Effectiveness of Electronic Service-Learning (e-SL) in Primary School Children in China during the COVID-19 Pandemic

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Abstract

In recent years, Service-Learning (SL) has become a popular pedagogy in higher education, especially in Asian societies such as Hong Kong. However, although prior studies have generally showed positive effects of SL for service providers (university students in particular), there is limited evidence of the benefits of SL for the service recipients. Additionally, due to the COVID-19 pandemic, some SL programs have shifted from a traditional in-person mode to an online mode, thereby creating the need to evaluate e-Service Learning (e-SL) projects. In this study, we evaluated changes among 422 primary school students as service recipients (50.6% male; 49.4% female; $M age = 11.53$) joining an e-SL program conducted in mainland China by 85 undergraduate students from a public university in Hong Kong. Using a single-group pretest and posttest design with data collected before and after the e-SL program, which focused on leadership and personal development outcomes, we found that the service recipients showed significant improvements in positive youth development (PYD) attributes, leadership qualities, psychological well-being, and academic performance. We also found gender differences in most of the developmental outcomes, with male participants showing more positive improvements than female participants. These pioneering findings underscore the effectiveness of e-SL program in terms of promoting the holistic development of service recipients. This study also reveals gender differences in the benefits derived from e-SL programs.

Keywords Electronic Service-Learning program (e-SL) · Service recipients · Developmental outcomes · Effectiveness · Chinese children

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Introduction

As a pedagogy in experiential learning, Service-Learning (SL) consists of both intensive academic learning and voluntary service. It is intended to deepen students' understanding of the subject matter by providing opportunities for students to meet community needs through service activities (Bringle & Hatcher, 1995; Sandaran, 2012). Farber and Bishop (2018) described SL as an integrated curriculum that is "grounded in real-world tasks and deeply applied in focus, the program routinely combined academic and social and emotional learning concepts and contexts" (p. 7). Compared with traditional educational structures and learning methods, SL appears to be more effective in terms of helping students gain hands-on learning experiences (Farber & Bishop, 2018) and reducing the gap between universities and communities (D'Arlach et al., 2009). Student service providers engaging in a high-quality SL program have not only shown increased awareness of community needs, but also believed that they could make a difference by committing themselves to service (Billig, 2000). SL programs have also promoted the competencies and leadership skills of service providers and strengthened their positive development and well-being (Leung et al., 2021; Lin & Shek, 2021; Shek et al., 2022b). At the same time, SL can help service recipients improve their self-image and their aspirations (D'Arlach et al., 2009). Service recipients have perceived the SL activities in a positive manner (Shek et al., 2021).

Service-Learning Implementation in Universities

Billig (2000) considered SL as a way to "develop responsible, caring citizens who deeply understand democracy and the meaning of civic responsibility" (p. 659). It has been viewed as a curricular tool that enables students to demonstrate a sense of civic responsibility through which they can become more sensitive about the political and social issues in their communities (Celio et al., 2011; Miceli-Randolph, 2015). Indeed, SL has prevailed across universities as a method of engaging students in community activities and promoting their learning and persistence (Song et al., 2017). SL programs have been widely introduced to the education sector globally, including the United States and the United Kingdom, since the 1990s (Berry & Chisholm, 1999). SL has also developed rapidly across Europe, including Spain, Switzerland, the Netherlands, and Ireland (Sotelino-Losada et al., 2021). Similarly, SL has been expanding across Asia (such as in Japan, Korea, and Singapore) for more than 10 years, becoming increasingly common in higher education institutions in Hong Kong (Ma et al., 2019; Ngai & Shek, 2022; Shek et al., 2019).

In a meta-analysis, Celio et al. (2011) highlighted the importance of SL as a pedagogy for university students. As SL promotes academic learning and civic and social responsibility among university students (Langworthy, 2007), numerous higher education institutions in North America (Haski-Leventhal et al., 2010), Europe (Cayuela et al., 2020), and Hong Kong (Chan et al., 2019) have implemented credit-bearing SL programs. In Asia, since 2013, one university in Hong Kong has adopted SL as an institutional strategy to enhance university students' community

engagement, social responsibility, and ethical behavior (Chan et al., 2019; Ngai & Shek, 2022; Shek et al., 2019).

E-Service Learning (e-SL)

E-Service Learning (e-SL) is "an electronic form of experiential education and incorporates electronically supported service learning. It is delivered online and uses the Internet and state of the art technologies that permit students, faculty, and community partners to collaborate at a distance in an organized, focused, experiential SL activity, which simultaneously promotes civic responsibility and meets community needs" (Malvey et al., 2006, p. 187). SL and e-SL share the same characteristics in terms of concepts and pedagogy (Waldner et al., 2012); the main difference between them is that they rely on different platforms. While e-SL operates in a virtual environment and relies on electronic device and internet access, traditional SL is conducted in an in-person setting. McGorry (2012) found that students perceived similar benefits from both online and traditional SL programs. Lin and Shek (2021) further found that students who took e-SL showed a higher level of overall satisfaction than did students who took the in-person SL subject.

Prior to the COVID-19 pandemic, scholars tried to incorporate online elements into SL (Waldner et al, 2012), but community involvement in online learning was very limited (Marcus et al., 2020). During the pandemic, e-SL became an efficient alternative to traditional SL. In the United States, higher education practitioners provided remote services, such as recording fitness videos and writing cards for service recipients such as the elderly, which were to be delivered by email or mail (Tian & Noel, 2020). In addition, non-contact services such as tutorial videos and online learning workshops were provided to service recipients during the pandemic (Lin & Shek, 2021).

Although Waldner et al. (2012) has pointed out that only a small number of schools or institutions have adopted e-SL, many traditional forms of in-person SL have to be conducted in an online mode due to COVID-19 (Leung et al., 2021; Schmidt, 2021). Leung et al. (2021) highlighted that SL provides on-site services and activities through in-person interaction between service providers and service recipients, whereas e-SL provides indirect services and activities in an online environment. Thus, for both service providers and recipients, challenges have been imposed on e-SL development and expansion. Compared with on-site SL, e-SL requires higher levels of computer literacy and technological equipment for both parties. Despite the merits of removing geographical barriers and creating a zone for learners and community partners (Stefaniak, 2020), Leung et al. (2021) argued that e-SL may involve many difficulties, including but not limited to logistic and administrative issues and miscommunication or inadequate communication between service providers and service recipients. On the one hand, due to insufficient support for digital devices, it is difficult to perform e-SL in remote and rural areas where there is insufficient technological support, stable equipment, or access to the internet. On the other hand, service providers have to be equipped with a high level of social skills to encourage the participation of the service recipients in an e-SL

context. Communication obstacles between service providers and service recipients seems to be frequent in e-SL, and service providers may fail to understand the communities they serve (Stefaniak, 2020). Based on a systematic review of e-SL programs in higher education, Marcus et al. (2020) declared that the challenges of e-SL include the use of technology, and rearranging and redesigning learning activities to adapt them for an online mode.

