International **R**eview of **R**esearch in **O**pen and **D**istributed **L**earning
Volume 20, Number 4

October – 2019

Factors Related to Student Persistence in Open Universities: Changes Over the Years

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Abstract

Student persistence has long been a major challenge for open universities. Despite the evolution of open education, an overall high student attrition rate remains. This paper examines the changes and trends in factors related to student persistence in open universities. It reviews the empirical studies from the 1970s to the 2010s which reported factors influencing student persistence. The relevant studies were searched from databases, including Scopus, Web of Science, and Google Scholar. Among the 108 studies collected, a total of 284 factors influencing student persistence were identified. The factors were categorised into student factors, institutional factors, and environmental factors. Their changes and trends over the years were examined. The results show that student factors were the most frequently studied over the years examined, with the major categories being students' psychological attributes and outcomes. Institutional factors have been increasingly studied in recent decades, with the design and delivery of programmes and courses being the strongest category. Finally, environmental factors have been decreasingly examined, with factors related to students' family and work being the two main categories. Based on the results, the implications for developing intervention and retention strategies for student persistence in open universities are discussed.

Keywords: student persistence, retention, attrition, open universities, open and distance education

Introduction

Student persistence has long been a major challenge for open universities. Throughout their development—from the founding of the UK Open University in 1969 to the current situation with about 60 open universities established around the globe—student persistence (and student attrition) has received considerable attention (Tait, 2018a, 2018b). Despite the wealth of literature published on this topic over the past decades, it remains a major problem for open universities today. A recent report by the Commonwealth of Learning, which reviewed the status of 27 open universities in the Commonwealth, found an average output rate of only 15.26% (the proportion of students leaving the universities in a particular year with a qualification), indicating a huge attrition rate in these universities (Commonwealth of Learning, 2017).

The challenge of student persistence has affected the performance of open universities. For example, the UK Open University, despite having the highest output rate (about 55%) among open universities (Commonwealth of Learning, 2017), is still facing the problem of student retention. The high student attrition rate is threatening the financial status of open universities as well as having a negative impact on their reputation and recruitment, particularly when about half of the open universities have already been suffering an enrolment decline or loss of market share (Garrett, 2016).

Although student attrition has been shown to be happening in many higher education institutions, Simpson (2013) found that the graduation rates in open universities were in general only about a quarter of those in conventional face-to-face institutions. The contexts in which these two types of education institutions operate suggest that the factors which contribute to student persistence differ between them. Tait (2018a) pointed out that the characteristics of the open university model make student retention more vulnerable. For example, opening access to study results in learners having lower prior educational achievement, and learners in part-time and distance modes face more difficulties than do full-time students. Therefore, specific factors affect student persistence in the open university model.

This paper presents a comprehensive study of the factors involved in student persistence in open universities and identifies changes in these factors. Within the large amount of work carried out in this area, the evolution of open education—involving technological updates and changes in the course delivery mode—has introduced new factors related to student retention. The results of this study contribute to informing the strategies for student retention and intervention in open universities. In particular, this study focuses on the following research questions: (1) What are the factors which affect student persistence in open universities in various periods of time? (2) What are the changes and trends in these factors over the various periods of time?

Literature Review

Student persistence has been widely studied in the past, and a broad range of related factors have been identified. For example, Au, Li, and Wong (2017) reviewed the literature on this issue, and categorised the related factors into student factors and institutional factors. The former address students' demographic information, such as age, personal expectations about studying in an open university (e.g., the amount time and effort required and work and family commitments), and motivational and psychological factors (e.g., a sense of accomplishment and the goals of study). Institutional factors are

related to the quality and content of programmes and courses, and the institutional support offered to students. Li, Wong, and Wong (2015) and Wong and Wong (2016) addressed the issue from the perspective of student support, identifying the specific support needs of students studying in open universities.

Simpson (2013) identified several inherent deficit factors in open universities that may cause students to terminate their studies. One major factor is the lower student qualifications as a result of open entry, and many mature students possess low self-expectations about fulfilling the challenging course requirements (Gibbs, Regan, & Simpson, 2006). Second, the courses provided by open universities may be taken by students with the aim of meeting the requirement for gaining admission to other institutions, so they can transfer there after gaining course credits from the open universities. There are also cases in which students settle for only an intermediate qualification, such as a diploma or certificate, without pursuing the full degree, which leads to some pre-graduation dropout. Yet another factor is the part-time mode of study, wherein many students must cope with family and job responsibilities along with their studies, and eventually drop out for non-academic reasons.

Despite the substantial amount of work on student persistence, the related factors have yet to be systematically reviewed and summarised. The existing reviews of this topic have covered only part of the relevant literature. For example, Hart's (2012) review of the factors associated with student persistence—which identified a total of 24 factors which facilitate or hinder it—covered only 20 articles published from 2001 to 2011. Similarly, Lee and Choi (2011) summarised a total of 69 factors from 35 studies published between 1999 and 2009. Given the several decades of historical development of open universities, a large amount of literature remains to be covered. In addition, as open education has evolved, with technological advances and changes in the delivery mode, the factors influencing student persistence have also been changing. However, this aspect has yet to be addressed in the existing reviews of the literature.

