

NATIONAL SERVICE INFORMATION NETWORK STRUCTURE: CENTRAL CONNECTOR AND BROKERAGE POSITIONS

Hwee Ling Lim

College of Arts and Sciences, Khalifa University, United Arab Emirates.

ABSTRACT

This study described the structural properties of two national service information networks. Social network analysis was applied to survey results from two samples comprising Emirati male high school youths (N=60 Dataset 1) and Fathers (N=26 Dataset 2). Results showed that youths initially depended on Social sources but future sources expanded to include Social and Institutional sources. Youths would move from relying on kinship/friendship sources with strong ties, to non-kinship/non-friendship sources where there are weak ties since the latter could provide access to information not already known to kin and friends. The Father actor was found to be the central connector which most youths turn to for information. The Father network was more varied than the youth network with non-human and non-kinship/non-friendship Social sources selected. Also, the Father brokerage position facilitated youths' access to new information through the former's Friends, Work colleagues, Internet sites that youths otherwise would have no physical or cognitive access. These findings contributed new knowledge about national service information dissemination in the United Arab Emirates and it is recommended that the UAE military support the broker node by providing official resources about the servicethrough government websites that specifically target parents.

Keywords: Brokerage, Central Connectors, National Service Information Networks, Social Network Analysis.

1. Introduction

National service was first introduced in the United Arab Emirates (UAE) in 2014 through the Federal Law No.6 of 2014 on the National Military Service and Reserve Force that required all male citizens (Emiratis), aged 18 to 30 years, who are able-bodied and not eligible for permanent exemption, to be drafted. Since the law's implementation, several changes were made to service length and eligibility for academic deferment. In 2016, service length was increased from nine months (in 2014) to 12 months, then to 16 months (in 2018) for male Emiratis with high school qualifications and above. In 2022, the Ministry of Defense announced a reduction of service length to 11 months for high school graduates while youths leaving school without qualifications must serve three years. Academic deferment for the purpose of higher education ended in 2020 when the National Service and Reserve Authority (NSR); a government body created by the Federal Law No.6, announced that high school graduates, with grades of 90% or higher who plan to enroll in the university, must first complete a four-month basic military training course after which they are allowed to start

university studies.

When national service was first introduced in 2014, recruits and the Emirati community lacked opportunities to interact with those who had served or currently serving. Emirati youths eligible for draft were faced with uncertainties such as adjustment to the service culture particularly its regimentation and discipline, the impact of service period on education and job-seeking, separation from family and friends, and personal safety. Such uncertainties about the service would lead recruits and parents to seek information to alleviate this anxiety. Hence, information-gathering is a strategy used to reduce uncertainty and it is a form of anticipatory behavior [8] which individuals adopt to prepare for a future event i.e. enlistment in national service. By 2019, six years post-implementation of national service in the UAE, a number of institutional and social information sources on national service are available to future recruits. Institutional information sources include government websites, mass media, teachers and military recruiters while social information sources include the recruits' friends, family members, and social media

contacts.

Assuming that youth perceptions of national service are typically based on their socialization experiences at home, in school and society, and the reliability of the sources, it is important to identify information sources used by Emirati youths since these sources could influence youths' expectations of and subsequent adjustment to service life. Moreover, these sources could affect the formation of positive or negative attitudes by youths towards national service that impact the long term sustainability of the service program. Since information is an important resource derived from having access to the right sources, we adopted a social network analysis approach to describe the structural properties of two national service information networks. The characteristic of one youth network (Dataset 1) is first described and the central connector identified namely the information source for almost everyone in the network. After identifying the primary conduit for national service information, we examined further another network (Dataset 2) where the central connector occupies a structural role as a broker node bridging a structural hole between two otherwise unlinked networks.

2. Key Concepts and Measures
Information Sources Classification

In this study, the construct *information sources* refer to resources that provide information on national service, measured as individuals, mass media, Internet sites, and categorized as Institutional and Social sources (Table 1). The list of sources was adapted from Lehnus & Wilson (1996). *Institutional sources* provide information on national service that is regulated or controlled and include government websites, military recruiter, teacher, newspapers, TV/movies. *Social sources* provide information that are based on own opinion, personal experiences or hearsay and would not have the authority to disseminate official information on national service. Social information sources include spouses, parents, siblings, relatives, friends, work colleagues, Internet sites, TV/movies. TV/movies are regarded here as both institutional and social

information source since this media may convey official and unofficial information on the service to the public.