Benefits of Service-Learning for Service Providers and Recipients

Service-Learning generally emphasizes the equal importance of learning and service, with both service providers and recipients acquiring benefits from the programs (Khiatani & Liu, 2020; Sandaran, 2012). SL has the potential to enhance service providers' academic learning, develop their life skills, and foster their sense of civic responsibility (Conway et al., 2009; Hammersley, 2012). By providing services, SL benefits the service providers academically, emotionally, and socially, and increases their learning commitment, social competencies, positive identity, and positive values (Search Institute, 2000; Wilczenski & Coomey, 2007). SL has also been shown to motivate student service providers to display good learning motivation and attributes, and to improve their academic performance (Celio et al., 2011; Miceli-Randolph, 2015). Other than academic knowledge and technical skills, Weiler et al. (2013) also found that, by engaging in a service, university students can improve important soft skills, such as high-quality teamwork and effective communication skills. In the process of providing a service, service providers have opportunities to develop leadership qualities and personal competencies such as empathy, a sense of responsibility, independence, and problem-solving skills (Farber & Bishop, 2018; Richards et al., 2013). Researchers have further argued that SL helps students develop self-esteem and life meaning and purpose, reduce their delinquent behaviors (e.g., substance use), and reach socially desirable outcomes (Ma et al., 2018; Wilczenski & Coomey, 2007). In summary, SL promotes a strong sense of citizenship amongst service providers, enabling them to connect socially and politically with their communities, and drives them to become strong community members as adults (Miceli-Randolph, 2015).

Research has also shown that SL facilitates the development of personal responsibility and interpersonal skills amongst service recipients (Hammersley, 2012; Khiatani & Liu, 2020). For example, Ma and Cheung (2018) found that service recipients experienced a significant improvement in their capacity in terms of the English language after receiving a service related to English training. Su and Chi (2016) also found that the motivation to learn English was enhanced among service recipients who had joined an English-learning-related SL program in Inner Mongolia. Besides promoting specific knowledge, SL projects also promote recipients' soft skills (Wilczenski & Coomey, 2007; Yu et al., 2019). For instance, McElwain et al. (2016) found that SL can rectify erroneous beliefs held by service recipients, develop their conflict management skills, and reduce their depression. Yu et al. (2019) asserted that joining an SL program can increase the learning motivation and aspirations of service recipients, enhance their interpersonal competence, and reinforce their

confidence and resilience. In another study, Shek et al. (2021) demonstrated that service recipients could benefit greatly from an SL program in terms of different developmental outcomes (e.g., resilience and self-confidence). In short, SL is valuable in terms of service recipients' personal development, achievements, and well-being (Chiva-Bartoll et al., 2020).

The Needs of Migrant Children in Mainland China

China's economy has been growing rapidly over the past four decades. Young people in rural China are willing to migrate to urban areas for better living conditions in terms of career development, public services, social welfare, and children's education (Wang et al., 2021). As a result of migrant parents who were attracted to work in the cities, left-behind migrant children emerged as one of the social problems associated with China's rapid economic growth, with their estimated number of 130 million equating to over 40% of China's children population in 2020 (Wang et al., 2021; Wei, 2022). Despite optimistic promises, there was virtually no policy support for migrant children, especially in terms of primary education. Without a local "hukou", migrant children are either automatically barred from accessing most local primary schools or forced to endure stricter entrance procedures and criteria (Wang, 2008). Barriers imposed by relevant policies, along with the urban/rural division generated by unequal economic growth, have given rise to structural exclusion (e.g., class mobility) against migrant children.

This structural exclusion consequently impairs migrant children's psychological well-being. Notably, many studies have raised concerns about migrant children's learning and psychological adaptation in response to their limited access to resources in urban areas under the current hukou system. Li and Placier (2015) described how migrant children in Chengdu (one of southwestern China's metropolitans, where the current project took place) faced separation from their urban-born counterparts. As such, migrant children's access to cultural and social capital is limited. Given these circumstances, migrant children are more vulnerable to multi-dimensional psychological malfunction than their urban-born peers. For example, Huang et al. (2023) found that migrant children had lower academic emotions, self-concept, and achievement than did non-migrant children. Liu et al. (2020) also found that the level of cognitive competence of migrant children was lower than that of non-migrant children. Due to the effects of acculturation stress, migrant children are at high risk of depression and low levels of satisfaction (Yuan et al., 2019). Migrant children also show lower self-esteem, feel more alienated, and display more mental and behavioral problems (e.g., depression and internet addiction) than typically developing children (Guo et al., 2012). Gao et al. (2015) also found that migrant children present more internalizing and externalizing problems and have lower levels of life satisfaction than their local peers. Furthermore, Xiong et al. (2021) found that migrant children suffering from relative deprivation could experience reduced prosocial tendencies, such as empathy and helping others. In addition to the differences between migrant children and their local peers, gender differences in some developmental outcomes have been noted among migrant children. In terms

of well-being, migrant girls have reported higher level of depression and anxiety than boys (Ren et al., 2021). Chen and Qu (2021) also indicated that migrant girls have more stressful experiences, higher levels of depression, and lower levels of resilience and coping skills than boys. Although migrant boys and girls show different developmental problems, our understanding of this gender difference is quite limited.

A Service-Learning Program in a Hong Kong University

With its merits being globally recognized, SL is a graduation requirement for undergraduate students at one of the universities in Hong Kong. There is a subject entitled "Service Leadership through Serving Children and Families with Special Needs" that aims to serve children with special educational needs, such as children with emotional or behavioral problems, and children from disadvantaged families. Chung and Bell (2012) regard service leadership as satisfying others' needs by providing high-quality services; everyone has the opportunity to be a leader equipped with three major qualities: leadership competencies, moral character, and a caring disposition. With specific reference to this subject, registered undergraduates are expected to acquire knowledge and skills of service leadership and apply their personal strengths and academic knowledge acquired from their own professions to the service, which could in turn further improve their leadership qualities and personal development.

This SL subject aimed to enable students to understand the core attributes of service leaders (namely, competence, moral character, and a caring disposition) and encouraged them to apply and demonstrate their leadership skills and positive youth development (PYD) attributes by serving children in need. These PYD attributes, essential in promoting the holistic development of young people and aligned with the objectives of current SL project, consist of cognitive competence, behavioral competence, social competence, moral competence, prosocial norms, and prosocial behaviors. This SL program can also contribute to the personality development of young people by promoting ethical and moral values, which they can apply to their daily lives. The program thus has positive impacts on their peers and broader communities. Ngai et al. (2018) found that participating in services can help young people develop compassion and caring for others, and further cultivate a sense of responsibility for their actions.

After gaining intensive knowledge by attending three lectures and seven workshops, university students are expected to provide high-quality services (i.e., 40 service hours over two semesters) to children with special needs. Initially, from 2013 onward, this SL subject only served local children and adolescents in Hong Kong. Several studies have documented the effectiveness of this subject for service providers who have provided services in Hong Kong's local communities (Lin & Shek, 2021; Ma et al., 2018; Shek et al., 2020) and local secondary schools (Leung et al., 2021; Shek et al., 2021).

