



Hope, career competency, and social well-being among non-engaged youth in Hong Kong: a longitudinal network analysis

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Abstract

Although it has been widely acknowledged that hope, career competency, and outcomes of social well-being (i.e., social integration, social contribution, and civic engagement) are key components of youth's career and life development (CLD), those interrelationships, their predictive relationships, and the relative importance of the variables in the relationships remain poorly understood. To fill that gap, we conducted two network analyses on three waves of data collected in the CLAP@JC Community Intervention Project. A total of 4,220 non-engaged youth (NEY) from Hong Kong participated in the project, all of whom were 13–29 years old ($M=18.66$, $SD=3.20$) and 53.3% of whom were boys and young men. The first network analysis, conducted on the data at baseline, revealed a moderate correlation between career competency and hope and a strong correlation between civic engagement and social contribution. The second network analysis, conducted on the aggregated three-wave data, showed that career competency could predict all other variables and that only hope could positively impact career competency over time. We also observed that social contribution can positively influence hope. Overall, our findings highlight the central role of career competency in networks while also revealing the different roles of the examined variables within the networks. Our new findings on the functions of and the relationships among those variables provide insights for further theorizing CLD, while the information obtained can also help practitioners to develop effective intervention strategies for promoting CLD among NEY.

Keywords Non-engaged youth · Career and life development · Network analysis · Hope · Career competency · Social well-being

Introduction

Due to economic globalization and the advance of high technology, the current labor market has become increasingly populated by uncertainty, unpredictability, and insecurity. As a result, individual school-to-work transitions have shifted from a linear, well-defined process to one that is complex, diverse, and lengthy (Savickas, 2012). This trend increases the challenges faced by young people seeking to make informed career decisions and achieve productive

livelihoods (Ngai et al., 2023). Around the world, more than 20% of young people aged 15–24 years were identified as being not in employment, education, or training (NEET) in 2020, and young people are more likely than adults to suffer from the repercussions of unemployment, underemployment, and unstable employment (Pavlova et al., 2018). Moreover, the recent COVID-19 pandemic has caused worldwide economic stagnation and heightened both competition and employment-related challenges in the job market, which has placed additional stress on youth (Karta et al., 2022; Oluwatayo et al., 2022). In Hong Kong, for example, from June 2022 to August 2022, the unemployment rates for young people aged 15–19 and 20–29 were 18.7% and 7.5%, respectively, both of which were higher than the overall unemployment rate of 4.3% for the same period (Census and Statistics Department, 2022). The unfavorable and intensely competitive career environment and the high rate of unemployment has not only impaired young

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people's sense of hope about achieving meaningful goals, but has also led to a series of social, emotional, and behavioral problems such as disengagement, anti-social behaviors, and social withdrawal, which ultimately impede their long-term career and life development (CLD) (Ngai et al., 2021, 2022).

Against this background, non-engaged youth (NEY), including school dropouts, young mothers, and ethnic minority youth, need special attention because they are more vulnerable than their peers due to systematic barriers such as poverty, discrimination, social exclusion, and other risks lurking in their career pathways (Ngai et al., 2023). Such vulnerabilities make them more likely to be involved in traumatic events that lead to higher levels of physical and psychological strain (Aekwarangkoon & Thanathamath, 2022). Moreover, societies dominated by knowledge-based and service economies such as Hong Kong often demand that job seekers possess high levels of career competency and commitment to continuing education and lifelong learning, which are often beyond the reach of young people who are stuck in different disadvantaged social circumstances (Pavlova et al., 2018). Consequently, NEY may either be persistently NEET or forced to engage in part-time, low-skilled, low-paid, precarious, and highly manual jobs (Ngai et al., 2023). Furthermore, characteristics of NEY, such as inactivity, passivity, and a lack of ambition, may lead to feelings of isolation and hopelessness and prevent them from developing valuable networks and the resources they will need to create a fulfilling career that aligns with their personal values and goals (Sylva et al., 2014). It can be argued that a combination of personal, social, and structural factors creates significant obstacles to NEY in pursuing their desired careers and lives.

CLD theorists have emphasized the importance of young people—especially NEY—developing hope (Ngai et al., 2022, 2023). The existing literature shows that people with a greater sense of hope are more likely to maintain a positive outlook toward attaining their career and life goals and achieve fruitful outcomes in the work world (Peila-Shuster, 2018; Santilli et al., 2014). Ngai et al. (2022) conceptualized hope in the CLD context as a positive motivational–cognitive–behavioral state toward the actualization of personally valued goals. Specifically, hope consists of two components: the motivational component (i.e., agentic thinking) functions to initiate and maintain an individual's motivation to achieve desired career and life goals, while the cognitive–behavioral component (i.e., pathway thinking) entails the production of goal-directed pathways. Put simply, hope is essential to igniting an individual's CLD by creating plausible pathways and providing motivation for the use of those pathways. Moreover, CLD theorists have posited that career competency is paramount for young people to

adapt to changing and increasingly complex work environments (e.g., Park et al., 2020; Savickas, 2012). Unlike self-efficacy, which emphasizes an individual's perceived ability in situation-specific tasks and goals, career competency represents a broad range of abilities for young people to become active navigators and change agents along their pathways (D'Souza et al., 2020; Ngai et al., 2023). In other words, career competency can support an individual's CLD by enabling them to take realistic actions to navigate their career pathways. Finally, studies have suggested that hope and career competency can be reciprocally impacted during an individual's school-to-work transition (Peila-Shuster, 2018; Santilli et al., 2014; Wandeler & Bundick, 2011). Taken together, these related theories and empirical evidence indicate an urgent need to explore hope, career competency, and the hope–competency mechanism in the CLD of NEY.

Notably, the long-term disengagement status and various socially disadvantaged situations render NEY's social well-being a great concern. Social well-being refers to an individual's self-appraisal about their social situations and functioning in society (Ngai et al., 2023), which encompasses a variety of elements such as social integration (i.e., feelings of being part of a group or community), social contribution (i.e., deeds for societal benefit), and civic engagement (i.e., participation in activities addressing issues of public concern) (Checkoway & Aldana, 2013; Ngai et al., 2022). As the term NEY implies, their prolonged disengagement from society may limit their access to important resources and information that are conducive to career competency (Yuen et al., 2021). Furthermore, experiencing social disconnectedness or social exclusion may make it difficult for them to develop a sense of trust and security that would allow them to be hopeful about their future careers and lives (Eraslan-Capan, 2016). In this regard, social well-being may serve as a solid foundation for nourishing an individual's hope as well as career competency, and efforts to enhance NEY's sense of hope and career competency cannot be separated from considering their social well-being.