Research Method

This study reviewed the factors related to student persistence in open universities, examined the changes in the factors between various periods of time, and identified the trends in the factors, if any. It covered the studies conducted from the 1970s to the 2010s, and targeted peer-reviewed journal articles to help ensure the quality of the studies (Krull & Duart, 2017). The related literature was collected from publication databases including Scopus, Web of Science, and Google Scholar. The keywords used for the search included student persistence/retention/attrition/dropout, open/distance learning/education, and open university/universities.

The initial search following the above criteria resulted in 1,860 articles. Each of these was scanned and was selected if it

- involved an empirical study conducted in an open education setting;
- focused on identifying factors affecting student persistence;
- was published in a peer-reviewed journal;

- was written in English; and
- was available in full text.

After further screening, a total of 108 journal papers were collected for review, including one paper published in the 1970s, 16 in the 1980s, 18 in the 1990s, 35 in the 2000s, and 38 in the 2010s (until 2017). As only one relevant paper published in 1979 was found for the 1970s, it was put together with the papers published in the 1980s for analysis.

From these selected studies, the study contexts and the relevant factors for student persistence in open universities were identified for further analysis and evaluation of the quality of the studies. The contextual information on the studies was organised according to their scale, location, and research method. The student persistence factors were included for analysis only if they were found empirically in the studies through checking their results. Among the 108 papers reviewed, a total of 284 factors were reported which were found to have positive or negative effects on student persistence. After excluding the repeated factors, the number of factors was 194.

The factors were categorised into three main groups: (a) student factors, (b) institutional factors, and (c) environmental factors. The grouping approach followed that used by Lee and Choi (2011), except that since a broader range of factors were identified, a more general group—institutional factors—was used in this study (to replace the course and programme factors in their review). Within each main group, the factors were further classified into various subcategories and their frequency was counted. Lee and Choi's categorisation was extended to include the subcategories not covered in their study, resulting in a total of 14 subcategories under the three main groups, namely:

- Student factors—demographic factors; psychological attributes; prior educational experiences; prior knowledge and skills; planning, managing and resource allocation; psychological outcomes; and academic outcomes.
- Institutional factors—the design and delivery of programmes and courses; interaction; institutional support; and other institutional factors.
- Environmental factors—family factors; work factors; and other environmental factors.

The identification and categorisation of factors were performed by two researchers independently for cross-checking. Any disagreements during the process were resolved through discussion and further review of the disputed cases.

Results and Discussion

Overview of the Studies

The 108 papers collected for this study were published in 43 different journals. Table 1 shows the journals with three or more papers, which covered about 60% of the papers in this research. The journals focused mainly on studies related to distance education and technology in education.

Table 1

Distribution of Journals with Three or More Papers in This Study

Journals	Frequency
Distance Education	24
American Journal of Distance Education	12
Internet and Higher Education	9
Online Journal of Distance Learning Administration	7
International Review of Research in Open and Distributed Learning	6
Computers & Education	5
Research in Higher Education	3

Figure 1 presents the sample sizes of the studies. The studies involved various scales, from below 100 to above 1,000 participants, with no dominant sample grouping. The largest group (28%) included the studies with 100 participants or below, which mainly adopted qualitative research methods such as interviews and case studies (see also Figure 3).

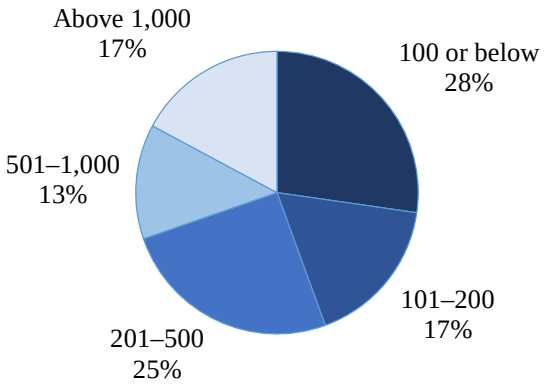

Figure 1. Proportion of the sample sizes of the studies.

Figure 2 illustrates the locations of the studies and the frequency count of the locations. The studies covered a total of 29 countries and regions, of which 46 studies were conducted in the United States, followed by 14 in Canada. These two countries accounted for over 50% of the studies. All the remaining locations involved less than 10 studies, and more than half of them had only one study. Although most of the studies were conducted in the North American context, the locations of the studies covered various continents in the globe.