Since 2018, we have expanded the SL service to several cities across mainland China (including Chengdu and Xi'an), Vietnam, Cambodia, and Kyrgyzstan. In 2019,

we began to offer on-site services each summer to a primary school where the majority of students are migrant children, in Chengdu, Sichuan Province, China. Different from local services that usually last for two semesters, the summer services are more intensive in the summer term (usually five days) to accommodate the schedules of both the service providers and recipients. Shek et al. (2021) found that the types of activities in SL programs are significantly related to service recipients' perceived benefits. To better satisfy the expectations of the school being served and fulfill the needs of migrant children in mainland China (e.g., the promotion of their concrete knowledge, intra- and interpersonal competence, and aspirations), the university's SL service providers teach four subjects across a five-day summer camp: English, Science, Health Education, and Personal Development, which are particularly relevant and important to the positive development of migrant children from rural low-income households, who may not have sufficient learning resources. We designed English and Science lessons to enrich the children's academic knowledge and increase their exposure. As knowledge regarding health and hygiene awareness is often lacking among migrant children (Cha et al., 2021), it is crucial to enhance their understanding in these areas. Researchers have found that children from high-risk households (e.g., single parents or low-income families) display inadequate interpersonal and solving-problem skills (Mata et al., 2017; Whittaker et al., 2011). Accordingly, we offer a Personal Development subject covering psychosocial competence (e.g., emotional regulation and social skills) to migrant children, aiming to promote their social skills, problem-solving abilities, and well-being. By attending lectures and participating in group discussions in class, children can gain a deeper understanding of these "soft skills".

Before serving in Chengdu, we offered different learning components to facilitate students' learning from the second to the third semester of each academic year. During the second semester, students were first required to take three lectures, each lasting three hours, to grasp the concepts and theories of service leadership. Students were also assigned a 10-h self-learning online module of Service Learning to strengthen their understanding of the concepts and theories of SL. Next, students were divided into two groups and attended six workshops (i.e., Workshops 1 to 6), each lasting for three hours, to prepare for their service. Finally, students were required to take part in a group presentation in the last workshop (Workshop 7), to consolidate their learning and service experiences after they had provided services.

Due to the COVID-19 pandemic, all lectures and workshops were conducted via an online conferencing platform, Blackboard Collaborate Ultra. Accordingly, the service was forced to change from an on-site to an online mode. The five-day summer camp was conducted via VooV Meeting, a commonly used online platform in mainland China. The service recipients (primary school students) from Chengdu attended online lessons at home using their own electronical devices, such as laptops, mobile phones, and iPads.

Research Gaps Leading to this Study

Several research gaps are present in existing studies of SL. First, there are very few studies on the benefits of SL programs for service recipients. Although numerous

studies have pointed out the effectiveness of SL programs for service providers, how service recipients benefit from SL programs is still scarcely known (Shek et al., 2021). Second, few studies have examined whether the benefits of SL programs differ between male and female recipients. In health studies, it has been observed that male service recipients benefit more than female service recipients after psychosocial interventions. For example, Kent et al. (2014) reported that, compared to women, men showed a more significant reduction in their chronic disease risk factors after participating in a health program. Duran (1987) found that men also reported significantly fewer depression symptoms than women after receiving a grief intervention. Third, systematic evaluations of SL in mainland China are sparse (Shek et al., 2022b). In China, volunteering has become increasingly popular in higher education, but SL is still a new pedagogy for most Chinese educators and researchers (Wang et al., 2019). Finally, very few studies have focused on the effectiveness of electronic Service-Learning. Since the start of the pandemic, the suspension of classroom learning in schools and social-distancing measures (Shek, 2021) have limited in-person SL programs, causing many SL programs to be implemented virtually. While numerous studies have reported the benefits of SL based on traditional in-person teaching modes, systematic evaluations of e-SL are not sufficient (Lin et al., 2023; Shek et al., 2022b). Hence, there is a need to understand the effectiveness of e-SL.

To fill these research gaps, we test the following two sets of hypotheses in this study.

Hypothesis 1a to 1d: After attending an e-SL program implemented by Hong Kong university students, the service recipients in mainland China would show positive changes in terms of positive youth development attributes (Hypothesis 1a), leadership qualities (Hypothesis 1b), psychological well-being (Hypothesis 1c), and academic performance (Hypothesis 1d).

Hypothesis 2: Based on previous studies (e.g., Ahmad et al., 2014), male service recipients would show more significant improvements in terms of positive youth development attributes, leadership qualities, psychological well-being, and academic performance than female service recipients.

Methods

Participants

Due to the global COVID-19 pandemic, instead of conducting on-site services, 85 university students who took the "Service Leadership through Serving Children and Families with Special Needs (Chengdu)" subject organized a five-day online summer camp in July 2021 for 494 children from a public primary school in Chengdu, the capital of Sichuan Province, China. Children of migrant workers comprised 80% of the school's student population. In line with the local policies of compulsory education provision, the primary school was required to accommodate migrant workers' children (Chengdu Education, 2023). The 494 children were grouped into 16

classes, with around 30 primary school students in each class. Around five university students were assigned to each class, to offer four subjects encompassing three English lessons, four Science lessons, four Health Education lessons, and four Personal Development lessons over the five days. Because 40 primary school students (8.1%) only responded at the pretest and 32 students (6.5%) only responded at the posttest, we received complete data from 422 students (85.4%) after matching the pretest and posttest data. A total of 50.6% ($n = 208$) of the participants were male and 49.4% ($n = 203$) were female; 53.1% ($n = 224$) were from Grade 5, and 46.9% ($n = 198$) were from Grade 6. The participants were aged from 10 to 13 years (mean $= 11.53$). Further details can be found in Table 1.

Procedures

This study was approved by the Institutional Review Board of the university. Before the study, consent was obtained from the children, parents, and school principals. Respondents were informed that participation was voluntary and that they had the right to withdraw from participating in this study without any penalty. Before and after attending the SL program (i.e., in a pretest and a posttest), the respondents were invited to complete the same questionnaire. All information reported by the participants was kept strictly confidential.

Measures

Positive Youth Development (PYD) Attributes

The Chinese Positive Youth Development Scale (CPYDS) (Shek et al., 2007) was used to measure the PYD attributes of the service recipients. The CPYDS has been validated and used in mainland Chinese studies. For example, Zhou et al. (2020) conducted a longitudinal study using the CPYDS among 2,648 adolescents from

Table 1 Demographic information of participants ($n = 422$)

Demographic variables	Frequency	Valid percent
Gender		
Male	208	50.6
Female	203	49.4
Grade		
Grade 5	224	53.1
Grade 6	198	46.9
Age		
10-year-old	20	4.7
11-year-old	179	42.4
12-year-old	192	45.5
13-year-old	30	7.1

four junior high schools in mainland China. Shek et al. (2022a) further validated the CPYDS among 4,922 Grade 3 to Grade 9 students in Sichuan, mainland China, confirming the validity of the CPYDS in regard to mainland children. This study used 11 subscales: 1) Self-Determination, with three items (e.g., "I am confident about my decisions"); 2) Cognitive Competence, with six items (e.g., "I know how to see things from different angles"); 3) Behavioral Competence, with six items (e.g., "I can face criticism with an open mind"); 4) Social Competence, with seven items (e.g., "I know how to communicate with others"); 5) Moral Competence, with six items (e.g., "I will fulfill my promises"); 6) Emotional Competence, with six items (e.g., "I can see the world from the perspectives of other people"); 7) Resilience, with six items (e.g., "When I face difficulty, I will not give up easily"); 8) Bonding, with six items (e.g., "When I need help, I trust my parents will help me"); 9) Clear and Positive Identity, with seven items (e.g., "I am a person with self-confidence"); 10) Belief in the Future, with seven items (e.g., "I have the confidence needed to solve my future problems"); and 11) Prosocial Norms, with five items (e.g., "I care about unfortunate people in society").