Despite the growing body of studies examining hope, career competency, and social well-being as three key components for youth's CLD (e.g., Checkoway and Aldana, 2013; Peila-Shuster, 2018; Su & Wong, 2022), little is known about how they are interrelated with each other among NEY or, more importantly, about how their interrelationships may form a network over time. To fill those gaps in knowledge and to extend our previous work on the development and validation of measurement tools on hope and career competency (Ngai et al., 2021, 2022), we performed a network analysis on three waves of data collected from NEY in Hong Kong to examine the potential network constructed by hope, career competency, and social well-being as key variables

of NEY's CLD. Network analysis is a useful approach for understanding the structural relationships among variables. Compared with other approaches that may limit investigations into one-way linear relationships, network analysis allows researchers to comprehensively detect interrelationships and predictive relationships among variables, as well as the central variables in the network structure (Fang et al., 2023). The produced knowledge will be of great significance in at least three aspects. First, if NEY's CLD is spread across many dimensions, a network panorama can help practitioners design programs that maximize the overall positive impact of the CLD programs. Second, as our literature review demonstrates, various theoretical and empirical studies have implied several controversies regarding the relationships among the aforementioned variables of hope, career competency, and social well-being; a comprehensive understanding of these relationships can help clarify or respond to controversies within the NEY context. Third, the network-analysis method may disclose relationships that previous research has overlooked or given less weight to and thus provide ground-breaking insights into NEY's CLD theory.

Literature review

Relationships between hope, career competency, and social well-being

A rich body of literature has shown that hope and career competency can mutually influence one another (e.g., Ngai et al., 2021, 2022; Wandeler & Bundick, 2011). According to Snyder's (2002) Hope Theory, people with a strong sense of hope are more certain about the pathways to their goals and more motivated to use those pathways to reach goals. As such, compared to low-hope people, high-hope individuals are more likely to develop their career competency and achieve their vocational goals. Well-established evidence has shown that hope is particularly important in the development of career competency including career adaptability, career decisions, and self-efficacy (Peila-Shuster, 2018). Ngai et al. (2022) conceptualized hope in relation to the career development context and characterized hopeful young people as having higher levels of motivation to set up their goals, explore and manage their career pathways, and find jobs that suit their personalities and interests. Previous studies also reported that career competency can positively affect an individual's sense of hope (D'Souza et al., 2020; Ngai et al., 2023; Wandeler & Bundick, 2011); this could be because people who are better equipped to navigate career pathways and overcome obstacles in the workplace often hold a more optimistic attitude toward their future

and engage in more hopeful thinking (Santilli et al., 2014). Moreover, individuals with higher levels of career competency tend to possess greater self-understanding, which facilitates their ability to comprehend their aspirations and dreams regarding work and life (Ngai et al., 2021). Finally, the reciprocal relationship between hope and career competency has been also demonstrated in the time dimension. Based on a cross-lagged model, for example, Wandeler and Bundick (2011) found that vocational competency has a positive effect on young people's sense of hope, and hope can in turn lead to the development of career competency. These studies suggested that the interrelationship between hope and career competency may also hold in the dynamic network formed by key NEY's CLD variables.

Furthermore, extant studies have also suggested that hope is positively related to social well-being (e.g., Ngai et al., 2022; Snyder, 2002). Theoretically, people with a strong sense of hope have optimistic expectations about work and life, which provides a foundation for the belief that their social life will be positive (Callina et al., 2014; Fan & Wang, 2022; Wang et al., 2022). Hope could also serve as a cognitive reserve that allows individuals to effectively manage obstacles in their lives by supporting cognitive flexibility in goal-setting and pursuit (Folkman, 2010). Empirical studies have found that individuals high in hope are more likely to build or maintain close relationships with others and have a stronger sense of belonging to a group or community (i.e., social integration) (Murphy, 2023; Ngai et al., 2022; Wurster et al., 2021). Additional studies have shown that hopeful young individuals are more inclined to participate in constructive, goal-oriented activities within their communities and society, which indicates a positive impact of hope on social contribution (Flanagan, 2003; Ngai et al., 2022). Callina et al. (2014) discovered that hope and optimistic future expectations can positively influence an individual's civic engagement. After reviewing the related literature, Murphy (2023) concluded that hope can facilitate social well-being by helping people positively evaluate their interpersonal relationships, establish meaningful and positive social roles, and reduce aggressive behaviors.

Finally, past studies have suggested that career competency and social well-being are positively related (Ngai et al., 2021, 2023). Ngai et al. (2023) discovered that career competency is positively associated with three aspects of social well-being: social contribution, social integration, and civic engagement. According to them, young people with high levels of career competency are more likely to have a meaningful career and life pathway, which increases the chance that they will commit to deeds for the benefit of society. Alternatively, developing career competency might strengthen young people's sense of belonging to society (i.e., social integration) by enabling them to connect with

peers, social workers, employers, and other stakeholders in society. The literature has also documented that career planning and management skills can promote positive social integration among young people (e.g., Savickas, 2012). Young people with higher levels of career-related abilities and skills are more likely to volunteer or contribute to society (i.e., social contribution) (Pavlova et al., 2018). In addition, Ma et al. (2016) have observed that career-related service-learning activities can facilitate engaging in action for the common good (i.e., civic engagement). Their empirical observation implied that career competency may exert a positive impact on civic engagement.

Unexplored reverse relationships between social well-being, hope, and career competency

While research on NEY's CLD has revealed that hope and career competency can predict social well-being (e.g., Ngai et al., 2021, 2022, 2023); the reverse relationship—that is, how social well-being may play a vital role in improving NEY's hope and career competency—has received scant attention. Snyder (2002) speculated that an individual's hope about others and themselves should be conditioned by social environments, and they illustrated what a society in which people had more hope would be like. Likewise, Braithwaite (2004) remarked that when it comes to hope, people not only consider individual goals but sometimes those of group members as well. This might be particularly true in the Hong Kong Chinese context, which emphasizes the collectivistic culture in which people tend to believe that personal success is linked to the advancement of society as a whole (Bernardo et al., 2018; Jin & Kim, 2019). Considering these perspectives, it can be argued that social well-being may serve as the fertile soil that nourishes hope.

Several studies have suggested that people with higher levels of social well-being in terms of social integration experience a strong sense of belonging, security, and trust and are inclined to envision a bright future and feel empowered to overcome challenges and attain their goals (e.g., Callina et al., 2014; Dixon et al., 2017; Hong et al., 2020). In contrast, social disruptions and disengagement may lead to a sense of hopelessness or despair (Eraslan-Capan, 2016). These studies imply that people who are more integrated into society are more likely to experience a sense of hope. Moreover, social well-being in terms of making social contributions through socially valued actions such as volunteering is crucial for enhancing youth's sense of agency—that is, their ability to initiate and sustain motivation to achieve desired outcomes (Ngai et al., 2022)—which is a key competent of hope (Snyder, 2002). As such, participating in social-contribution activities may enhance an individual's agency and facilitate hope. This speculation was supported

by a recent study by Laslo-Roth et al. (2022), which concluded that benefiting society through volunteering can boost an individual's agency and pathway thinking which are core components of hope. Finally, social well-being in terms of civic engagement may help people to view themselves as valuable members of society with full access to the rights and opportunities they need to attain their desired future status (Flanagan & Levine, 2010). A study by Jin and Kim (2019) found that people who engage in communal endeavors such as giving to charity often exhibit higher levels of hope. These studies imply that civic engagement may positively affect an individual's sense of hope.

