoting “Friends will be important, but so will study”. Interestingly, although some answers expressed simple uncertainty – “Don’t know yet”, others were quite nuanced in their expectations of the relationship or balance between friendship and their future studies, for example:

“It might help me focus, but it might make me more distracted.”

“Yes and no. The right friend will push you to be your best.”

8) *HelpWorkFut*

This code denoted “Friends will help with studying”. In contrast to students whose view of friendship at university was of mutual help, 11 respondents were explicit that they expected to receive help from their study network [27]:

“Friends help with problems or when stuck.”

“Yes, they can support me in my studies and help through subjects I struggle in.”

“Potentially will help with any confusion or my areas I’m unsure or lack confidence in, providing further clarity.”

“Can help me answer questions I struggle on.”

9) *MotivAcAc*

We coded ten references in which [friends] “encouraged, pushed or motivated me in my past academic achievements” prior to university entrance. We noticed that respondents mostly didn’t talk about the practical help their friends gave them. They instead acknowledged that friends contributed to mental health, provided an enjoyable context for study and, in this case, motivated them. Motivation from friends will have been of particular value given the loss of engagement [43] and stress caused by the pandemic’s prolonged disruption to education [44]:

“Yes, my friends pushed me to study and allowed me to pass my exams with a support system.”

“Having friends who want to do well and succeed definitely helped my motivation and focus.”

“When my mental health took a dip, my friends would usually notice and help me best they could. This allowed me to feel confident enough and safe enough to continue without feeling like giving up.”

10) *Other interesting responses*

There were many other noteworthy responses, some of them eloquent and quite poignant, coded under multiple or less common themes, for example:

“Yes, having people to model, to learn with, make mistakes with, and being yourself around, is v important. I try to be my best self around my friends. Hopefully friends want to protect and help you.”

“I am already my own fully developed man. Yet, everyone has an impact on you in some way.”

“Social relationships are important and I won’t be too lonely.”

“Yes, I think the four factors (mental, emotional, physical and spiritual) are closely linked, so when my emotional state is good, my mental, etc are good. So I am more motivated to study + learn.”

“Feeling like I have people that support me will be important, that if I fail I will still have friends. I think friends are important because they are not in your head, so can distract you, give you different advice, and love you unconditionally.”

VI. CONCLUSIONS

Our aim in this study was to explore a small group of CS1 entrants’ feelings and views about friendship as they embarked upon their degree course. They had experienced disruption of their social role [34] during mainly school-based learning, as well as curtailment of their physical freedom to socialise [38], that may have led them to under-report the benefits of friendship in their prior academic achievement. Despite the interruption to the normal patterns of face-to-face interaction, and a large number finding or maintaining their friendships online, we discovered they confounded the usual stereotypes of computing students [35], and have largely positive expectations of, and place a high value on, “real-life” [33] friendship in their studies during the year to come.

We expected few, if any, students to admit that their feelings towards their studies might be influenced by their friends. That 15 agreed or strongly agreed, and elaborated in the open answers, lends some weight to the many studies suggesting a beneficial relationship between students’ social

network, their sense of belonging, and engagement [23]; they value the opportunity to discuss work with their peers, and enjoy purposeful collaboration [24]; it also offers support to those studies proposing a more direct link between students' social network and persistence [27].

There is a temptation to concentrate bonding and cohort-building activities during induction or freshers' week, and trust that students can create and consolidate friendships by themselves thereafter. However, good friendships of the kind that our respondents are hoping for, of mutual trust in which they can talk freely [32], require time and not just propinquity to flourish [39] [40]. There is a danger that institutions might not initiate or return to resource-expensive, semester-long in-person active learning following the enforced experiment with the remote version [41], despite evidence that online learning is having a deleterious effect on engagement [44]. If anything, our findings should encourage us as educators to create active learning events that nurture budding friendships [22]. Lurking behaviour [45] is reduced and engagement fostered [28] amongst students experiencing in-person active learning, even within large classes.

This study does not claim that friendship is pre-eminent among the multiple factors in a CS1 student's progression to second year. However, students themselves acknowledge the benefits of friendship to their overall resilience and mental health, which in turn enable academic persistence and success. We need to acknowledge that recognising and valuing students' friendships now will support the mental wellbeing and personal development of coming cohorts of first years similarly affected by the Covid-19 pandemic.

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