We also measured the children's prosocial behavior, one of the PYD attributes, using the Social Emotional Character Development Scale (Ji et al., 2013). This is a five-item scale (e.g., "I will be kind to children who are different from myself"). All PYD attributes were reported by the children using a six-point Likert scale that ranged from one (strongly disagree) to six (strongly agree). Higher scores indicated higher levels of positive development outcomes. In this study, these measures showed good reliability (Cronbach's αs ranged from 0.77 to 0.91 in the pretest and from 0.84 to 0.95 in the posttest) for the 12 PYD attributes. The data are reported in Table 2.

Psychological Well-Being

The Satisfaction with Life Scale (Diener et al., 1985) was used to measure students' well-being and quality of life. The scale consists of five items (e.g., "In most ways, my life is close to my ideal"). This is scored using a six-point Likert scale ranging from one (strongly disagree) to six (strongly agree). Higher scores indicate a higher level of life satisfaction. In this study, the SWLS demonstrated good internal reliability (Cronbach's αs were 0.86 in the pretest and 0.92 in the posttest).

Leadership Qualities

Leadership qualities were measured by the 28-item service leadership scale developed by Shek et al. (2014). This scale covers three leadership qualities: self-leadership, with five items (e.g., "I clearly know my strengths and weaknesses"); caring disposition, with eight items (e.g., "I am always willing to help people"); and character strengths, with 15 items (e.g., "I am willing to respect the rules"). This scale is scored using a six-point Likert scale from one (strongly disagree) to six (strongly agree). Higher scores indicate stronger leadership qualities. In this study, all three variables demonstrated very good internal reliability (Cronbach's αs ranged from 0.89 to 0.94 in the pretest and from 0.93 to 0.97 in the posttest).

Table 2 Gender difference: Outcome changes between pretest and posttest ($n=422$)

Variable	Group	Pre-test		Post-test		Mean difference	Test effect (pre-test to post-test)		Gender effect		Test × gender	
		M1	SD1	M2	SD2	M2-M1	F	η^2_p	F	η^2_p	F	η^2_p
PYD	All	5.40	.92	5.53	.76	.13	4.79***	.126	3.13***	.086	1.75	.050
	Male	5.32	.98	5.52	.71	.2	4.23***	.206				
	Female	5.48	.84	5.54	.81	.06	3.04**	.160				
SD	All	5.50	.68	5.55	.66	.05	2.80	.007	3.38	.008	3.65	.009
	Male	5.41	.71	5.53	.60	.12	6.20*	.029				
	Female	5.58	.63	5.57	.72	-.01	.03	.000				
CC	All	5.34	.80	5.51	.70	.17	18.89***	.044	7.16**	.017	3.54	.009
	Male	5.21	.90	5.47	.71	.26	15.30***	.069				
	Female	5.45	.66	5.56	.69	.11	4.23*	.021				
BC	All	5.31	.88	5.48	.73	.17	12.53***	.030	2.73	.007	.39	.001
	Male	5.24	.95	5.43	.73	.19	7.33**	.034				
	Female	5.38	.80	5.51	.73	.13	5.26*	.025				
SC	All	5.35	.84	5.54	.70	.19	17.91***	.042	1.69	.004	.94	.002
	Male	5.29	.91	5.51	.69	.22	12.13**	.055				
	Female	5.41	.77	5.55	.71	.14	6.07*	.029				
MC	All	5.35	.74	5.51	.65	.16	16.89***	.040	6.59*	.016	4.66*	.011
	Male	5.24	.85	5.47	.65	.23	15.45***	.069				
	Female	5.46	.59	5.54	.65	.08	2.67	.013				
EC	All	5.18	.96	5.49	.71	.31	38.90***	.087	7.41**	.018	2.83	.007
	Male	5.04	1.10	5.44	.73	.40	26.12***	.112				
	Female	5.31	.81	5.54	.70	.23	13.15***	.061				

Table 2 (continued)

Variable	Group	Pre-test		Post-test		Mean difference	Test effect (pre-test to post-test)		Gender effect		Test×gender	
		M1	SD1	M2	SD2	M2-M1	F	η^2_p	F	η^2_p	F	η^2_p
Resilience	All	5.51	.75	5.57	.70	.16	2.39	.006	.50	.001	.00	.000
	Male	5.48	.75	5.54	.65	.06	1.08	.005				
	Female	5.52	.76	5.58	.75	.06	1.35	.007				
Bonding	All	5.47	.74	5.54	.71	.07	2.77	.007	.17	.000	2.04	.005
	Male	5.46	.76	5.58	.56	.12	5.39*	.025				
	Female	5.49	.73	5.50	.85	.01	.03	.000				
CPI	All	5.21	1.00	5.42	.80	.21	15.60***	.037	.03	.000	2.51	.006
	Male	5.17	1.05	5.45	.69	.28	14.35***	.065				
	Female	5.26	.95	5.38	.91	.12	3.01	.015				
BIF	All	5.41	.76	5.51	.74	.10	6.21*	.015	2.86	.007	5.81*	.014
	Male	5.31	.83	5.50	.65	.19	10.82**	.050				
	Female	5.51	.67	5.51	.83	0	.004	.000				
PN	All	5.51	.66	5.58	.87	.07	4.92*	.012	4.21*	.010	7.37**	.018
	Male	5.40	.73	5.57	.54	.17	11.86**	.054				
	Female	5.60	.57	5.58	.63	-.02	.13	.001				
PB	All	5.46	.73	5.57	.62	.11	8.02**	.019	3.69	.009	8.52**	.020
	Male	5.35	.83	5.57	.55	.22	14.65***	.066				
	Female	5.56	.60	5.56	.62	0	.004	.000				
Leadership	All	5.48	.83	5.55	.72	.07	3.30*	.024	4.71**	.034	2.94*	.021
	Male	5.36	.90	5.51	.69	.15	5.16**	.070				
	Female	5.58	.73	5.58	.75	0	.13	.002				

Table 2 (continued)