Furthermore, it is also conceivable that social well-being can positively influence an individual's career competency. Social well-being in terms of social integration often represents an individual's positive social relationships with their parents, siblings, teachers, peers, employers, and other key individuals (Yuen et al., 2021). Literature has shown that such integration is an essential dimension of an individual's CLD because it provides people with a sense of security and support and enables them to believe in their ability to adapt to new workplaces and prepare for future careers (Hui et al., 2018). Moreover, young people with a stronger support system and sense of belonging (i.e., social integration) may develop higher levels of hardiness or resilience, which can enhance their ability to manage stress and cope with career-related challenges (Yuen et al., 2021). Furthermore, as key elements of social well-being, social contribution, and civic engagement may positively affect an individual's career competency. For example, by participating in voluntary service and political-advocacy events, an individual can cultivate a range of skills and knowledge that can then be transferred to accomplish such work tasks as planning meetings, giving presentations, and collaborating with others (Benenson, 2017). Participating in social and civic activities can also help people expand their social networks (Benenson, 2017); this allows them to access more information, resource, and sponsorships and develops their career competency (Sou et al., 2022). Besides, engaging in these actions may help young people to reflect upon themselves and explore their potential and strengths, which is necessary for them to make informed career decisions and choose suitable career pathways.

Taken together, our literature review pointed to three research gaps. First, previous studies on hope, career competency, and social well-being were often limited to investigating one-directional linear relationships among these variables, resulting in a lack of a holistic picture to depict the interrelationships thereof. Second, because an individual's hope, career competency, and social well-being may change over time, studies that were based on cross-sectional designs may not fully capture interrelationships across time.

Third, in the absence of network analysis, previous studies have made it difficult for practitioners to design and optimize their service due to the lack of understanding of the interrelationships among these key CLD variables. We, therefore, propose the following three research questions:

- 1) What are the interrelationships among the key CLD variables of hope, career competency, and social well-being?
- 2) What are the predictive relationships between hope, career competency, and social well-being over time?
- 3) What is/are the central variable(s) in this network of CLD?

Methods

Procedure and participants

In our study, we used a sample of NEY from the CLAP@JC project, a territory-wide project aimed at facilitating young people's transitions from school to work in Hong Kong. NEY in Hong Kong often face various disadvantages in their school-to-work transitions and are at risk of becoming NEET youth (Ngai et al., 2023). Data collection was on a rolling basis; there have been new NEY participating in the project since October 2020. According to the project design, the participating NEY completed three-wave questionnaires with the help of social workers working with the CLAP@JC project. Notably, because the target participants were youth who were characterized by passivity, inactivity, and being socially disengaged, the CLAP@JC project understood that while social workers might take a relatively short time (e.g., Month 4–6 or 2 months in Wave 2) to invite NEY to complete the first follow-up survey, they needed to take a relatively long time (e.g., Month 6–10 or 6 months in Wave 3) to invite NEY to complete the second follow-up survey. Our analysis used data accumulated through November 2022.

We collected three waves of data on each participant to detect the dynamic network formed by key variables of NEY's CLD over time. The first wave of surveys was conducted when the NEY participated in this research project (i.e., Wave 1; Month 0), and it included the participants'

demographic information and their responses to questions about hope, career competency, and social well-being outcomes; the second wave was conducted 4–6 months after participating in the project (i.e., Wave 2; Month 4–6); and the third wave was conducted 10–16 months after participating in the project (i.e., Wave 3; Month 10–16). The two follow-up waves of surveys investigated the participants' responses to questions regarding hope, career competency, and social well-being outcomes. The number of participants in the three waves of the surveys was 4,220, 2,365, and 518, respectively. Since data collection was cumulative in nature, the reduced sample sizes in Wave 2 and Wave 3 were not due to attrition or dropout. We drew from methods of examining missing data to determine whether we could conduct a longitudinal network analysis on the data in our study (see Sect. 3.3.3 for details about the data examination). All participants were informed of the purpose and procedures of this study, and parental consent was obtained for all participants younger than 18 years of age. The method employed in our study was evaluated and approved by an ethics review committee prior to its administration.

Measures

Hope

Hope among NEY was measured by the Career and Life Development Hope scale developed by Ngai et al. (2022), which assesses a positive motivational–cognitive–behavioral state toward the realization of personal goals. Sample items included “Had encounters with the business sector to understand the industry;” “Took initiatives to set career and life development goals and plans;” “Was confident to make career choices that suit me;” and “Maintained positive work attitudes and life values.” NEY participants were asked to appraise their level of hope over the past month, and each item was measured on a 5-point scale ranging from 1 (never) to 5 (always). The reliability estimates of the scale in the three waves of surveys were high, with Cronbach's alphas from 0.930–0.950 (see Table 1).

Career competency

Career competency was measured by the Youth Career Development Competency Scale developed by Ngai et al. (2021), which uses 17 items to assess a range of career-related competencies needed to navigate school-to-work transitions. Sample items included “Compared different career and life development pathways according to personal and environmental factors;” “Identified personal limitations and social barriers encountered when pursuing career and life development goals;” “Stated learning and training

Table 1 Reliability Estimates of Hope, Career Competency, and Social Well-Being Outcome Measures

Scale	Reliability		
	Wave 1	Wave 2	Wave 3
Hope	0.950	0.950	0.930
Career Competency	0.960	0.960	0.960
Social Integration	0.729	0.730	0.723
Social Contribution	0.952	0.957	0.963
Civic Engagement	0.955	0.959	0.956

approaches that equip me to achieve career and life development goals;” and “Knew the necessary steps in making good career and life development decisions and understand the strengths and limitations of my decision-making methods.” NEY participants were asked to rate their ability to perform a list of activities in the past month, each on a 5point scale ranging from 1 (*not confident at all*) to 5 (*highly confident*). The reliability estimates of the scale in the three waves of surveys were high, and Cronbach’s alphas were all 0.960 (see Table 1).

As mentioned in the Introduction, social well-being in our study was evaluated by the following three social well-being outcomes: social integration, social contribution, and civic engagement.

Social integration

This study assessed NEY’s social integration—which refers to young people’s sense of belonging to a community or society—using four items adapted from the Social Integration Scale (Ngai et al., 2022). Participants were asked to rate their level of social integration over the past month in response to items such as “Had friends with whom I could chat” and “Felt accepted by my friends” on a 5point scale ranging from 1 (*never*) to 5 (*always*). The reliability estimates of the scale in the three waves of surveys were high, with Cronbach’s alphas ranging from 0.955 to 0.959 (see Table 1).

Social contribution

This study evaluated NEY’s social contribution—which refers to young people’s deeds for the benefit of society—using five items adapted from the Social Contribution Scale (Ngai et al., 2022). Participants were asked to rate their level of social contribution over the past month in response to such items as “Did something beneficial for the community” and “Helped someone in the community” on a 5point scale ranging from 1 (*never*) to 5 (*always*). The reliability estimates of the scale in the three waves of surveys were high, and the Cronbach’s alphas ranged from 0.723 to 0.730 (see Table 1).