Table 1: Institutional and Social Information

| | Institutional | Social | Youth items ⁴ | Father items ⁵ |
|------------------------------|---------------|--------|--------------------------|---------------------------|
| Friends ¹ | | x | x | x |
| Friends (older) ² | | x | x | x |
| Wife | | x | | x |
| Brother/Sister | | x | x | x |
| Relatives | | x | x | x |
| Work colleagues | | x | | x |
| Internet sites ³ | | x | x | x |
| Father | | x | x | |
| Mother | | x | x | |
| Teacher | x | | x | |
| Military recruiter | x | | x | x |
| Newspapers | x | | x | x |
| TV/movies | x | x | x | x |
| Government websites | x | | x | x |

Sources: Youth and Father Participant Items

Social Network Analysis Concepts
Social Network Analysis Approach

Social network analysis (SNA) is defined as a method enabling the disciplined inquiry into the patterning of relations among social actors at the group level of analysis [12]. A *social network* is formed from a set of actors, which can be individuals, groups or organizations, which are connected by regular patterns of relations or interaction between them [13-14]. SNA focuses on examining these patterns of relations between actors and the transfer or exchange of resources between them [15-16]. The resources can be tangible i.e. goods, services, money, or intangible i.e. information, social support, influence [13]. Social networks enable access to three types of *intangible resources*: emotional support; social companionship; and informational support. *Informational support* refers to the provision or exchange of novel information, guidance, and advice [17] while *information relations* reflect the kinds of information transferred or exchanged

between actors and its extent or frequency.

Tie strength in Information Networks

In Granovetter’s (1973). *The strength of weak ties*, tie strength was measured as the frequency of interaction between actors for a relation but tie strength can also be measured based on degree of *kinship*. Tie strength indicates the overall connectedness of actors in a network and likelihood of information flow from one actor to another. *Strong ties* demand time and energy to maintain; requiring frequent interactions or contact that facilitate information flow. Strong ties include kinship and friendship ties. The absence of such ties can leave individuals isolated when deprived of needed information or resources. *Weak ties* are formed in distant social relationships with infrequent interactions. Weak ties include non-kinship/non-friendship ties between acquaintances or strangers which are determined by structural arrangements rather than by choice. Weak ties can facilitate access to novel information not already known to the participants through their kinship and friendship ties. Granovetter (1973) showed that weak ties are important for access to unique information not available among actors with strong ties. Moreover, networks characterized by a combination of weak and strong ties is more efficient in information exchange since diversity of ties (network diversity) provides actors with access to a wider range of individuals with different expertise and information.

In this study, the Institutional and Social sources that provide information on national service included human and non-human sources. The human information sources are further categorized in terms of their degree of intimacy or closeness of their relationship with the actors: kinship, friendship, and non-kinship/non-friendship (Table 2). Human information sources based on *kinship* include nuclear family members such as parents and spouse (Father, Mother, Wife) and extended family members such as siblings (Brother, Sister) and *Relatives* such as Uncle, Aunt, Cousin. Information sources based on *friendship* include nonfamilial individuals who have bonds of mutual affection with the

participants. Information sources based on *non-kinship/non-friendship* are from the actors’ school, work or military community such as *Teacher, Work Colleagues* and *Military Recruiter*.

Table 2: Classification of Human Information

| | Kinship | Friendship | Non-kinship/friendship |
|------------------------------|---------|------------|------------------------|
| Father | x | | |
| Mother | x | | |
| Wife | x | | |
| Brother/Sister | x | | |
| Relatives | x | | |
| Friends ¹ | | x | |
| Friends (older) ² | | x | |
| Work colleagues | | | x |
| Teacher | | | x |
| Military recruiter | | | x |

Sources: Kinship, Friendship, Non-Kinship/Non-Friendship

Whole Networks

Information transfer or exchange can be examined in *whole networks* that depict who a group chooses or depends on for information and from whom it receives the information. Whole networks can show actors who hold important roles in information dissemination such as central connectors and those who occupy brokerage positions in networks.

Network Positions of Central Connectors and Brokers

Central connectors are the central information source for most actors in the network i.e. they are actors who others depend on most for information. Network positions can reveal key actors in information dissemination such as central connectors and brokers. *Brokers* function to bridge a structural hole between two actors or networks that are not connected i.e. they have no physical or cognitive access to each other, in order to facilitate access to novel information or resources.

In summary, this study applied SNA as an

approach to examine the structure of two national service information networks which could reveal a) the information sources selected by actors; b) the actors who are central to information flow; and c) actors who are closely or distantly connected (linked) to their information sources.