Variable	Group	Pre-test		Post-test		Mean difference	Test effect (pre-test to post-test)		Gender effect		Test×gender	
		M1	SD1	M2	SD2	M2-M1	F	η^2_p	F	η^2_p	F	η^2_p
SL	All	5.46	.69	5.54	.64	.08	6.46**	.016	4.80*	.012	4.33*	.010
	Male	5.36	.74	5.51	.62	.15	9.50**	.044				
	Female	5.55	.63	5.57	.68	.02	.12	.001				
CD	All	5.52	.62	5.58	.60	.06	2.82	.007	11.13**	.026	3.13	.008
	Male	5.40	.68	5.52	.58	.12	5.59*	.026				
	Female	5.63	.54	5.63	.62	0	.004	.000				
CS	All	5.46	.63	5.54	.59	.08	6.41*	.015	6.86**	.016	7.24**	.017
	Male	5.34	.72	5.51	.57	.17	11.56**	.053				
	Female	5.56	.51	5.56	.63	0	.02	.000				
Psychological well-being												
LS	All	5.25	.89	5.42	.79	.17	15.14*	.036	1.76	.004	4.30*	.010
	Male	5.14	.95	5.42	.70	.28	15.98***	.072				
	Female	5.33	.83	5.41	.89	.08	1.87	.009				
AP	All	5.14	1.12	5.51	.80	.37	62.99***	.236	1.31	.006	.42	.002
	Male	5.06	1.16	5.48	.79	.42	31.63***	.235				
	Female	5.20	1.06	5.54	.82	.34	32.72***	.246				
SI	All	5.34	.79	5.54	.71	.20	22.94***	.053	2.45	.006	.83	.002
	Male	5.27	.80	5.51	.68	.24	16.91***	.076				
	Female	5.40	.78	5.57	.73	.17	7.23**	.035				

Table 2 (continued)

Variable	Group	Pre-test		Post-test		Mean difference	Test effect (pre-test to post-test)		Gender effect		Test×gender	
		M1	SD1	M2	SD2	M2-M1	F	η^2_p	F	η^2_p	F	η^2_p
KA	All	4.94	1.00	5.48	.72	.54	109.95***	.212	2.24	.005	.35	.001
	Male	4.86	1.04	5.44	.69	.58	60.38***	.226				
	Female	5.00	.96	5.51	.76	.51	49.82***	.198				

SD self-determination, *CC* cognitive competence, *BC* behavioral competence, *SC* social competence, *MC* moral competence, *EC* emotional competence, *CPI* clear and positive identity, *BIF* belief in the future, *PN* prosocial norms, *PB* prosocial behavior, *SL* self-leadership, *CD* caring disposition, *CS* character strength, *LS* life satisfaction, *AP* academic performance, *SI* study interest, *KA* knowledge acquired

*** $p<.001$; ** $p<.01$; * $p<.05$

Learning Interest and Knowledge Acquired

We used 10 items to measure the students' interest in learning (e.g., "I am interested in learning") and knowledge acquired (e.g., "I gained a lot of knowledge"). This was scored on a six-point Likert scale ranging from one (strongly disagree) to six (strongly agree). Higher scores indicate higher levels of interest in learning and knowledge acquired. The internal reliabilities of those two variables were very good (Cronbach's αs ranged from 0.82 to 0.87 in the pretest and from 0.93 to 0.94 in the posttest).

Data Analysis Plan

To compare the service recipients' improvements gained from participating in the SL program in terms of their positive youth development attributes, psychological well-being, leadership qualities, and academic performance, we used SPSS 26.0 to conduct a series of two-way multivariate analyses of variance (MANOVAs), in order to examine the main effects of Test (pretest versus posttest) and Gender (male versus female), as well as the interaction effect of Test × Gender. A series of univariate ANOVAs were separately conducted among male and female participants, to enable us to gain a better understanding of the Test × Gender interaction effects.

Results

Pretest and Posttest Changes in the Service Recipients

As shown in Table 2, the main effect of TEST was significant in regard to nine outcome variables. For example, students experienced significant changes in cognitive competence ($F = 18.89$, $p < 0.001$), behavioral competence ($F = 12.53$, $p < 0.001$), and social competence ($F = 17.91$, $p < 0.001$) at the posttest. Although the children did not experience any statistically significant changes in self-determination ($F = 2.80$, $p > 0.05$), resilience ($F = 2.39$, $p > 0.05$), or bonding ($F = 2.77$, $p > 0.05$), their posttest scores for these three variables were higher than their pretest scores. Hypothesis 1a was thus generally supported.

In term of leadership qualities, the service recipients showed significantly higher levels of self-leadership ($F = 6.46$, $p < 0.01$) and character strength ($F = 6.41$, $p < 0.05$) at the posttest than at the pretest. Although the children did not experience any statistically significant change in regard to caring disposition ($F = 2.82$, $p > 0.05$), their posttest scores were higher than their pretest scores. Hypothesis 1b was thus generally supported.

In regard to life satisfaction, the service recipients showed significantly higher scores ($F = 15.14$, $p < 0.05$) at the posttest. Hypothesis 1c was thus fully supported.

In terms of academic performance, the students reported significantly higher posttest scores in both interest in learning ($F=22.94$, $p<0.001$) and knowledge acquired ($F=109.95$, $p<0.001$). Hypothesis 1d was thus supported.

Table 2 shows that a significant gender effect was identified in regard to four PYD attributes: cognitive competence ($F=7.16$, $p<0.01$), moral competence ($F=6.59$, $p<0.05$), emotional competence ($F=7.41$, $p<0.01$), and prosocial norms ($F=4.21$, $p<0.05$). Significant gender effects were also identified in regard to the three leadership qualities: self-leadership ($F=4.80$, $p<0.05$), caring disposition ($F=11.13$, $p<0.01$), and character strength ($F=6.86$, $p<0.01$). Thus, our findings suggest that male and female children experience different levels of developmental outcomes.

We further found that the Test×Gender interaction effects were significant for moral competence ($F=4.66$, $p<0.05$; see Fig. 1), belief in the future ($F=5.81$, $p<0.05$; see Fig. 2), prosocial norms ($F=7.37$, $p<0.01$; see Fig. 3), and prosocial behavior ($F=8.52$, $p<0.01$; see Fig. 4). In addition, the Test×Gender interaction effects were significant for self-leadership ($F=4.33$, $p<0.05$; see Fig. 5), character strength ($F=7.24$, $p<0.01$; see Fig. 6), and life satisfaction ($F=4.30$, $p<0.05$; see Fig. 7). These findings generally show that male participants improved significantly more than female participants did across the four PYD attributes, two leadership qualities, and life satisfaction outcome measures.