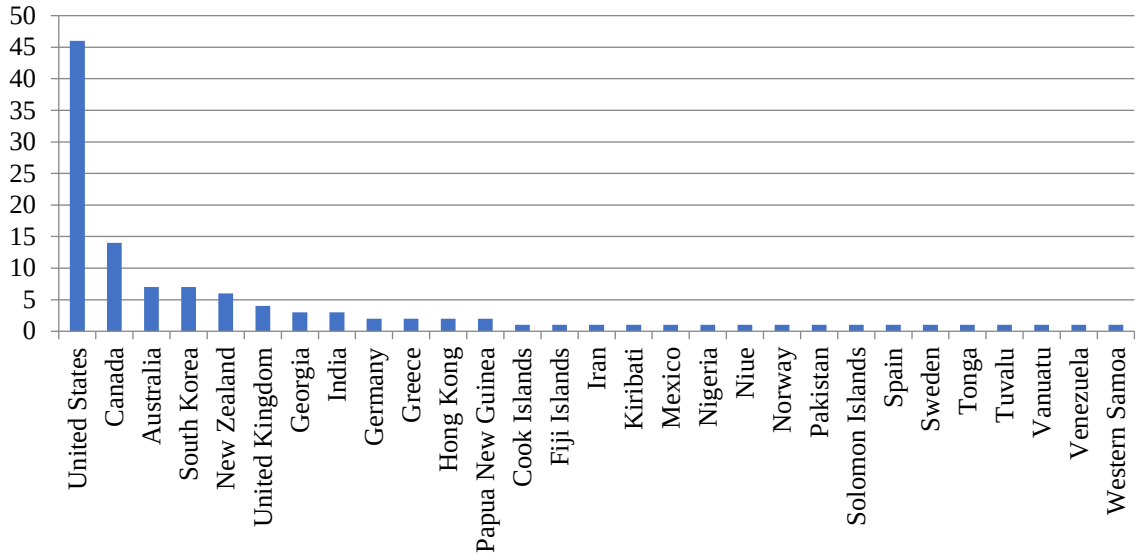

Figure 2. Frequency of the countries covered in the studies.

Figure 3 summarises the types of research methods used in the studies. Most of them adopted quantitative research methods, the majority using questionnaire surveys; and 23% analysed institutional data to identify potential factors related to student dropout. Common types of data included (a) student demographics, (b) course selection and completion records, (c) student logs on learning management systems, and (d) the completion of assignments. The remaining studies used qualitative research methods, most of them involving interviews (14%) and other methods such as case studies, content analysis of the reflections of dropout students, and the Delphi method (i.e., collection of experts' opinions from several rounds of communication). The student persistence factors identified from these studies were thus mainly based on empirical methodology.

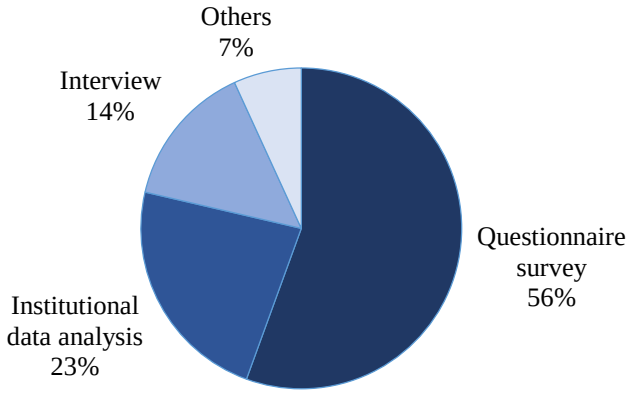

Figure 3. Proportion of the research methods used in the studies.

Factors of Student Persistence

Tables 2 and 3 provide a summary of the student factors before and after students' enrolment. The periods of time when the factors were identified in the literature are also indicated. The pre-enrolment student factors include the subcategories of (a) students' demographic factors, (b) psychological attributes, (c) prior educational experiences, and (d) prior knowledge and skills. The post-enrolment student factors include the subcategories of (a) planning, (b) managing and resource allocation, (c) psychological outcomes, and (d) academic outcomes. Some factors have been studied in different time

periods, such as students' locus of control and academic achievement. It is also clear that some factors were identified following the use of e-learning in open education, such as students' satisfaction with e-learning.

Table 2

Student Factors Affecting Persistence (Pre-Enrolment)

Student factors (pre-enrolment)		Periods of time when the factors were identified in the literature			
		1970s/80s	1990s	2000s	2010s
Demographic factors	• age	✓	✓	✓	✓
	• gender	✓	✓	✓	✓
	• geographic location	✓			✓
	• marital status		✓		✓
	• occupation		✓		
	• role in life/being parents				✓
	• being a migrant				✓
	• employment status				✓
	• enrolment status				✓
Psychological attributes	• locus of control	✓	✓	✓	✓
	• cognitive style	✓			
	• initial goal of study				
	- goal setting				✓
	- goal expectation	✓			✓
	- perceived value of the qualification/perceived utility of learning				✓
	- reason for taking/attending the course	✓			✓
	• concrete experience score		✓		
	• learning style		✓		✓
	• self-efficacy			✓	
	• self-motivation			✓	✓
	• love of learning			✓	
	• self-discipline			✓	✓
	• personal drive and determination			✓	✓
	• life-challenger			✓	
	• resiliency			✓	
	• expectations of the courses			✓	
Prior educational experiences	• prior experience with distance learning	✓		✓	✓
	• length of time since last college course	✓		✓	
	• recent completion of an online course		✓		
	• prior educational level		✓		✓
	• age when completing full-time education		✓		
	• perception of prior educational experience		✓		
	• credit transfer opportunity				✓
Prior knowledge and skills	• prerequisite knowledge/skills on the subject		✓		✓
	• high school achievement/pre-enrolment GPA			✓	✓
	• computer skills		✓		
	- prior computer skills training		✓	✓	
	- computer proficiency			✓	✓
	- computer confidence		✓	✓	