Social Network Data Visualization

Social network analysis offers a variety of visualization techniques for representing actors and relations in information networks. A *sociogram* is defined as “one kind of graphic display [in two-dimensional space] that consists of points (or nodes) to represent actors and lines (or edges) to represent ties or relations” [24, p.21] (Fig. 1). Sociograms enable not only the visualization of actors and ties, but also depict the directional nature of interpersonal relations to illustrate sources of influence and path of information diffusion. Moreno, Jennings & Stockton (1943) used sociograms to display group and subgroup structures in classrooms based on friendship choices made by students. The fundamental concern of SNA in the nature of relational ties is captured by a *sociometric star* (Fig. 2) representing “the recipient of numerous and frequent choices from others and who, therefore, held a position of great popularity and leadership”. Variations in sociograms included the use of directed ties, different shapes, locations, and/or colors to highlight significant network structural features. Further sophistication in the visualization of relational properties includes the assignment of numbers to indicate quantity or frequency in *valued graphs* (Fig. 3).

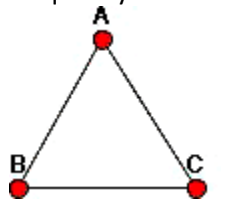


Figure 1. A sociogram

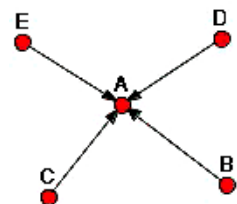


Figure 2. A sociometric star

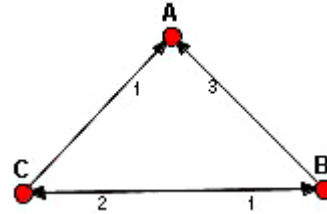


Figure 3. A directed and valued graph

When analyzing larger datasets with multiple actors, relations and number of ties, matrices offer clearer displays of network features than sociograms. Studies have examined *affiliation networks* where “one set of actors is measured with respect to attendance at or affiliation with, a set of events or activities”. Such data are captured by *case-by-affiliation matrices* where cases are represented by rows, and affiliations of cases (in events, activities or organizations) are represented by columns.

In this study, *directed, valued ties* are fundamental to examining the information-seeking behavior of groups in terms of the direction and frequency of choices (ties) made by groups and received by information sources. The SNA software NetMiner 4.4 (Cyram, 2022) was used to process relational data in *case-by-affiliation matrices* where groups are measured with respect to affiliation with a set of activities. It was also used to visualize the data as sociograms or network graphs. The concepts and assumptions underlying data visualization are explained below:

A node represents a social unit which is a group (participants) or an information source; both of which are differentiated by shape.

A tie represents a connection/link between two nodes i.e. a group and an information source.

A connection exists between a pair of nodes which has a tie incident to each other.

A Transmitter node has only ties originating from it i.e. originator of choices of information sources (a group) (Fig. 4).

A Receiver node has only ties terminating at it i.e. recipient of choices made by a group (Fig. 5).

An Isolate node has no ties incident to and from it (Fig. 6).

Ties are directed and asymmetrical (one way) i.e. ties are only sent from a group to an information source (out-ties) (Fig. 2). Directed ties are represented with arrows.

Ties are valued and the value represents the weight of the tie which is the frequency or sum of choices made for an information source by a group (Fig. 3).

The strength of a tie is represented by its weight and illustrated by its length and width i.e. thicker and shorter ties from group to source represent information sources that are chosen more often.

A relation refers to the type of tie that exists between a pair of nodes i.e. information acquisition or information-seeking behavior whereby a group selects one or more information source.



Figure 4. Transmitter node (i)



Figure 5. Receiver node (i)



Figure 6. Isolate node (i)

3. Method Instruments

As network data are typically obtained through questionnaires, this study developed three questionnaires (survey, individual interview, and focus group interview) that contained closed questions on demographics and the constructs examined. In this qualitative study, *construct validity* as the appropriateness of the questions for eliciting the required information, was addressed at the piloting stage which identified a general difficulty in understanding the questionnaires' instructions and questions worded in English since the Emirati participants' first language is Arabic. Hence, the final questionnaires were printed in English and Arabic so that participants would have recourse to the language they were more comfortable with. To identify

information sources on national service used and to compare them with the sources participants intend to access in the future, two closed questions were asked that required participants to a) select the sources they had used in 2018 or 2019 (data collection period); and b) select the sources they will use in the future for national service information. Table 1 lists the information source items available to participants for selection. The quantitative data from closed questions were processed and presented as descriptive statistics, then graphically represented as sociograms and network graphs. The findings were interpreted from a SNA perspective and not intended to be statistically generalized to wider populations.

Ethical Considerations

In this study, the main ethical considerations were participant protection, confidentiality, and informed consent. Data collection started in June 2018 till December 2019. Institutional Review Board approval for the study protocol was granted in May 2018 and valid till April 2020. This research did not place participants in physical danger. Confidentiality of identity was ensured by not gathering real names of participants, using codes to replace actual participant names in data processing and publications. Assent was obtained from Dataset 1 participants since they were minors (below 18 years) and consent obtained from their parent/guardian. All participants read, understood and signed a consent form (available in English and Arabic) that included the project aims, assurance of confidentiality, consent to voluntary participation and audio recording of interviews, and the right to withdraw from participation anytime without penalty.