Civic engagement

This study measured NEY’s civic engagement—which refers to young people’s participation in activities addressing issues of public concern—using six items adapted from the Civic Engagement Scale (Ngai et al., 2022). Participants were asked to rate their level of civic engagement over the past month with items that included “Became an active member in the community” and “Devoted myself to

improving the community” on a 5point scale ranging from 1 (*never*) to 5 (*always*). The reliability estimates of the scale in the three waves of surveys were high, with Cronbach’s alphas ranging from 0.959 to 0.959 (see Table 1).

Demographic variables

This study included NEY’s demographic information such as gender, age, and educational attainment. It also considered specific NEY groups, namely potential school dropouts (i.e., students who were absent from school for at least seven consecutive days but would occasionally attend); school dropouts (i.e., young people who left the formal education system early); unemployed youth (i.e., youth without a paid job); young offenders (i.e., youth who had committed crimes and had been arrested), youth with special education needs (i.e., young people diagnosed with special education needs by helping professionals); ethnic-minority youth (i.e., youth of non-Chinese ethnicity in Hong Kong); young mothers (i.e., young women who entered motherhood unprepared); and youth living in residential-care settings (i.e., youth admitted to residential care due to chronic family poverty, disruptive family situations, abuse, and/or neglect). Moreover, we included information as to whether the participating NEY were born in Hong Kong.

Data analysis

Network analysis at baseline

Following our research questions, we first investigated the interrelationships of key NEY’s CLD variables, namely hope, career competency, and social well-being (i.e., social integration, social contribution, and civic engagement). We performed a partial correlation network analysis with the *pairwise Markov random field* technique (PMRF) using the cross-sectional dataset at baseline (Epskamp Waldorp et al., 2018).

The partial correlation network structure was estimated using the R package *qgraph* (Epskamp Borsboom et al., 2018). The network analysis also used the graphical Least Absolute Shrinkage and Selection Operator (gLASSO) to provide a parsimonious solution reflecting empirical relationships in the cross-sectional data. A PMRF network is comprised of a set of *nodes* (i.e., variables) and a set of *edges* (i.e., partial correlations) that interlink the nodes; a higher value of the edge indicates stronger associations between the nodes after adjusting for the effects of other nodes. Three centrality indices were also used to determine the importance of each node in the network: *expected influence*, which quantifies the importance of a node in affecting other nodes in the network; *betweenness*, which quantifies

the number of times a node acts as a bridge along the shortest path between two other nodes; and *closeness*, which quantifies how closely a node is indirectly connected to other nodes. The higher the centrality indices, the more important the nodes are in the network.

Finally, the significance and stability of the edges were tested using the case-dropping bootstrapping method and the correlation stability analysis, respectively; a 95% bootstrapping confidence interval not including zero indicates the edge is significant; a correlation stability (CS) coefficient equal to or greater than 0.5 indicates acceptable stability of the edges (Epskamp Borsboom et al., 2018). Moreover, we adopted commonly used standards to interpret correlations; correlations with a coefficient (r) less than 0.1 is negligible, 0.1–0.3 is weak, 0.3–0.6 is moderate, and greater than 0.6 is strong (Dancey & Reidy, 2007).

Dynamic network analysis for three-wave data

Dependencies among variables in a PMRF network were modeled through pairwise conditional associations, which lead to an undirected network representation. To explore the predictive directions among NEY's hope, career competency, and social well-being over time, we performed a longitudinal network analysis using a set of repeated measurements of hope, career competency, and social well-being outcomes. Since our data contained the baseline survey and two follow-up surveys, it was considered to be time-series data with $\text{Wave} = \{1, 2, 3\}$ and could therefore be analyzed using the graphical vector autoregressive (GVAR) model (Epskamp Borsboom et al., 2018). The GVAR model is a useful tool to analyze time-series data and estimate regressions on previous time points (Epskamp, 2020); the longitudinal network analysis estimated by the GVAR model characterizes changes in conditional dependencies over time and is often applied in situations where researchers are seeking insight into the dynamic structure of systems (Borsboom et al., 2021).

We first analyzed the data with the GVAR model using the *psychometrics* package. In the GVAR model, we quantified conditional dependencies among variables as a matrix of standardized *partial directed correlations* (\mathbf{B}) that constitutes a *temporal network* (Wild et al., 2010). In a temporal network, each partial directed correlation (i.e., $\beta_{y_T|y_{T-1}}$) can be interpreted as the predictive effect of one node on other nodes on the later time point (Epskamp, 2020).

We then conducted significance tests of all edges in the longitudinal network using the case-drop bootstrapping method to gain further insight into the accuracy of network estimates. Specifically, we calculated the number of times each edge was included in the temporal network out of 1,000 bootstrapping samples, with a higher selection rate

indicating better stability of the edge; according to Epskamp (2020), edges that are included fewer than 400 of 1,000 times in bootstrap samples indicate low levels of stability.

Handling the sample size reduction

Little's (1988) missing completely at random (MCAR) test and Fairclough's (2002) logistic regression are both widely used statistical tools to test the randomness of a sample's loss of information. While our sample size reduction in Wave 1 and Wave 2 should not be understood as missingness caused by attrition or dropping out, it still leads to a loss of information and threatens the estimation accuracy of the network analysis; in light of this, we deployed these two statistical tools to test the randomness of our sample's loss of information. Specifically, if Little's MCAR test and Fairclough's logistic regression detected that our sample's loss of information belonged to missing completely at random or missing at random (MAR), we could choose the full-information maximum likelihood method to handle missingness when conducting our network analysis. In this way, we could ensure that the statistical inference accuracy in our study was not affected by the loss of information caused by a reduced sample size.

The result of Little's test ($X_2 = 13,191$, $p < 0.001$) suggested that the three-wave data were not missing completely at random. We then took the missing status of Wave 2 and Wave 3 data as outcomes and used demographic variables and the key NEY's CLD variables in Wave 1 as predictors to perform Fairclough's logistic regression. Our results confirmed that, while gender, age, and education level were significant predictors of the missing status of outcomes, the CLD variables in former waves were not significant predictors (see Appendix I for details about logistic regression estimates). According to Fairclough's (2002) method, our results suggested that the loss of information in our data should be understood as MAR. Finally, we employed the *full-information maximum likelihood* estimation method to maintain estimation accuracy for MAR data in the network analysis. Notably, all tests were performed using R language Version 4.0.2.