• time management skills		✓	✓	
• literacy		✓	✓	
• independent learners			✓	
• coping strategies			✓	
• ability to juggle family, work, and study			✓	
• study management skills			✓	
• test-taking and memory skills			✓	
• metacognitive self-regulation skills				✓
• learning approaches (deep approach, strategic approach, surface approach)				✓
• mathematic ability				✓
• English skills				✓

Table 3

Student Factors Affecting Persistence (Post-Enrolment)

Student factors (post-enrolment)		Periods of time when the factors were identified in the literature			
		1970s/80s	1990s	2000s	2010s
Planning, managing, and resource allocation	• investment of money	✓			✓
	• time management			✓	✓
	- availability of time	✓	✓	✓	✓
	- amount of time devoted to study	✓			
	- distribution of time for study	✓			
	- regular time for study		✓		
	- estimation of the time required			✓	
	• management of other resources				
	- study environment/designated place for study		✓		
	- household income and perceived financial security		✓		
	- financial aid/assistance			✓	
	• coping with various responsibilities			✓	
	• managing workload			✓	
	• achieving a balance among work, life, and study				✓
Psychological outcomes	• motivation (studying/learning goals newly developed)			✓	✓
	- clear goals		✓		
	- goal commitment	✓	✓		
	- progress towards completion of goals	✓			
	- perception of chances of success		✓		
	- perception of consequences of not passing		✓		
	• flow experience				✓
	• satisfaction		✓		
	- course satisfaction	✓		✓	✓
	- goal satisfaction	✓			
	- expectations met by course experience			✓	
	- satisfaction with e-learning/distance learning			✓	✓
	- satisfaction with the university experience				✓

	• perception of institutional commitment	✓			
	• self-esteem		✓		
	• impression of the course		✓		
	• commitment to the course				✓
	• social connectedness/sense of learning community			✓	✓
	• campus connectedness				✓
	• perceived stress and support				✓
Academic outcomes	• academic achievement	✓	✓	✓	✓
	• perceived academic performance	✓			
	• number of courses taken				✓
	• number of assignments completed	✓			
	• number of hours enrolled			✓	
	• class standing/academic experience				✓
	• perceived degree of learning			✓	✓

Table 4 summarises the institutional factors, including the subcategories of (a) design and delivery of programmes and courses; (b) interaction; (c) institutional support; and (d) other institutional factors (those that do not belong to the above subcategories). The periods of time in which they were identified suggest that institutional factors did not receive much attention in the early periods, as most of these factors were identified in the 2000s and 2010s.

Table 4

Institutional Factors Affecting Student Persistence

Institutional factors		Periods of time when the factors were identified in the literature			
		1970s/80s	1990s	2000s	2010s
Design and delivery of programmes/courses	• quality of the programme			✓	
	• quality of the courses		✓	✓	
	• course design		✓		
	- course structure				✓
	- course difficulty		✓	✓	✓
	- workload		✓	✓	✓
	- course length			✓	✓
	- schedule and pacing			✓	
	- flexibility of the course schedule			✓	✓
	- use of an online learning environment			✓	
	- match with students' learning styles			✓	
	- team-building activities			✓	
	- collaborative learning				✓
	- motivational design				✓
	- work-integrated learning				✓
	- type of assessment				✓
	- start date of the course				✓
	- elective or compulsory course				✓
	• instruction				
	- instructional design		✓		
	- instructional materials	✓	✓	✓	✓
	- communication channels	✓			
	- quality of online instruction		✓		
	- timely delivery of course materials			✓	
	- clearly-stated requirements			✓	

	- clarity of expectations				✓
	• content				
	- quality of the content		✓	✓	
	- relevancy to students' interests and work		✓	✓	
	- perceived usefulness of the content				✓
	• guidance for assignments				✓
Interaction	• interaction with teaching staff			✓	
	- tutorials	✓			
	- turnaround time	✓			
	- interaction with tutors via telephone	✓			
	- availability of tutors		✓		
	- instructors' teaching presence			✓	✓
	- instructors' feedback (timeliness, quality, and quantity)		✓	✓	✓
	- amount of course-related communication			✓	✓
	- students' attitudes to interaction with teaching staff			✓	
	- students' perceived usefulness of interaction with teaching staff			✓	
	• interaction with peers		✓		✓
	- peer contact/communication	✓			
	- students' feeling of presence of and support from peers			✓	
	- students' attitudes to interaction with peers			✓	
	- students' perceived usefulness of interaction with peers			✓	
	• interaction during the course				✓
	- class discussion			✓	
	- student participation in interaction			✓	
	- student participation in collaborative learning				✓
	- students' viewing of discussion posts and content pages			✓	
	- students' social presence			✓	
	- students' cognitive presence			✓	✓
	- faculty participation			✓	
	• students' initial contact with the institution from admission		✓		
Institutional support	• student support services				✓
	- provision of support services			✓	
	- availability of a local support centre	✓			
	- quality of services		✓		
	- timely support to students		✓		
	- office hours		✓		
	- personal contact for support				✓
	- general messages of support				✓
	- students' perceived availability of services			✓	
	- communication of course information			✓	
	- technical support			✓	
	- online academic advisors			✓	