Results: Dataset 1

Dataset 1 sample ($N = 60$) were all male Emirati youths in high school, aged 16 to 17 years (in 2019) who have not served but would be obliged to serve after graduation and unlikely to be permanently exempted at the time of data collection. All were single; 98.2% had an average monthly allowance below US\$5,450; and most

expected to graduate in 2019 (59.6%).

Dataset 1 participants were first asked to select information sources on national service they had used in 2018 or 2019 (data collection period). The results showed that Emirati youths depended least on Institutional sources (TV/Movies, Newspaper, Teacher) but depended most on Social sources (Father, Friends-same age/younger, Relatives) for national service information (Table 3, Fig. 7, full dataset in Appendix A Table A-1). Dataset 1 participant were then asked to select the sources they would access after 2018 or 2019, to identify their future use of national service information sources. A comparison between information sources used and the future sources participants would access showed that youths would continue to depend least on Institutional sources (TV/Movies, Newspaper, Teacher) and more on Social sources (Father, Relatives) for national service information (Table 3, Fig. 8).

Findings on Dataset 1 participants' choice of national service information sources revealed several patterns in their information-seeking behavior:

The top three information sources (items ranked 1-3) used by youths were limited to Social sources (Father, Friends-same age/younger, Relatives) but their future top three sources expanded to include Social (Father, Relatives) and Institutional sources (Military Recruiter). The item Military Recruiter replaced Friends (same age/younger) as one of the top three national service information sources that youths would access in the future (Table 3).

Kinship based human Social sources (Father, Relatives) were ranked among the top three sources youths had used and would continue to use in the future for national service information. Although kinship and friendship ties provide participants with informational support, there could be preferential selection of kin as the presence of frequent interactions between family members could encourage information flow. There could also be greater expectations of informational support from kin compared to

friends since friendship ties are voluntary.

The selection of *Military Recruiter* as one of the top three future information sources (Rank 3) indicates a move from relying solely on sources based on kinship/friendship where there are strong ties, to include non-kinship/non-friendship sources which are connected to participants by weak ties. This use of sources linked to youths by weak ties provides them with access to new or more valuable information not already known to kin and close friends.

Table 3: Youth Information

| Rank | Youths-sources used | Mean Rank | Rank | Youths-future sources | Mean ² |
|------|----------------------|-----------|------|-----------------------|-------------------|
| 1 | Father | 0.80 | 1 | Father | 0.68 |
| 2 | Friends ¹ | 0.68 | 2 | Relatives | 0.65 |
| 3 | Relatives | 0.60 | 3 | Military recruiter | 0.62 |

Sources on national service in 2019 (Top 3 items ranked)

Figure 7: Information Sources on National Service Used – Emirati Youths

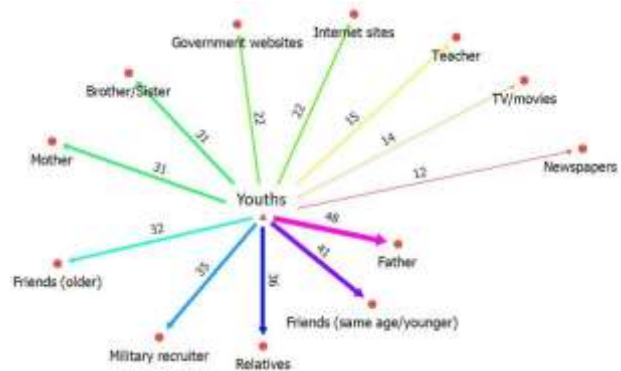
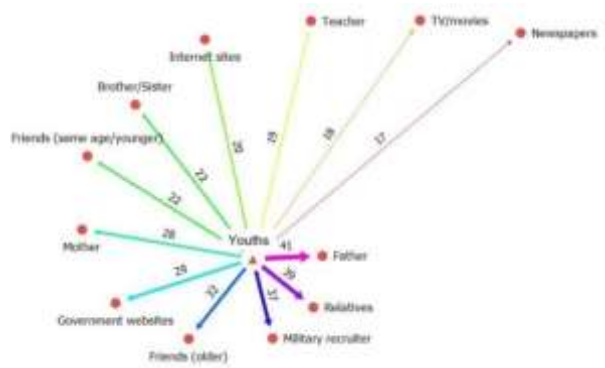