To better evaluate the interaction effects between Test and Gender, we further performed post-hoc analyses in regard to male and female participants, respectively. A series of univariate ANOVAs reveals that male service recipients showed significant main test effects across almost all of the PYD attributes ($ps<0.5$), with the single exception of resilience ($F=1.08$, $p>0.5$). The boys also showed significant changes across all leadership qualities, including self-leadership ($F=9.50$, $p<0.01$), caring disposition ($F=5.59$, $p<0.05$), and character strength ($F=11.56$, $p<0.01$). In addition, the male participants experienced significant changes in life satisfaction
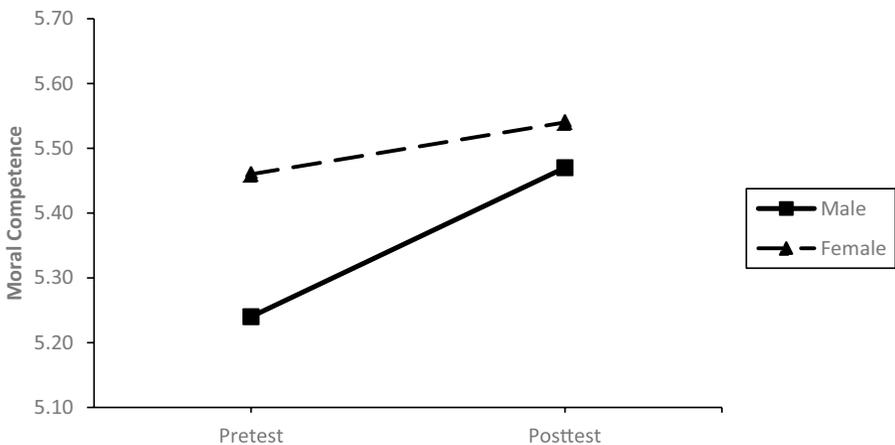

Fig. 1 Interaction effects between test (pretest vs. posttest) and gender (male vs. female) on moral competence
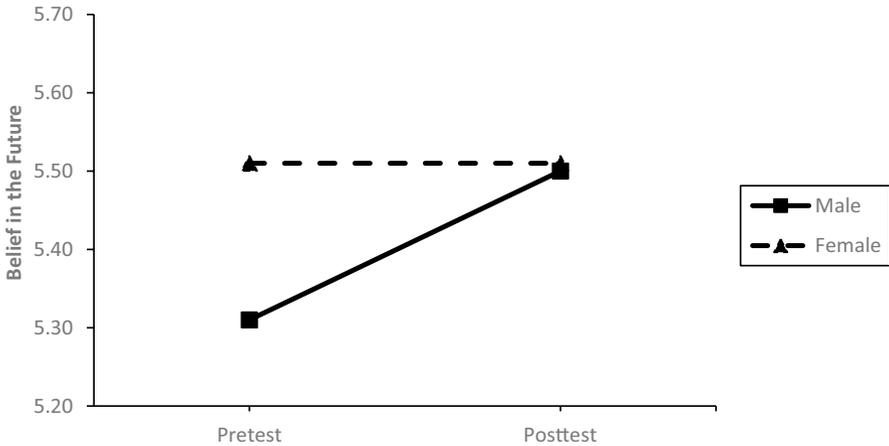
Fig. 2 Interaction effects between test (pretest vs. posttest) and gender (male vs. female) on belief in the future
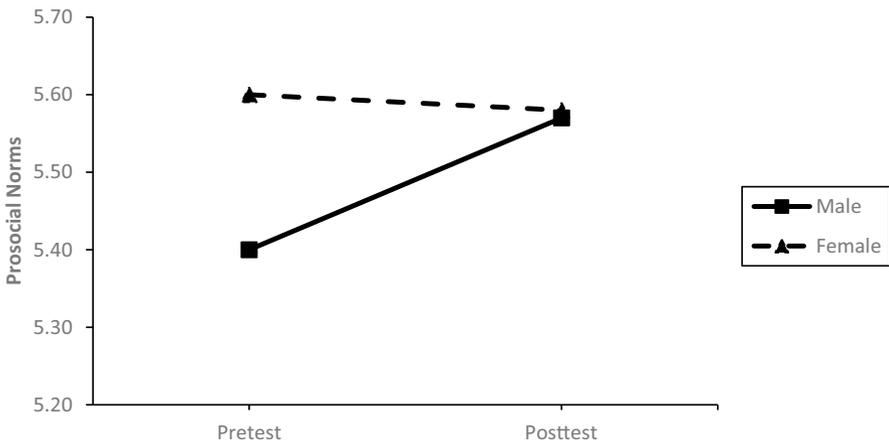

Fig. 3 Interaction effects between test (pretest vs. posttest) and gender (male vs. female) on prosocial norms

($F = 15.98$, $p < 0.001$) and in academic performance in terms of both interest in learning ($F = 16.91$, $p < 0.001$) and knowledge acquired ($F = 60.38$, $p < 0.001$). The female participants, on the other hand, only showed significant changes across four of the PYD attributes: cognitive competence ($F = 4.23$, $p < 0.05$), behavioral competence ($F = 5.26$, $p < 0.05$), social competence ($F = 6.07$, $p < 0.05$), and emotional competence ($F = 13.15$, $p < 0.001$). The girls showed no significant changes in the three leadership qualities ($p > 0.05$) and in life satisfaction ($p > 0.05$), but they did
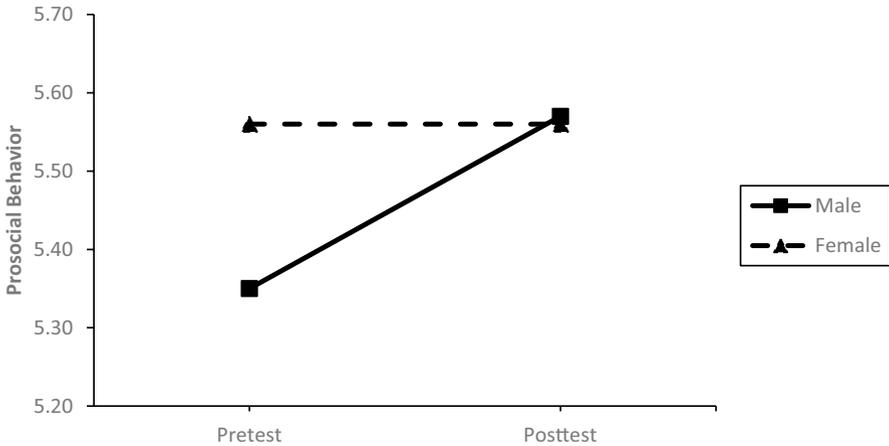
Fig. 4 Interaction effects between test (pretest vs. posttest) and gender (male vs. female) on prosocial behavior
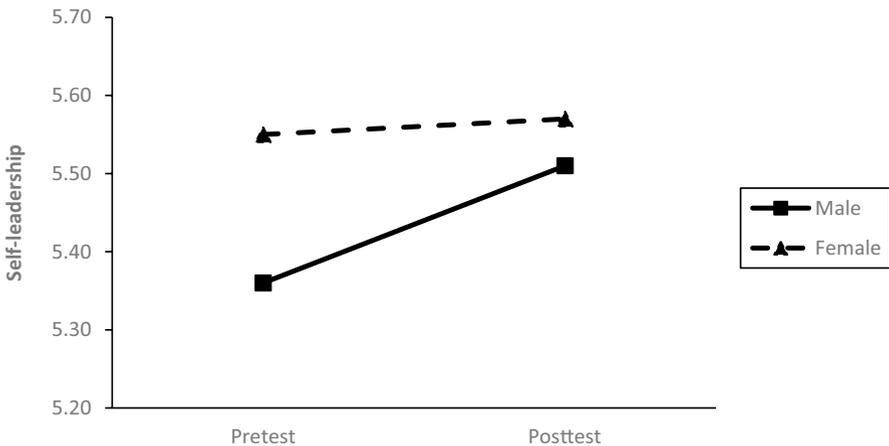
Fig. 5 Interaction effects between test (pretest vs. posttest) and gender (male vs. female) on self-leadership

show significant changes in interest in learning ($F = 7.23$, $p < 0.01$) and knowledge acquired ($F = 49.82$, $p < 0.001$). Hypothesis 2 was thus supported.