Results

Participants' profile

Table 2 delineates the participants' background information. Of the 4,220 participants at baseline, all were 13–29 years of age ($M = 18.66$; $SD = 3.20$), and 53.3% were male. Most of the participants (93.6%) were Chinese; most (87.4%) were born in Hong Kong and had been residents for a median

Table 2 Background Information of Study Participants (N = 4,220)

Characteristics		Percentage (%)
Gender	Female	46.7
	Male	53.3
Ethnicity	Chinese	93.6
	Non-Chinese	6.4
Born in Hong Kong	Yes	87.4
	No	12.6
NEY groups	Single disadvantage group (SDG)	93.1
	SDG1: Potential school dropouts	29.5
	SDG2: School dropouts	14.8
	SDG3: Unemployed youth	14.8
	SDG4: Youth offenders	11.3
	SDG5: Youth with special education needs	6.9
	SDG6: Ethnic minority youth	4.9
	SDG7: Young mothers	4.1
	SDG8: Youth living in residential care settings	2.9
Education level	SDG9: Others	3.9
	Multiple disadvantage group	6.9
	Primary level	0.4
	Junior secondary level	23.1
	Senior secondary level	53.3
	Diploma or certificate courses	10.1
Age (years)	Higher diploma or associate degree	8.3
	Bachelor or above	3.8
	None of the above	1.0
	<i>M</i> = 18.66	<i>SD</i> = 3.20

of 18 years. Regarding their level of education, most participants (76.8%) obtained senior secondary level education or lower. As for the NEY groups, 93.1% were faced with a single disadvantage, while 6.9% were facing multiple disadvantages. Among the NEY with a single disadvantage, 29.5% were potential school dropouts, 14.8% were school dropouts, 14.8% were unemployed youth, 11.3% were young offenders, 6.9% were youth with special education needs, 4.9% were ethnic minority youth, 4.1% were young mothers, 2.9% were youth living in residential care settings, and 3.9% were others.

Network structure at baseline

Case-dropping bootstrapping was used to gain insight into the stability and accuracy of the network parameters. The stability of correlations was summarized in the *CS* coefficient ($CS(\text{cor}=0.7)=0.75$), which indicated that 75% of the data can be dropped to retain a correlation of at least 0.7 with the original correlation coefficients. In other words, the estimated correlation coefficients did not vary from sample to sample in the case-dropping bootstrapping procedure. According to Epskamp (2020), this *CS* coefficient

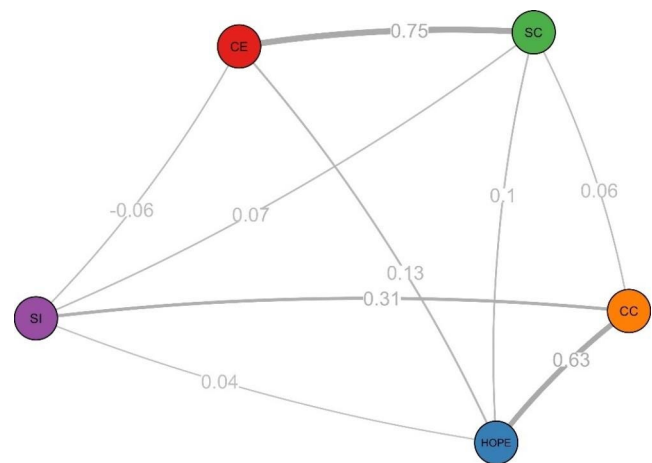
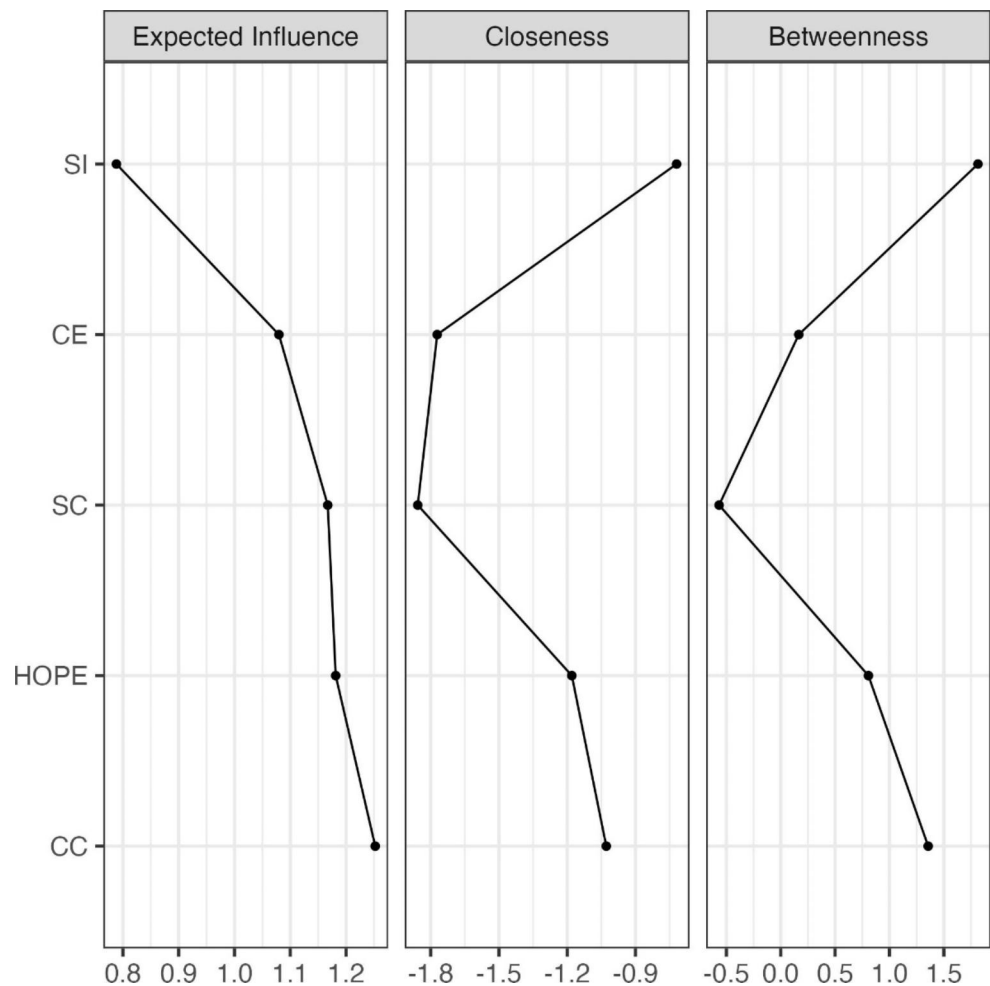


Fig. 1 Estimated Network Structure of the Key NEY CLD and Demographic Variables. *Note.* Gender, ethnicity, whether born in Hong Kong, education level, and NEY groups were controlled. Only significant edges were shown in the network. CE = Civic engagement; SC = Social contribution; SI = Social integration; CC = Career competency; HOPE = Hope

of above 0.5 indicated ideal coefficient stability, suggesting that the estimated network structure was stable. In addition, the estimated results suggested that 132 of 171 possible correlations in the network were statistically significant ($p < 0.05$). All non-significant correlations in the network were constrained to zero to obtain a sparse network model. Figure 1 presents statistically significant correlations among hope (HOPE), career competency (CC), and social well-being outcomes after controlling for the participants' ages, genders, ethnicities, education levels, NEY groups, and whether they were born in Hong Kong. The strengths of correlations were all standardized. Overall, the results confirm that social well-being outcomes were related to career competency and hope, which is supported by the extant literature. Specifically, career competency and hope had a moderate correlation ($r_{CC \leftrightarrow HOPE} = 0.63$, $p < 0.05$) while civic engagement (CE) and social contribution (SC) had a strong correlation ($r_{CE \leftrightarrow SC} = 0.75$, $p < 0.05$). In addition, social integration (SI) had negligible associations with civic engagement ($r_{SI \leftrightarrow CE} = -0.06$, $p < 0.05$) and social contribution ($r_{SI \leftrightarrow SC} = 0.07$, $p < 0.05$). Besides, civic engagement had a negligible correlation with hope ($r_{CE \leftrightarrow HOPE} = 0.13$, $p < 0.05$). Social integration had a weak correlation with career competency and a negligible correlation with hope ($r_{SI \leftrightarrow CC} = 0.31$, $p < 0.01$; $r_{SI \leftrightarrow HOPE} = 0.04$, $p < 0.05$). Social contribution showed both negligible correlations with career competency ($r_{SC \leftrightarrow CC} = 0.06$, $p < 0.01$) and hope ($r_{SC \leftrightarrow HOPE} = 0.1$, $p < 0.05$).