Figure 8: Future Information Sources on National Service – Emirati Youths

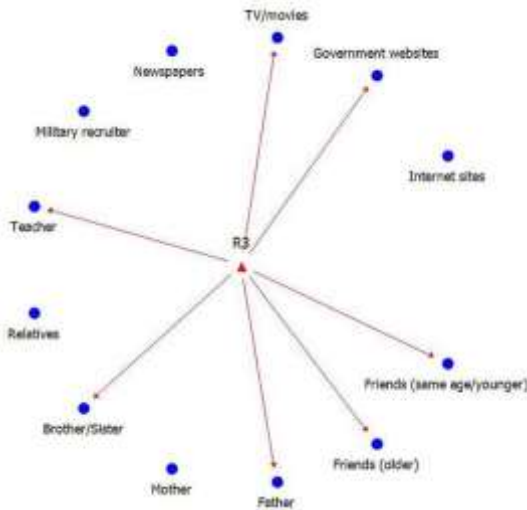


The following observations were made about the

youth information network structure:

From the view of whole networks, there were no Isolates found in the youth network i.e. nodes with no ties incident to and from it. Given the assumptions that information sources are represented as Receiver nodes and ties are asymmetrical (one way); sent from the participant group (Transmitter node) to one or more information source, the presence of an Isolate would indicate an unused source which could limit the acquisition of information by the group. However, in egocentric networks that visualize links from the perspective of a single participant, Isolates were present and expected since it is possible for an individual actor to select only some but not all information sources. For instance, Figure 9 shows an egocentric network of youth Respondent 3 (R3) and several Isolate nodes were present indicating sources that were not used by the actor.

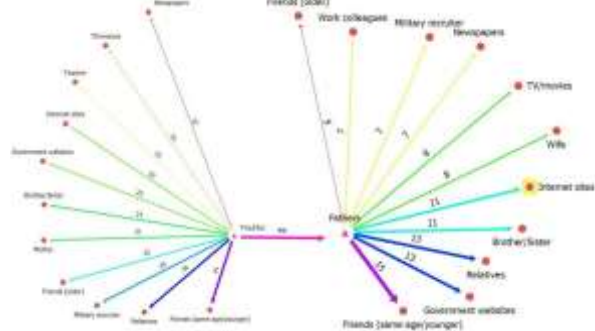
Figure 9: Isolates in a Youth Egocentric Network (R3)



Father remained the top ranked source (Rank 1) youths had used and would continue to use in the future for national service information. Since Father is the primary information source for

most participants, it is identified as a *central connector* in the youth information network. In addition, Father also functions as a *broker* node which is crucial role bridging a structural hole between two networks that are otherwise not connected. The graphs in Figure 10 show that the Father Brokerage position facilitates youths' access to other sources available in the Father network that could provide new information. The next section describes the Father national service information network structure.

Figure 10: Brokerage Position of Father Node



Results: Dataset 2

Dataset 2 sample (N = 26) were all male Emiratis aged 18 years and above with at least one child (Fathers). Most Father participants were aged 34 and above (88.4%), have two or more children (84.6%), well- educated with a Bachelor's degree and above (80.8%), employed (92.3%) with an average monthly income of US\$10,890 and above (54.5%), and more than 7 years' work experience (86.9%).

Dataset 2 participants were first asked to select information sources on national service they had used in 2018 or 2019. Results from the top three ranked sources showed that Fathers used both Social (Friends, Relatives, Brother/Sister, Internet sites) and Institutional (Government websites) sources for national service information (Table 4, Fig. 11, full dataset in Appendix A Table A-2).

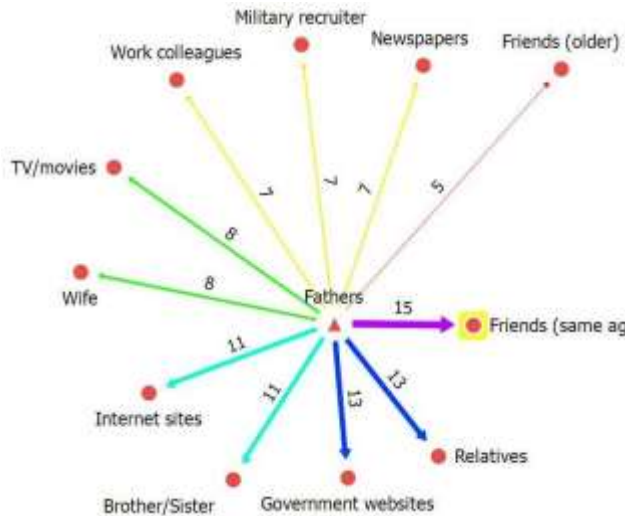
Table 4: Comparison of Emirati youth and Fathers' information sources: Used vs. future (Top three sources)

| Rank | Youths | Rank | Father |
|--------------|----------------|--------------|----------------|
| Sources used | Future sources | Sources used | Future sources |