	- study centre			✓	
	- prompt assistance/reply to queries				✓
	- effectiveness of advice				✓
	- financial aid, counselling, tutoring				✓
	• support from instructors/tutors		✓	✓	✓
	• library facilities		✓	✓	
	• provision of advice			✓	
	• online orientation			✓	✓
	• survey on students' readiness for distance study				✓
	• supportive learning environment				✓
Other institutional factors	• costs of study		✓		
	• knowledgeable and supportive staff				✓
	• employment status of faculty members				✓
	• ease of use of the learning system				✓
	• financial and academic penalties				✓

Table 5 presents the environmental factors, including the subcategories of (a) family factors; (b) work factors; and (c) other environmental factors (those that do not belong to the above two subcategories). The results show that environmental factors have been studied in different time periods. Some factors, such as students' family commitments, family support, and work commitments, have been continuously studied over time.

Table 5

Environmental Factors Affecting Student Persistence

Environmental factors		Periods of time when the factors were identified in the literature			
		1970s/80s	1990s	2000s	2010s
Family factors	• number of children	✓			✓
	• family commitments		✓	✓	✓
	• family support		✓	✓	✓
Work factors	• work commitments	✓	✓	✓	✓
	• employment dislocation	✓			
	• professional activities during study	✓		✓	
	• attitude of employer and workmates		✓		
	• employer's support			✓	
	- financial support		✓		✓
	• support from colleagues			✓	
	• employment change			✓	
	- change in work environment		✓		
	- promotion/job transfer		✓	✓	
	- new employment/launch of business/extra responsibility			✓	
Other environmental factors	• unexpected life events/change in life circumstances (e.g., illness, divorce)	✓		✓	
	• other educational opportunities	✓	✓		
	• additional commitments	✓			
	• events which hinder study		✓		
	• social life		✓		

• friends' support	✓	✓	
• social obligations		✓	✓
• study environment		✓	✓
• computer access		✓	

Changes and Trends in the Student Persistence Factors

Figure 4 illustrates the changes in the proportion of the three groups of factors among the various periods of time. Student factors were the largest group in all the time periods (covering a total of 131 out of the 284 factors), despite there being an overall trend for a decline in their proportion studied from 58% in the 1970s/80s to 47% in the 2010s. On the other hand, the proportion of institutional factors has been increasing and has become comparatively as important as student factors in terms of the frequency of being examined. Finally, the proportion of environmental factors has been decreasing, and only 9% of the factors studied in the 2010s belong to this group (compared to 20% and 22% in the 1970s/80s and 1990s, respectively).

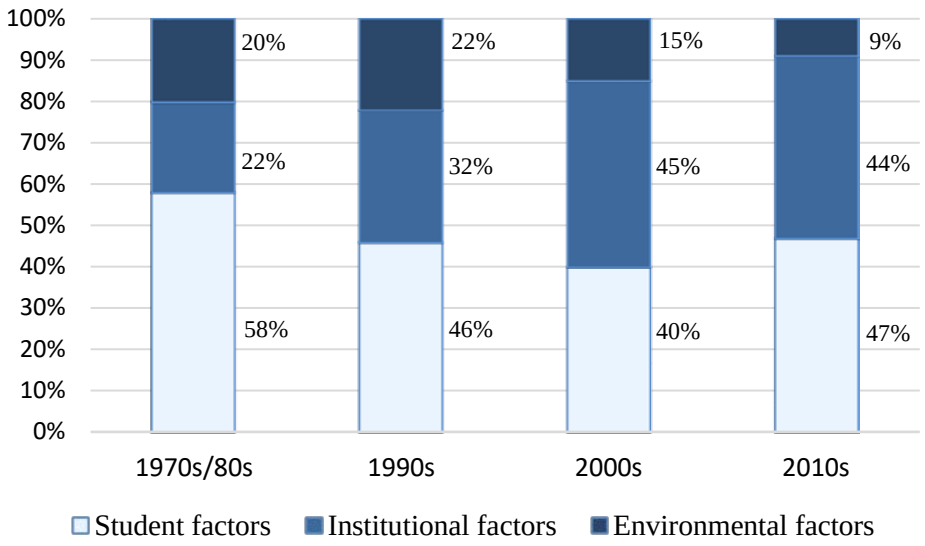

Figure 4. Proportion of the frequency of the three factor groups in various periods.

Figures 5 to 7 show a breakdown of the frequency counts of the factors. Student factors (Figure 5) belonging to prior knowledge and skills were not studied until the 1990s. Some subcategories of factors, such as demographic factors and psychological attributes, have been increasingly examined in the past two decades. Among the subcategories, the factors most frequently studied were related to students' psychological attributes and outcomes.