In short, all participants have changed in a positive direction in regard to most of the developmental outcomes over time, and the positive changes were more pronounced in male than in female participants.
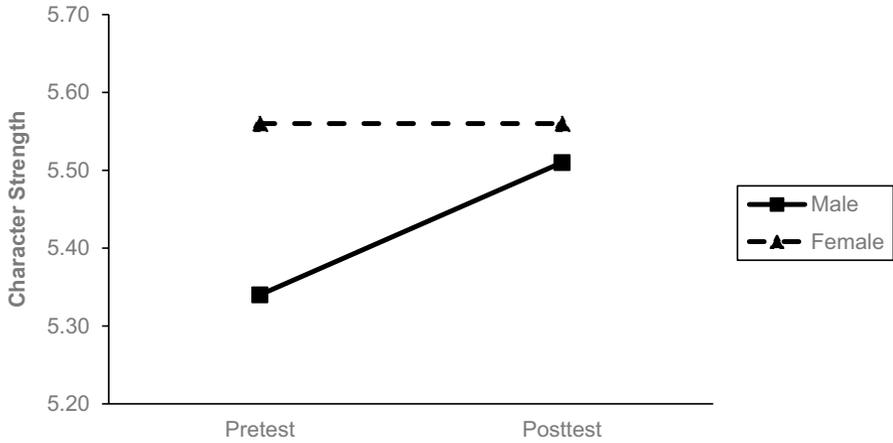
Fig. 6 Interaction effects between test (pretest vs. posttest) and gender (male vs. female) on character strength
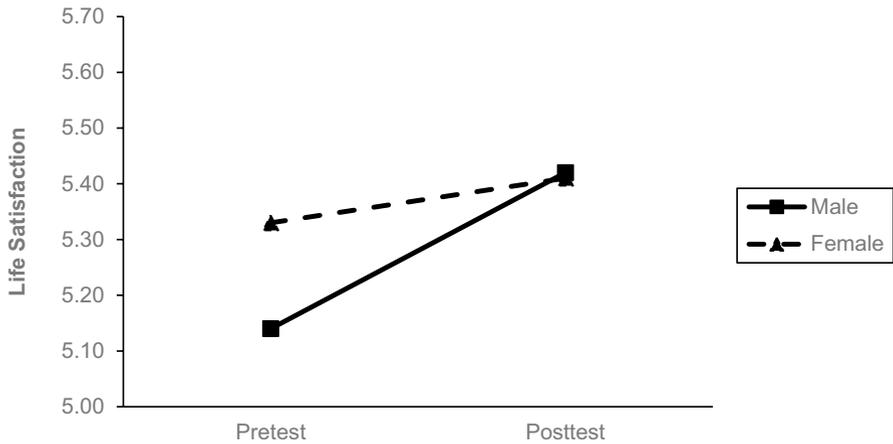
Fig. 7 Interaction effects between test (pretest vs. posttest) and gender (male vs. female) on life satisfaction

Discussion

This study examines the impact of an e-SL program on the developmental outcomes of service recipients in a primary school in mainland China. We found that service recipients showed significant improvements in developmental outcomes, indexed by PYD attributes, leadership qualities, psychological well-being, and academic performance, after attending this e-SL program, and the positive changes were more significant for male than for female participants.

Benefits of SL for the Service Recipients

As mentioned above, the benefits gained by service providers, such as improvements in life skills, personal and academic development, content mastery, vocational interests, and civic responsibilities, have been well documented in previous studies (Hammersley, 2012; Ma et al., 2018). Yet, most studies only focus on service providers, neglecting the gains experienced by service recipients. The main contribution of this study is to strengthen our limited understanding in this area by demonstrating that a successful SL program can benefit service recipients as well (Shek et al., 2021). After attending the e-SL program, the service recipients in this study displayed significantly higher scores at the posttest compared with their pretest scores across nearly all of the PYD attributes, including social competence, moral competence, emotional competence, cognitive competence, behavioral competence, belief in the future, clear and positive identity, prosocial norms, and prosocial behavior. They also improved significantly in terms of leadership qualities, life satisfaction, and academic performance.

Although the positive impacts of SL programs on service recipients have previously been reported for in-person SL programs, the number of such studies is not sufficient. In a qualitative study with nine community members, D'Arlach et al. (2009) found that service recipients felt less helpless and had more reasonable views toward social issues after participating in a SL language exchange program. Yu et al. (2019) found that 355 primary school students, as service recipients, showed significant improvements (e.g., broadened horizons, improved interpersonal relationships) after attending an SL program in mainland China. Shek et al. (2021) found that more than 90% of 1,854 secondary school service recipients in Hong Kong agreed that joining SL programs increased their interest in learning, improved their self-confidence, and widened their horizons.

We noted that service recipients in this study experienced no significant improvement in a few outcomes at the posttest stage: self-determination, resilience, bonding, and caring disposition. One possible explanation for this outcome could be that such attributes may require more time for practice and improvement, compared with other relatively immediate outcomes such as cognitive competence, prosocial behaviors, and knowledge obtained. For example, Sippel et al. (2015) noted it is more difficult to change a child's internal character, such as determination and resilience, within a short period of time. Indeed, shaping character requires a longer time and relies on multiple factors, such as parental support and community network. Compared with other outcomes evaluated, children may need additional opportunities to enhance their resilience (Sippel et al., 2015). Bonding with others may not be easily improved in a short period of time, instead being developed on the basis of long-term interactions and integration (Savage et al., 2021).

Similarly, improving children's caring disposition through a short-term e-SL program may not be achievable because service recipients take more time to learn how to care about others and practice caring behaviors in different contexts. Online teaching also limits children's learning about a caring disposition because it reduces service providers' opportunities to interact with their service recipients in reality. Furthermore, cultural differences may affect service providers' ability to inspire

certain abstract components and to understand some of their service recipients' needs in some cases. In this study's SL program, 80% of the service providers were local Hong Kong students with social and cultural characteristics, who are very different from those in mainland China. Yu et al. (2019) also found a negative influence of cultural sensitivity in an SL program.