NATIONAL SERVICE INFORMATION NETWORK STRUCTURE: CENTRAL CONNECTOR AND BROKERAGE POSITIONS

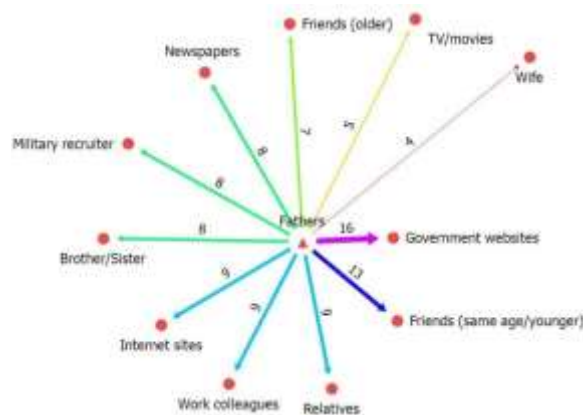
| | | | | | |
|---|----------------------|--------------------|---|---|---|
| 1 | Father | Father | 1 | Friends ¹ | Government websites |
| 2 | Friends ¹ | Relatives | 2 | Relatives Government websites | Friends ¹ |
| 3 | Relatives | Military recruiter | 3 | Brother/Sister Internet sites ² | Relatives Work colleagues Internet sites ² |

Figure 11: Information Sources on National Service Used – Fathers



Dataset 2 participants were then asked to select the sources they would access after 2018 or 2019, to identify their future use of national service information sources. Results from the top three ranked future sources showed that Fathers would continue to use both Social (Friends, Relatives, Work Colleagues, Internet sites) and Institutional (Government websites) sources for national service information (Table 4, Fig. 12).

Figure 12: Future Information Sources on National Service – Fathers



Findings on Dataset 2 participants' choice of national service information sources revealed several patterns in their information-seeking behavior. Unlike the youth information network which was dominated by a dependence on human Social sources based on kinship/friendship (Rank 1-3 for used and future sources) which indicates a lack of diversity in ties, the Father network was more varied as the top three ranked sources (used and future) show a selection of both Social and Institutional sources. Moreover, Father Participants' choice of Social sources (Rank 1-3) included non-human (Internet sites) and non-kinship/non-friendship (Work colleagues) sources.

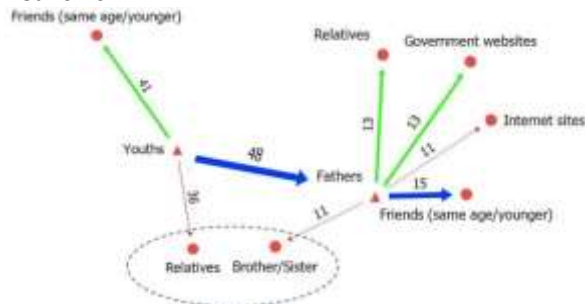
The following observations were made about the Father Brokerage position and information network structure:

A comparison of youth and Father Networks revealed several new information sources accessible to youths only via the Father participants' brokerage position. For example, among the Father's top three ranked sources (used and future), the Father Broker node facilitated youths' access to new information and advice through the former's Friends (same age/younger), Work colleagues, Internet sites that youths otherwise would have no physical or cognitive access (Table 4).

There is redundancy in network structure when sources used overlap in different networks. This may appear to be the case when Father and youth participants selected common items such as Friends, Relatives, Internet sites, Military recruiter, etc. However, this is not a true instance of redundancy but the result of the methodological design where the same named items were available to participants for selection (Table 1) and could be eliminated by allowing participants to name the information sources themselves instead

of providing a pre-compiled list of sources. Instead, actual instances of redundancy in the youth and Father Networks could be found when ties are interpreted based on kinship relations. For instance, when the Father participants' siblings (Brother/Sister item) is considered to be equivalent in kinship relations to youths' *Relatives* (i.e. their Uncle or Aunt), this means that both youth and Father Participants are accessing the same source for national service information (Fig. 13). This could also happen when the youth participants' choice of *Mother* item is considered to be equivalent in kinship relations to Fathers' *Wife*. The presence of such instances of redundancy among the top ranked items would suggest youths' dependence on selecting human Social sources based on kinship for information.

Figure 13: Redundancy in Youth and Father Information Networks



4. Conclusion

In conclusion, this study described the structural properties of two national service information networks. The characteristics of one Emirati high school youth information network (Dataset 1) was first described. In terms of national service information-seeking behavior, the results showed that youths initially depended mainly on Social sources but their future selection of sources expanded to include both Social and Institutional sources. It also found that youths would move from relying mainly on human sources based on kinship/friendship where there are strong ties, to depending on non-kinship/non-friendship sources where there are weak ties since the latter sources could provide youths with access to new information not already known to kin and close friends. Through the application of SNA, the Father actor was found to be the central

connector which most youths turn to for information.