Figure 2 presents the centrality measures of the five variables in the network. Career competency and hope showed high expected influence scores of 1.252 and 1.181, respectively; relatively high closeness scores of -1.028 and

Fig. 2 Centrality Measures of the Key NEY’s CLD Variables.
Note. CE=Civic engagement; SC= Social contribution; SI= Social integration; CC= Career competency; HOPE= Hope



– 1.180, respectively; and betweenness scores of 1.356 and 0.806, respectively. In contrast, while social integration exhibited a high closeness score (-0.719) and betweenness score (1.814), this variable showed the lowest expected influence score (0.788).

Dynamic network structure from wave 1 to wave 3

Figure 3 presents the dynamic network structure, which included predictive relationships of the key NEY’s CLD variables (i.e., hope, career competency, and social well-being outcomes) over time. Similar to the network at baseline (see Fig. 1), the dynamic network did not include non-significant edges, because their strength had been penalized to zero by the gLASSO method (Epskamp Borsboom et al., 2018). In addition, to control for the Type I error rate of the estimates, all *p*values of the estimated coefficients were adjusted according to the *false discover rate* method (Benjamini & Hochberg, 1995). The results reveal that career competency of NEY measured in previous waves could significantly predict hope ($\beta_{CC \rightarrow HOPE} = 0.04, p < 0.05$); social contribution ($\beta_{CC \rightarrow SC} = 0.07, p < 0.05$);

social integration ($\beta_{CC \rightarrow SI} = 0.06, p < 0.05$); and civic engagement ($\beta_{CC \rightarrow CE} = 0.05, p < 0.05$) in later waves. Notably, while career competency could only be predicted over time by hope ($\beta_{HOPE \rightarrow CC} = 0.04, p < 0.05$), social contribution could promote future hope ($\beta_{SC \rightarrow HOPE} = 0.04, p < 0.05$) and future civic engagement ($\beta_{SC \rightarrow CE} = 0.12, p < 0.05$).

Finally, we conducted the case-dropping bootstrapping method to determine the stability of the generated longitudinal network structure. Table 3 delineates the estimated directional relationships and the proportion of significant edges included in the network during the 1,000 bootstrapping iterations; the nodes in the first column represent *source* nodes, and the nodes in the second row represent *target* nodes. The results indicated that all edges included in the original samples were selected more than 400 times out of 1,000 repetitions, which suggested that the stability of the network estimation was acceptable (Epskamp, 2020).

Fig. 3 The Estimated Network Structure with Directed Edges for Hope, Career Competency, and Social Well-Being Outcomes over Time. *Note.* Only significant edges were shown in the network. CE=Civic engagement; SC=Social contribution; SI=Social integration; CC=Career competency; HOPE=Hope

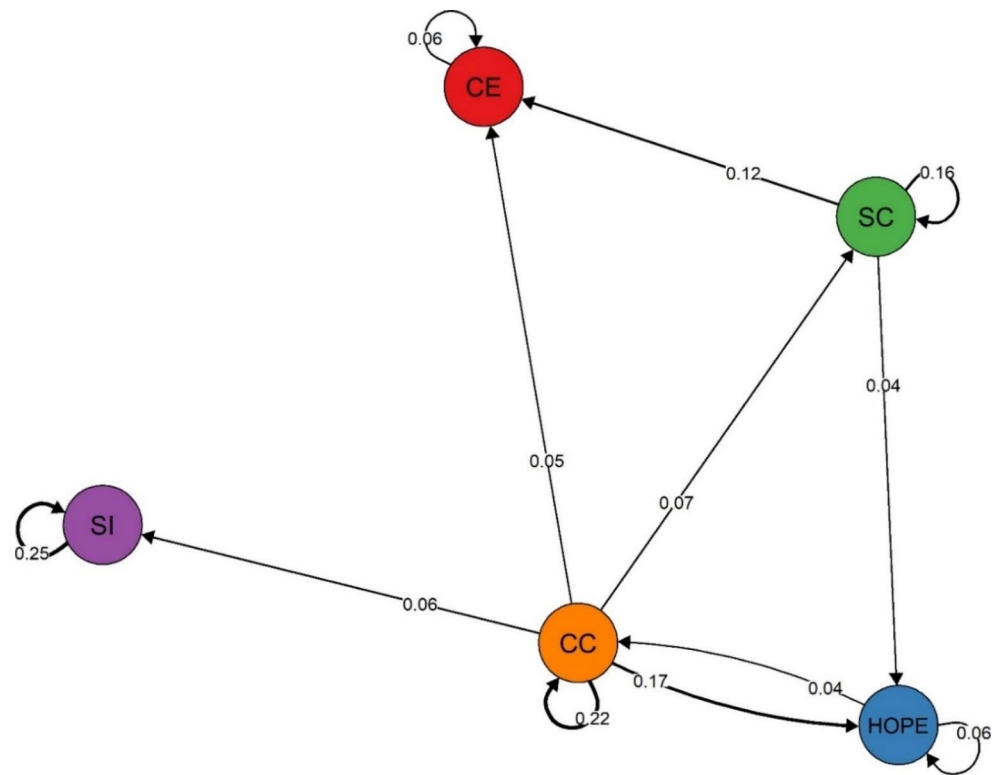


Table 3 Estimated Partial Directed Correlations of the Dynamic Network and the Probability of Selection according to the Bootstrapping Analysis

Source Nodes	Target Nodes				
	CE	SI	SC	CC	HOPE
CE	0.057*** (0.937)				
SI		0.245*** (0.988)			
SC	0.118*** (0.945)		0.158*** (0.970)		0.040*** (0.596)
CC	0.048*** (0.411)	0.056*** (0.577)	0.070*** (0.702)	0.220*** (0.973)	0.174*** (0.983)
HOPE				0.038** (0.570)	0.056** (0.798)

Note. The nodes in the second column represent source nodes while the nodes shown in the second row represent target nodes. Only significant edges are shown in the network. The values outside the parenthesis indicate the estimated strengths of edges, and the values inside the parentheses indicate the proportion of being selected in the network for each edge greater than 0.4, which suggests acceptable stability. CE = Civic engagement; SC = Social contribution; SI = Social integration; CC = Career competency; HOPE = Hope
** $p < 0.01$, *** $p < 0.001$

Discussion

Previous studies have revealed that hope, career competency, and social well-being outcomes (i.e., social integration, social contribution, and civic engagement) are important NEY's CLD variables (Ngai et al., 2022, 2023;

Wandeler & Bundick, 2011). To our knowledge, our study is among the first to employ a network analysis to present a holistic picture of the interrelationships among those variables. Overall, we found that the key variables of NEY's CLD—hope, career competency, and outcomes of social well-being—were interrelated, as is consistent with findings reported in the literature (Santilli et al., 2014; Wandeler & Bundick, 2011). More importantly, we also observed several relationships and variables' roles in the networks at baseline and across time that were not identified in previous works. First, we found that career competency plays a central role in the network. Second, we observed that only hope can predict career competency, which suggests that career competency and hope can form a feedback loop over time. Third, we discovered that social integration, social contribution, and civic engagement do not always positively relate to each other and that social contribution can positively influence hope. That third finding suggests that outcomes of social well-being should be understood in the specific social contexts in which the corresponding research is conducted. In what follows, the three key findings are discussed in greater depth.