Gender Differences in the Impact of e-SL on the Service Recipients

We are aware of the different impacts of SL programs on male and female service recipients. After attending the SL program, both male and female service recipients improved significantly in academic performance, but the male service recipients experienced significantly more changes in several non-academic variables than did their female counterparts. The male participants showed significant improvements in nearly all of the PYD attributes, leadership qualities, life satisfaction, and academic performance, whereas the female service recipients only showed significant improvements in certain PYD qualities, including social competence, emotional competence, cognitive competence, and behavioral competence, and in academic performance. Although gender differences in the impact of e-SL have rarely been examined in the literature, our findings align with evaluation studies on other training and intervention programs. For example, Ahmad et al. (2014) found that, after receiving a psychological intervention, male victims of war and terrorism showed a significantly greater decrease in depressive symptoms than did their female counterparts. Sun et al. (2016) found that male adolescents benefited more from a mindfulness program than did female adolescents in Hong Kong, with significant positive improvements in their autonomy, life goals, and personal development. Moreover, male participants were more confident in terms of technology usage for learning and computer literacy than were their female counterparts; thus, boys experience better performance and engagement than girls in this e-SL program conducted online that requires the heavy use of technology.

Furthermore, male service recipients were found to experience greater gains than the female service recipients did in some PYD attributes, including belief in the future, moral competence, prosocial norms, and prosocial behavior, after attending this SL program. In terms of stronger belief in the future among male service recipients, male students have been found to have stronger motivation to improve their grades and course credits than do female students (Hecht & Fusco, 1995), and academic motivation is the most relevant factor influencing the belief in the future for Chinese children. On the other hand, girls may underestimate their academic competence compared with boys, even if no actual gender differences exist in academic achievement in terms of teachers' ratings or if the female students' actual academic achievement is better than the male students' (Herbert & Stipek, 2005). Huang and Gong (2022) found that boys benefit more from academic expectations at the primary school stage, whereas girls benefit more from academic expectations at the secondary school stage in mainland China. This may explain why boys reported better outcomes in terms of academic performance than did girls in our study. In addition,

a possible reason for the male participants' significant improvements in moral competence and prosocial norms and behavior is that male children are actually weaker than their female peers in terms of those categories, leaving the boys with more room for improvement (i.e., differences in baselines). On the other hand, male participants benefit more than female participants in terms of emotion-focused interventions (Schut et al., 1997). Finally, we found that the male service recipients showed significant improvements in leadership qualities and psychological well-being, whereas the female participants did not experience any significant changes in these categories. A possible reason for the differences in the changes in leadership qualities based on gender is that men tend to become more expressive when they are with peers; they are more willing to talk and take the lead (Diab et al., 2014). It is also possible that the thresholds of women's leadership qualities are higher than men's, implying that men have more room to improve their leadership qualities than do women. In terms of non-significant changes in psychological well-being for female participants, one of the possibilities is that girls have already shown better psychological well-being than boys in China (Geng & He, 2022). Therefore, the girls may not have gained as much as the boys did in terms of life satisfaction from this e-SL program.

To further understand such gender differences following the e-SL program, special attention should be paid to service recipients' cultural contexts. In this study, all service recipients were recruited in mainland China, where a strong preference for sons has prevailed among most parents, including those who are migrant workers (Chan & Ren, 2018; Raymo et al., 2015; Yeung & Hu, 2013). It is possible that preference for sons in the family may impair girls' gains from e-SL programs, as girls might perceive themselves not as valuable as boys. As there are few studies on gender differences in the gains from SL programs, this study is a pioneering addition to the literature. At the same time, there is a need to replicate the findings in the future.

Impacts of the e-SL Program in a Chinese Context

With an increasing number of SL programs that have emerged in different higher education settings, researchers have focused on discussions of theoretical frameworks for SL, as well as describing the process of implementing or reporting undergraduate participants' (i.e., service providers) performance and learning outcomes (Yu et al., 2019). Yet, systematic investigations of the effectiveness of SL programs are limited in China, especially compared with a large number of studies in North America (Haski-Leventhal et al., 2010) and Europe (Cayuela et al., 2020) that have revealed the importance of SL programs in higher education. Therefore, the findings of this study could provide empirical evidence to enrich the existing literature on the impact of SL programs on service recipients in Chinese contexts.

Moreover, traditional in-person SL has been greatly challenged since the start of the COVID-19 pandemic, entailing e-SL as an alternative to overcome the restrictions caused by lockdowns and social isolation. Since the outbreak of COVID-19 in early 2020, many SL programs have been canceled or suspended due to school suspensions, social distancing, and travel restrictions. Most remaining SL programs have changed from an in-person mode to an online mode. Some studies have

demonstrated the effectiveness of e-SL programs on service providers. For example, Schmidt (2021) indicated that students showed positive attitudes toward e-SL and appreciated the advantages of e-SL under COVID-19. Another study also found that e-SL had slightly better outcomes than traditional SL in Hong Kong (Wong & Lau, 2022). However, no study has been conducted to examine the effectiveness of e-SL programs on service recipients. Therefore, this study could provide important empirical evidence to enrich the limited literature on e-SL during the pandemic—in particular, demonstrating the timely effectiveness of e-SL as a preferred alternative to SL for service recipients. This study also suggests how we can promote the psychological well-being of children under the pandemic (Shek et al., 2023).

Implications and Limitations

This is a pioneering study extending our understanding of the effectiveness of e-SL from the perspective of service recipients in a Chinese context under COVID-19. The findings can help us improve future SL program designs in order to better serve the target groups at hand on the basis of their needs, including taking gender into account. In particular, we propose that relevant SL programs with the following attributes should be designed. First, gender-specific components addressing the relevant learning demands of each gender among the service recipients should be delivered. With specific regard to gendered patterns of technology usage, it is also proposed that future programs should offer special training to help girls acquire computer literacy. Second, based on our speculation that culturally inherited gender inequalities may impair girls' gains, more programs should aim to ensure service providers are sensitive in regard to gender. Service providers should be properly trained to understand the gender issues that are inherited in mainland China's culture, such as the preference for sons. Special attention may be paid to service recipients whose households experience this issue. In short, service providers should be sensitive to the family and cultural backgrounds of service recipients during pre-service preparation, such as when attending lectures or home visits. Finally, a longer service period could generate a clearer picture of the impact of the program on the developmental outcomes (such as self-determination, resilience, and bonding) that may not be revealed in a short-term SL program. Moreover, the successful experience from this e-SL program example can be promoted to other places to enable them to serve more people in need.

However, some limitations of the current study should be acknowledged. First, since there was no control group in this study, we cannot prove that a causal relationship exists between the e-SL program and the observed benefits. Experimental or quasi-experimental studies could extend our understanding of the effectiveness of SL programs in the future. Second, we relied only on self-reported data from the service recipients, thus leading to shared-method variance. In the future, additional types of respondents should be involved, such as teachers and parents, to enable research to report the changes in service recipients after they have participated in an SL program, and to demonstrate the effectiveness of such SL programs. Despite

these limitations, this pioneering study underscores the positive impact of e-SL on primary school students, with related gender differences observed.

Data Availability The data that support the findings of this study are available from the first author upon reasonable request.

Declarations

Ethical Statement This study was approved by the Human Subjects Ethics Committee of The Hong Kong Polytechnic University (HSEARS20210412007).

Conflict of Interest The authors have no conflicts of interest to disclose.

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