We then examined further the Father Information network (Dataset 2) where the central connector also occupied a structural role as a broker node connecting youths to other information sources in the Father network. In terms of information-seeking behavior, the results showed that compared to the youth information network which lacked diversity in ties with its dependence on human Social sources based on kinship/friendship, the Father network was more varied with the selection of non-human and non-kinship/non-friendship Social sources. It also found that the Father Node brokerage position facilitated youths' access to new information through the former's *Friends (same age/younger)*, *Work colleagues*, *Internet sites* that youths otherwise would have no physical or cognitive access.

Findings from this work contributed new knowledge to an area that is not well researched i.e. the dissemination of national service information in the UAE context. The application of SNA revealed patterns in information transfer and highlighted a key actor in this process i.e. Father participant group that functions as both a central connector and broker. The SNA findings also added to existing knowledge of brokerage roles and brokers' ability to improve information flow across networks, namely through their structural positions, the Father participants helped youths gain access to novel information and advice.

However, SNA studies in organizational contexts pointed out that there are costs to brokerage that include the tendency of bridging ties to decay quickly due to the time and energy required to maintain contact; the potential of broker nodes to hoard information that result in bottlenecks in information flow; and brokers may become overwhelmed when everyone rely on them for help. It can be argued that when the broker role is fulfilled by Father Participants and the relation is based on close kinship and familial ties, there are many opportunities for interaction and strong motivation by Fathers to help their sons gain information. Hence it can be assumed

that this bridging tie would remain sustainable over time. Nonetheless, to avoid the risk of Fathers being overwhelmed by sons' reliance on them for information, it is recommended that the UAE military provide official resources about the service via government websites that specifically target Fathers (or parents). For instance, the Singapore Ministry of Defence has a Central ManPower Base (CMPB) which is a military recruitment office created for managing administrative matters from enlistment to release from full-time national service. The CMPB website provides a parents' guide to supporting their sons before and during national service. The website offers important information parents may need such as understanding their sons' national service obligation; helping their sons adapt to the camp discipline and communal living as a fresh recruit; recognizing common emotional or psychological issues early and helping their sons seek professional counselling.

The main limitations of this work lie in its research scope and aspects of its methodological design. Hence future research could examine not only the selection of information sources but also the extent to which each source is considered to be authoritative i.e. trustworthy in the information dissemination process. Furthermore, future work could increase the small Father Sample size so that it is equivalent to the youth sample for more accurate mean values.

5. Acknowledgements

This work was financially supported by the grant ADEK Award for Research Excellence (AARE) 2017 under Grant No. AARE17-186.