For the first finding, the centrality measures at baseline suggested that among the five key NEY's CLD variables, career competency and hope performed relatively well in affecting, indirectly connecting, and bridging other variables in the network structure at baseline, whereas social integration performed relatively poorly in affecting the

network despite of good performance in bridging and indirectly connecting other variables. Moreover, our analysis of the dynamic network structure across time further confirmed the central roles of career competency and hope. Previous studies have demonstrated the importance of career competency in NEY's CLD by confirming its positive impact on hope and social well-being (e.g., Ngai et al., 2021; Wandeler & Bundick, 2011). Our study supported the importance of this by revealing that even in the network formed by all the key NEY's CLD variables, career competency was the only variable that could simultaneously predict all others. This could be due to career competency being operationalized in this study to encompass a range of abilities needed for youth to become active navigators of their own career pathways (Ngai et al., 2023); unlike the employment-oriented skills that only help youth cope with certain work and life tasks, improved career competency allowed NEY to feel a sense of control over the present by overcoming various difficulties in their lives (Ngai et al., 2023). In their journey to becoming active navigators, young people might feel more hopeful about their future and gain confidence to interact with people from different groups and participate in social activities. According to Savickas's (2012) *Career Construction Theory*, young people in the 21st century often experience frequent job dislocation and career instability, which requires them to continuously revise or reestablish their goals and choices to incorporate new career experiences into their ongoing life stories. To advance career and life development theory, we suggest broadening the concept of career competency and linking it with the navigation of life pathways, for career competency conceptualized in that way may act as a central powerhouse that radiates its impacts to other variables in the network.

Our second finding is that career competency can be predicted only by hope, which is inconsistent with past results indicating that career competency can be influenced by other factors such as well-being (Fan & Wang, 2022; Wang et al., 2021, 2022). The unique social situation in Hong Kong may accentuate the importance of hope among NEY, who are currently experiencing a highly uncertain social environment caused by globalization, evolving technology, and the ongoing impact of the COVID-19 pandemic. Moreover, social unrest in recent years has deteriorated the relationship between the younger generation and the Hong Kong government, as well as the wider society, and placed these youth under tremendous mental pressure (Home and Youth Affairs Bureau, 2022); specifically, a significant number of young people have articulated feelings of hopelessness about their future after noticing the mainstream discourse focused on criticizing the damage caused by young people during social incidents, while ignoring the difficulties behind them (Youth I.D.E.A.S., 2022). Against this background, hope

may play a unique role among young people in Hong Kong, especially those on the social fringes. Redlich Amirav et al. (2021) claimed that hope could be an essential resource for young people to cope with social uncertainty and unpredictability and to support the sustainable development of career competency in adverse social environments. In particular, the motivational component of hope can keep young people going when there seems to be little chance that they can change the status quo (Fang et al., 2023). In other words, hope increases young people's confidence in a possible future and a possible self, thereby enabling them to enhance career competency, even in the face of adversity (Santilli et al., 2014).

Considering that career competency can predict hope, it could also be argued that career competency and hope form a feedback loop as time goes by. This finding was consistent with a previous study wherein the influence between hope and competency in the workplace flipped over time (Wandeler & Bundick, 2011). This mutually reinforcing relationship could be explained in terms of the functions of hope and career competency in youth's goal-directed pathways. As already described, hope generates both a determination to achieve goals and alternative pathways to replace those that may have been blocked in the process of pursuing these goals, while career competency represents a range of abilities youth need to connect these goals to concrete tasks in their everyday lives. As thus, career competency may prevent NEY's hopes from becoming too idealistic because they can feel the progressive realization of hope by deploying their ability to achieve goals. Hope, in turn, may provide reassurance to NEY facing adversity along the pathway to their goals and inspire them to fully develop their career competency. In that light, we advise CLD theorists to pay attention to the mechanism at work between hope and career competency, especially when investigating groups of disadvantaged youth.

Our third finding suggested that we should reflect on social well-being in two lights. First, while previous studies theorized social contribution, social integration, and civic engagement as different aspects of social well-being (e.g., Ngai et al., 2022, 2023), analysis of networks at baseline and across time showed that social integration has either a negative, a weak or no correlation with social contribution and civic engagement. A possible explanation for this difference could be that NEY tend to be affiliated with homogeneous peer groups that share unfavorable characteristics (e.g., passivity, lack of ambitions, and inactivity), resulting in limited opportunities for them to participate in activities that benefit their society or addressing issues of public concern. Therefore, outcomes of social well-being could be context-specific, and youth who perform well in some aspects of social well-being might not necessarily perform

well in others. Second, the results of our longitudinal analysis showed that social contribution can positively influence hope. While prior studies have often regarded social well-being as the outcome of hope and career competency (e.g., Murphy, 2023; Wandeler & Bundick, 2011), the present study indicated that social well-being as it relates to social contribution could be a predictor of NEY's hope about their future career and life. One plausible explanation for this is that under the collective Hong Kong Chinese culture, giving back to society by donating time, money, and/or resources to help others enables young people to understand their value to society and connects their efforts to collective goals. According to Harter (1999), a person's appraisal of their own worth may have great implications on their cognitive and behavioral outcomes and influence the cognitive-behavioral component of hope (Ngai et al., 2022). However, social integration and civic engagement did not predict hope. As stated earlier, social integration might be more clearly expressed as NEY's integration into homogeneous NEY peer groups; this suggested that they may have difficulty integrating into groups with which they are unfamiliar, thus limiting the development of both the cognitive-behavioral and motivational components of their hope. Notably, extant literature has demonstrated that the information and knowledge that proves to be useful in securing employment often reside in shallow, broad networks of acquaintances, each of whom knows of different people, things, and resources (Mann et al., 2020). NEY's difficulty integrating into groups that differ from them may hinder them from obtaining what Granovetter (1973) described as trusted and non-redundant career-related information, discourage them from exploring alternative pathways to desired careers, and inhibit their development of pathway thinking (i.e., the cognitive-behavioral component of hope). Through face-to-face interactions with acquaintances such as employers, managers, and workplace mentors, young people gain a sense of agency over their school-to-work transition (Ngai et al., 2023); regarding this, NEY's lack of interaction with these people may also hinder them from improving their agentic thinking (i.e., the motivational component of hope). Besides, the non-significant correlation between hope and civic engagement may be because civic engagement is often related to addressing such public issues as freedom of the press, pollution, food insecurity, and social injustice (Checkoway & Aldana, 2013); this implies that engaging in civic activities may not bring young people hope, but rather negative emotional experiences such as frustration, helplessness, and anger. As a result, among the three well-being outcomes, only social contribution can predict hope in the present study. In sum, the third finding fills an important gap in the literature regarding how social well-being can positively influence NEY's hope, as well as

underscores the need to explore new understandings of the role of social well-being on NEY's CLD.