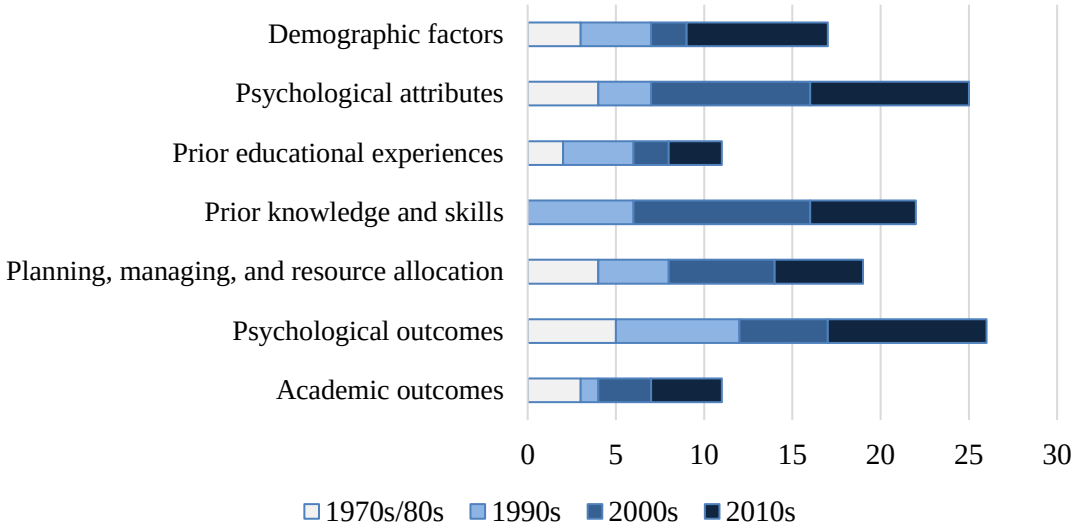

Figure 5. Frequency count of the subcategories of student factors in various periods.

For institutional factors (Figure 6), those related to the design and delivery of programmes and courses were the most frequent, with this growth in frequency being substantial, particularly in the 2000s and 2010s. The factors related to interaction and institutional support also demonstrate a very significant growth in the past two decades, which explains the increasing proportion of institutional factors among all the student persistence factors, as shown in Figure 4.

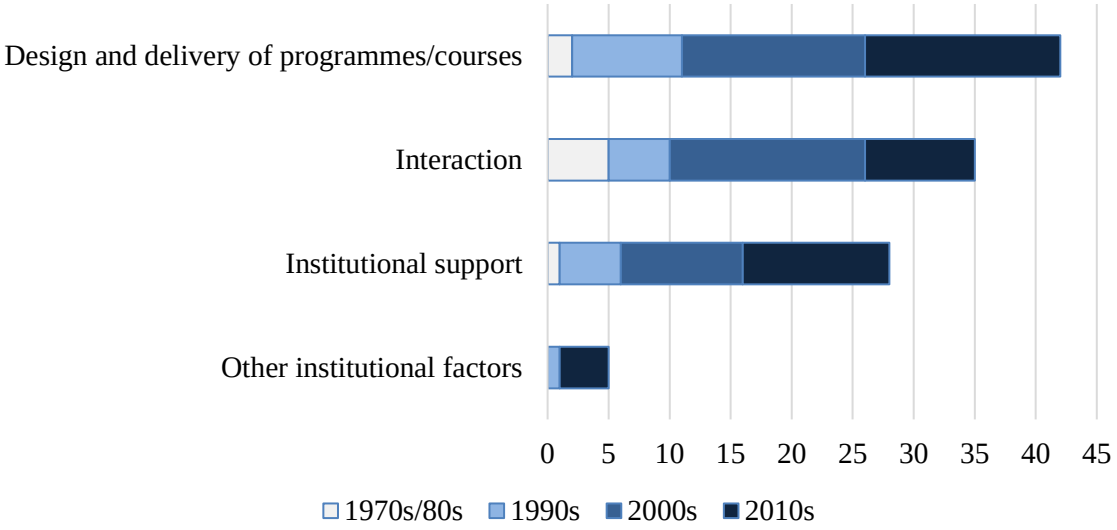

Figure 6. Frequency count of the subcategories of institutional factors in various periods.

The environmental factors (Figure 7) related to work are the most frequent. It is worth noting that this subcategory was studied most in the 1990s and 2000s, while in the 2010s relatively fewer new factors were identified. Also, many of the environmental factors became diverse and could not be categorised into family or work factors as shown in Figure 4, and therefore there is a large subcategory of other environmental factors.