References

- TDRA. (2022, 16 September). *Preserving the Emirati national identity*. Available: <https://u.ae/en/information-and-services/social-affairs/preserving-the-emirati-national-identity>
- The National. (2022, 13 May). *UAE to reduce national service to 11 months for high school graduates*. Available: <https://www.thenationalnews.com/uae/government/2022/05/12/uae-to-reduce-national-service-duty-to-11-months-for-high-school-graduates/#:~:text=Emirati%20high%20school%20graduates%20will,state%20news%20agency%20Wam%20reported>.
- The National. (2020, 14 September). *All male Emirati pupils due to graduate this year must enrol in National Service*. Available: <https://www.thenationalnews.com/uae/government/all-male-emirati-pupils-due-to-graduate-this-year-must-enrol-in-national-service-1.988292>
- H. L. Lim, A. Almaeeni, A. Alzaabi & A. Almaeeni, (2019). "National Service Enlistment Propensity Trends among Emirati High School Youths: Preliminary Findings," in *7th International Conference on Business and Social Science (ICBASS)*, Kyoto, Japan, pp. 163-174: Higher Education Forum.
- H. L. Lim, A. Alzaabi, A. Almaeeni, & A. Almaeeni, (2019). "Enlistment Propensity and Motivations: Initial Views of Emirati Youths on National Service," in *5th Asia-Pacific Conference on Social Sciences & Management (APCSSM)*, Seoul, South Korea, pp. 90-101: Higher Education Forum.
- H. L. Lim, A. Almaeeni, A. Almaeeni, & A. Alzaabi, (2022). "Developing Frameworks of Emirati Youth Goals by Understanding Enlistment Propensity and Motivation," *International Journal of Arts and Social Science*, vol. 5, no. 2, pp. 94-102.
- H. L. Lim, A. Alzaabi, A. Almaeeni, & A. Almaeeni, (2022). "Emirati Youth Selection of National Service Information Sources in the United Arab Emirates," *American Journal of Humanities and Social Sciences Research* vol. 6, no. 9, pp. 1-11.
- M. V. Butz, O. Sigaud & P. Gérard, (2003). "Anticipatory behavior: Exploiting knowledge about the future to improve current behavior," in *Anticipatory Behavior in Adaptive Learning Systems*, M. V. Butz, O. Sigaud, and P. Gérard, Eds. Berlin, Heidelberg: Springer, pp. 1-10.
- H. W. Chiang, (2012.). "Young Singaporeans' perspectives of compulsory military conscription: How they manage the national service experience in relation to their education, development and careers," Doctor of Education, School of Education, University of Leicester, Leicester, UK.
- R. F. Chisholm, D. E. Gauntner, & R. F. Munzenrider, (1980). "Pre-enlistment expectations/perceptions of army life, satisfaction, and re-enlistment of volunteers," *Journal of Political and Military Sociology*, vol. 8, no. 1, pp. 31-42.
- J. D. Lehnus & M. J. Wilson, (1996). "Sources of perception military service," presented at the International Military Testing Association (IMTA) Conference, U.S. Air Force Personnel Center, San Antonio, 12-14 November. Available: <http://www.dtic.mil/docs/citations/ADA364075>
- R. Breiger, (2004). "The analysis of social networks," in *Handbook of data analysis*, M. Hardy and A. Bryman, Eds. London: Sage, pp. 505-526.
- C. Haythornthwaite, (1996). "Social network analysis: An approach and technique for the study of information exchange," *Library and Information Science Research*, vol. 18, no. 4, pp. 323-342.
- S. Tabassum, F. S. Pereira, S. Fernandes & J. Gama (2018). "Social network analysis: An overview," *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery*, vol. 8, no. 5, pp. 1-21.

- J. Scott, (2000). *Social network analysis*, 2nd ed. Thousand Oaks, CA: Sage Publications.
- S. Wasserman & K. Faust, (1994). *Social network analysis: Methods and applications* (Structural analysis in the social sciences). Cambridge: Cambridge University Press.
- A. N. Bush, A. M. Walker, & B. L. Perry, (2017). "'The family plan': Characteristics of ties described as both 'friend' and 'family' in personal networks," *Network Science*, vol. 5, no. 1, pp. 92-107.
- M. Granovetter, (1973). "The strength of weak ties," *American Journal of Sociology*, vol. 78, no. 6, pp. 1360-1380.
- R. N. Greene, (2019). "Kinship, Friendship, and Service Provider Social Ties and How They Influence Well-Being among Newly Resettled Refugees," *Socius*, vol. 5, pp. 1-11.
- R. Cross & L. Prusak, (2002). "The people who make organizations go—or stop," *Networks in the Knowledge Economy*, vol. 80, no. 6, pp. 248-260.
- R. S. Burt, (1992). *Structural Holes: The Social Structure of Competition*, 1st ed. Cambridge, MA: Harvard University Press.
- A. K. Chaudhary & L. A. Warner, (2021). "Introduction to social network research: Brokerage typology," in *EDIS* vol. 3, 1st ed. Florida: University of Florida, pp. 1-4.
- J. C. Long, F. C. Cunningham, & J. Braithwaite, (2013). "Bridges, brokers and boundary spanners in collaborative networks: A systematic review," *BMC Health Services Research*, vol. 13, no. 1, pp. 1-13.
- R. Hanneman & M. Riddle. (2005, 19 July). *Introduction to social network methods*. Available: <http://faculty.ucr.edu/~hanneman/>
- H. Jennings, (1937). "Structure of leadership-development and sphere of influence," *Sociometry*, vol. 1, no. 1/2, pp. 99-143, July-October.
- J. Moreno, H. Jennings, & R. Stockton, (1943). "Sociometry in the classroom," *Sociometry*, vol. 6, no. 4, pp. 425-428, November.
- J. Moreno & H. Jennings, (1944). "Sociometric methods of grouping and regrouping with reference to authoritative and democratic methods of grouping," *Sociometry*, vol. 7, no. 4, pp. 397-414, November.
- Cyram Inc., (2022). "NetMiner 4.4," Seoul, South Korea: Cyram Inc.
- B. Wellman & S. Wortley, (1990). "Different strokes from different folks: Community ties and social support," *American Journal of Sociology*, vol. 96, no. 3, pp. 558-588.
- CMPB. (2021, 22 Dec). *Supporting your son during NS*. Available: <https://www.cmpb.gov.sg/web/portal/cmpb/home/parents-guide/supporting-your-son-during-ns>.