Limitations and implications

In addition to the significant findings delineated above, it is important to note some limitations of our study. First, we exclusively used self-reported data to examine the relationships between hope, career competency, and social well-being among NEY from their own perspective, which may have introduced mono-method bias. To cross-validate the results, future research could collect and triangulate data from multiple sources; for example, data from practitioners at nongovernmental organization or parent appraisals could be used to better understand NEY's social well-being, while social workers' ratings of NEY's abilities in the workplace or other career-related contexts could be used to evaluate NEY's career competency (Derakhshan et al., 2023). Second, the effect sizes of the predictor(s) on the outcomes in our dynamic network analysis were small according to the commonly used guidelines for interpreting effect sizes of partial correlations (Dancey & Reidy, 2007). Notably, however, Adachi and Willoughby (2015) pointed out that such guidelines may not be applicable in autoregressive modeling, because longitudinal models vary greatly in terms of the number of waves or timepoints examined; given this, a meaningful line of future research would be on how to properly assess and interpret the effect size of predictors on the network analysis outcomes. Third, due to the rolling nature of the data collection, the amount of data collected in the third wave was not as large as in the first and second waves. While we conducted statistical tests (i.e., Little's MCAR test and Fairclough's logistic regression) on the three waves of data to demonstrate that our data can satisfy the requirements of our network analysis, future studies should recruit as many NEY participants as possible, especially in the later stages of a longitudinal study, to enhance the validity of the study. Fourth, even though we focused on hope, career competency, and social well-being due to past studies on youth, other variables could be essential to youth's CLD; in the future, researchers should therefore consider additional variables, including career adaptability and life meaning, to enrich our proposed network. Fifth, we invited NEY from Hong Kong as the target group to investigate the interrelationships and dynamic impacts between their hope, career competency, and social well-being; choosing to focus solely on NEY in particular political, social, and cultural contexts may limit the generalizability of our conclusions to NEY in other contexts.

Notwithstanding these limitations, our study has both practical and theoretical implications. At the practical level, our study demonstrates the interplay among the key NEY's

CLD variables and identifies the different functions that each variable plays in the network. With a deeper understanding of the key NEY’s CLD variables, program leaders and designers could develop more effective plans and programs to help NEY live a more productive and meaningful life. Moreover, our analysis shows that career competency plays a more important role than other variables in the CLD network. In this regard, intervention targeted at career competency could be a feasible way to maximize positive effects across the network; for example, services and training that focus on enhancing NEY’s career competency could ultimately increase their sense of hope and their social well-being outcomes. Furthermore, by investigating the structural relationships of CLD variables across different time points, our work may encourage evidence-based practice among social workers and local NGO practitioners, especially when they face theoretical controversies or lack theoretical guidance.

At a theoretical level, our study provides a comprehensive picture of the interrelationships of the key NEY’s CLD variables. Our findings contribute to the advancement of current CLD literature, which often focuses on the effects of career interventions, yet rarely examines the interplay among CLD variables. Such a comprehensive demonstration of the relationships between key variables of NEY’s CLD may motivate the academic community to shift focus from conducting conceptual and theoretical explorations to instead performing empirical studies that benefit actionable, practical scholarship. Finally, while our study was conducted under Hong Kong’s unique circumstances, our results from the dynamic network structure may remind CLD theorists around the world to pay attention to the dynamic impacts of key CLD variables. In summary, our research reveals the interrelationship, prediction, and different functions of CLD variables in the CLD network and provides important implications for other countries and regions to better understand and cope with NEY-related issues.

Appendix I

Wave 2 and wave 3 missingness: estimates from logistic regression

Variables	β	SE	t	p	p_{fdr}
Intercept	0.388***	0.067	5.811	<0.001	<0.001
Gender (Female)	0.049*	0.016	2.983	0.003	0.018
Age	-0.010***	0.003	-3.520	<0.001	<0.001
Education	0.050***	0.008	6.016	<0.001	<0.001
CE_Wave1	0.020	0.015	1.349	0.177	0.885
SI_Wave1	-0.006	0.013	-0.461	0.645	1
SC_Wave1	0.004	0.015	0.257	0.797	1
CC_Wave1	0.002	0.019	0.116	0.908	1

Wave 2 and wave 3 missingness: estimates from logistic regression

Variables	β	SE	t	p	p_{fdr}
HOPE_Wave1	-0.014	0.018	-0.754	0.451	1
DV: Missing status in Wave 3					
Intercept	0.723***	0.087	8.274	<0.001	<0.001
Gender (Female)	0.107***	0.019	5.522	<0.001	<0.001
Age	-0.024***	0.003	-7.531	<0.001	<0.001
Education	0.003	0.010	0.252	0.801	1
CE_Wave1	-0.006	0.018	-0.349	0.727	1
SI_Wave1	0.022	0.015	1.418	0.156	1
SC_Wave1	0.037	0.018	2.106	0.035	0.315
CC_Wave1	-0.052	0.022	-2.339	0.019	0.209
HOPE_Wave1	0.048	0.022	2.208	0.027	0.270
CE_Wave2	0.001	0.018	0.039	0.969	1
SI_Wave2	-0.003	0.017	-0.186	0.853	1
SC_Wave2	0.018	0.019	0.960	0.337	1
CC_Wave2	0.031	0.022	1.401	0.161	1
HOPE_Wave2	0.035	0.022	1.630	0.103	0.824

Note. p_{fdr} = adjusted p-values with the false discovery rate method; DV = dependent variable; CE_Wave1 = Civic engagement measured in Wave 1; SI_Wave1 = Social integration measured in Wave 1; SC_Wave1 = Social contribution measured in Wave 1; CC_Wave1 = Career competency measured in Wave 1; HOPE_Wave1 = Hope measured in Wave 1; CE_Wave2 = Civic engagement measured in Wave 2; SI_Wave2 = Social integration measured in Wave 2; SC_Wave2 = Social contribution measured in Wave 2; CC_Wave2 = Career competency measured in Wave 2; HOPE_Wave2 = Hope measured in Wave 2

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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Data Availability The datasets generated and/or analyzed in the current study are not publicly available, as they contain information that could compromise the privacy of the research participants. The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declarations

Conflict of interest The authors declare no conflict of interest.

Institutional Review Board Statement The study was conducted in line with the guidelines of the Declaration of Helsinki and was approved by the Survey and Behavioral Research Ethics Committee of the Chinese University of Hong Kong (Protocol code SBRE-20-176; approved on December 8, 2020).

Informed consent Informed consent was obtained from all participants involved in the study. For participants younger than 18 years, parental informed consent was obtained.

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