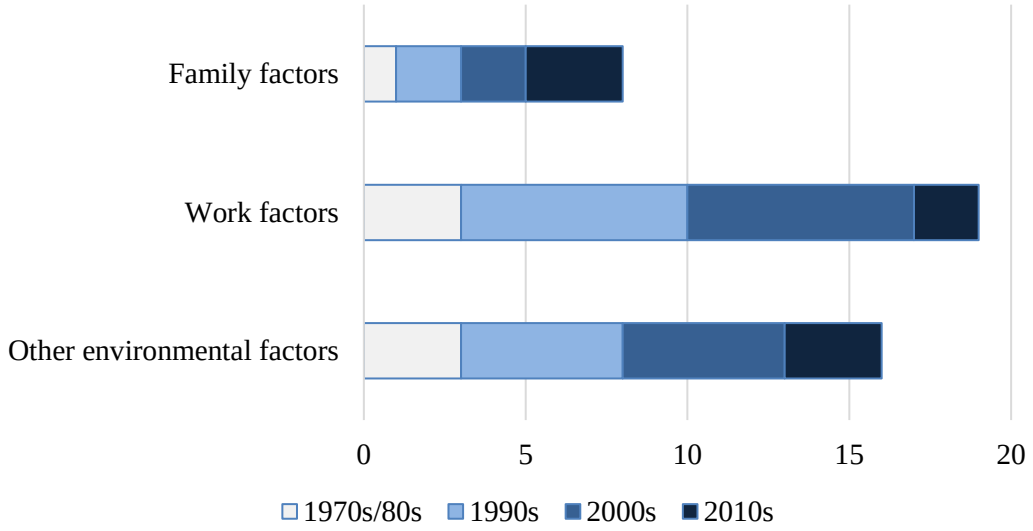

Figure 7. Frequency count of the subcategories of environmental factors in various periods.

In general, the number of factors has been increasing during the past few decades. As well, factors in some subcategories have become more sophisticated with time. For example, factors related to psychological outcomes studied in the 1970s/80s were concerned with more general concepts such as motivation and satisfaction, whereas in the 2000s and 2010s more specific concepts such as sense of community and flow experience were studied. Likewise, the major concern about the design and delivery of programmes and courses was general and related to the quality of the course materials in the 1970s/80s, but in the 2010s, it became more detailed and addressed pedagogical issues such as collaborative learning.

Some factors have been continuously studied in all the various time periods (e.g., the timeliness, quality, and quantity of instructor feedback). Time management has also been a long-lasting problem encountered by students studying in open universities, and has been examined since the 1970s/80s. Distance learners from different cohorts have faced similar challenges in the form of obligations competing with study for their time, energy, and financial resources.

Conclusions

This paper presents a comprehensive review of factors related to student persistence in open education. It covers the relevant literature in past decades along with the development of open universities. To our understanding, the numbers of relevant articles (108) and factors (284) identified are the highest among review studies. The analysis of the scale, location, and research method of the studies shows that a rich diversity of study contexts has been covered. The results reveal the changes and trends in the student persistence factors over various periods, and the ways in which the factors could be interpreted using relevant models and frameworks. The results contribute to informing the development of retention and intervention strategies for student persistence and potential future studies in the open education context.

Implications of Student Persistence for Open Universities

Intervention and retention strategies could specifically focus on the three major categories of student

persistence factors—student, institutional, and environmental factors. Lee and Choi (2011) also suggested that the strategies could focus on "understanding each student's challenges and potential, providing quality course activities and well-structured supports, and handling environmental issues and emotional challenges" (p. 593). However, the evolution of open education delivery and the identification of new factors have led to the need to formulate new or refined strategies to cope with the changes.

This study shows that institutional factors have recently become one of the most frequently examined groups of factors. Compared with the student and environmental factors, it is expected that open universities have relatively more control over institutional factors, particularly those related to course design and delivery, and institutional support. Therefore, the formulation of strategies could focus more on this area. In particular, Simpson (2013) claimed that the loss of motivation to learn is the main factor causing student attrition, and should be emphasised in retention strategies for open universities. In this regard, Pittenger and Doering (2010) reported the incorporation of motivational design—an instructional design approach to attract students' attention, build their confidence, establish relevance to their lives, and enhance their satisfaction (Keller, 1987, 1999)—into the development of online courses, and showed that the motivational design features had a positive impact on course completion rates. Their work demonstrated that some student psychological factors, such as learning motivation, could be addressed through institutional efforts in course design and delivery.

The other subcategories of institutional factors related to interaction and institutional support have also been increasingly studied in recent decades. Despite their significance for student persistence being recognised, cost-effectiveness issues for providing such kinds of intervention have also been raised; cost increases with the number of students (Tait, 2015). Simpson (2013) claimed that these interventions (e.g., personalised contact with at-risk students) are financially viable if the interventions are well-designed, since the additional institutional income from increased student success outweighs the cost of intervention. Also, Choi, Lam, Li, and Wong (2018) proposed a series of systematic proactive intervention strategies to strive for a balance between cost and effectiveness. Intervention strategies are adjusted according to students' risk level, ranging from the least expensive intervention methods (e.g., reminder e-mail) to more effective ones that are normally more costly (e.g., personal consultation).

In terms of the proportion of studies, relatively fewer have focused on environmental factors. This may be related to the nature of these factors, which makes institutions' ability to influence them negligible. As a possible consequence, only a limited number of strategies have been suggested that address these factors. Lee and Choi (2011) noted that no strategies had been found for addressing some environmental factors, such as increased work commitment.

A similar situation applies to the student factors. Although the largest group of factors, some of them, such as student demographics and prior experiences, can hardly be managed by institutions. Furthermore, the student factors identified in recent periods have been more specific in nature, many of them concerned with learners' psychological or cognitive attributes, such as metacognitive self-regulation skills, flow experience, and self-efficacy. Tait (2015, 2018a) commented that the open admission policy of open universities, together with their social justice and widening participation imperatives, further broaden students' background, making it difficult for institutions to accommodate their diverse needs. Addressing factors which have changed over time may require revisiting and revising the existing intervention and retention approaches developed to deal with an earlier understanding of student persistence.

Lee and Choi (2011) advocated the need to further study the interrelationship among diverse dropout factors, so that retention strategies can be formulated more holistically. For example, the work of Pittenger and Doering (2010) mentioned above addressed a specific student factor—motivation—through an institutional factor, incorporating motivational design into online courses. Au et al. (2017) presented another initiative which compared students who were successful in distance learning with those who were at risk of dropping out, regarding their attitudes to challenges in learning and ways to handle these. Their findings showed that the successful students also had diverse backgrounds and encountered challenges in relation to the environmental factors, but they had a more positive attitude than the at-risk students and found ways to actively manage their learning. Choi et al. (2018) thus recommended helping at-risk students to gain peer support from successful students.

In particular, the use of learning analytics has been viewed as a promising approach for identifying and predicting at-risk students and learning problems so that proactive intervention can be carried out early (Choi et al., 2018). As reviewed in Wong (2017), learning analytics has brought benefits for higher education institutions in terms of (a) improving student retention; (b) supporting informed decision-making; (c) increasing cost-effectiveness; (d) understanding students' learning behaviours; and (e) providing personalised assistance for students, including timely feedback and intervention. Learning analytics is also an emerging practice for open universities and MOOCs to inform the formulation of student retention strategies. Some initiatives have already taken place. For example, Rienties et al. (2016) presented an analytics framework at the UK Open University for facilitating tutors to select appropriate intervention methods for students predicted as being at risk. Greene, Oswald, and Pomerantz (2015) analysed MOOC data and found predictors of retention such as learners' level of commitment and intention to obtain a certificate. Yet, as Wong (2017) observed, very few studies have provided empirical evidence showing how intervention based on learning analytics was conducted and how effective it was in terms of retention.

Therefore, it is apparent that much remains to be done on making learning analytics more mature for open education. Features of open and distance education, such as open admission and limited face-to-face interaction, are yet to be adequately studied in relation to learning analytics practices. However, collecting data about student factors, such as students' psychological or cognitive status, in an online learning environment has been found to be challenging (Brown & Kinshuk, 2016). The new findings on student persistence thus demonstrate a need for advancing data-intensive/dependent prediction and intervention approaches that take those persistence factors into account.

Limitations and Future Studies

This study surveyed comprehensively the factors related to student persistence in open universities. Despite the findings showing the factors identified in the literature and their changes over the years, this study also had several limitations, as noted below.

First, the study covered only the factors reported in peer reviewed journal articles, and did not include the so-called grey literature such as conference papers, book chapters, and technical reports. This approach has the benefit of ensuring the quality of the studies reviewed, and aligns with that adopted in other reviews such as Krull and Duart (2017) and Hwang and Tsai (2011). However, it may have what Bernard, Borokhovski, and Tamim (2014) referred to as publication bias, as some relevant literature may not be covered in this review study.

Second, only articles written in English were included and, as shown in the results, the studies reviewed were mostly conducted in the North American context. Studies conducted in other open education contexts and reported in languages other than English, if any, were not covered.

Third, the analysis was based on frequency count of the factors reported in the literature. This approach was also adopted in relevant studies such as Hew (2018), Lee and Choi (2011), and the Government of Western Australia (2006) for presenting the differences in the proportion of various factors. However, Peltier, Laden, and Matranga (2000) pointed out that the previous research on the factors revealed more about the researchers' interests than their significance. The results of this study show the research trends in this area, but because factors were not being studied in a particular period of time does not mean that the related student persistence issues did not occur in that period.

Therefore, future studies should analyse further the student persistence factors. There is a need to evaluate the levels of significance of the factors in influencing students' persistence decisions. Identifying the more significant factors will help open universities to prioritise their retention efforts. There is also a need to examine the student persistence issues particularly in the open education contexts where relevant studies are less reported in English or journal articles, so as to better understand the contextual diversity of the issues.

Also, the factors identified so far require a more comprehensive theoretical foundation to conceptualise their interrelations and effects on student persistence. It has been emphasised that the factors are not independent but interrelated with each other (Lee & Choi, 2011). This calls for further work or new development of student persistence models tailored for open education that account for the factors studied in recent decades.

Acknowledgment

The work described in this paper was partially supported by a grant from the Research Grants Council of the Hong Kong Special Administrative Region, China (UGC/IDS16/15).

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