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SSM - Population Health 19 (2022) 101154

Contents lists available at ScienceDirect

SSM - Population Health

journal homepage: www.elsevier.com/locate/ssmph

The double-edged role of accessed status on health and well-being among middle- and older-age adults in rural South Africa: The HAALSI study

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ARTICLE INFO

Keywords:
South Africa
Health
Accessed status
Social capital
Social cost
Social network

ABSTRACT

Background: Social capital theory conceptualizes accessed status (the socioeconomic status of social contacts) as interpersonal resources that generate positive health returns, while social cost theory suggests that accessed status can harm health due to the sociopsychological costs of generating and maintaining these relationships. Evidence for both hypotheses has been observed in higher-income countries, but not in more resource-constrained settings.

We therefore investigated whether the dual functions of accessed status on health may be patterned by its interaction with network structure and functions among an older population in rural South Africa.

Method: We used baseline survey data from the HAALSI study ("Health and Aging in Africa: a Longitudinal Study of an INDEPTH Community in South Africa") among 4,379 adults aged 40 and older. We examined the direct effect of accessed status (measured as network members' literacy), as well as its interaction with network size and instrumental support, on life satisfaction and self-rated health.

Results: In models without interactions, accessed status was positively associated with life satisfaction but not self-rated health. Higher accessed status was positively associated with both outcomes for those with fewer personal contacts. Interaction effects were further patterned by gender, being most health-protective for women with a smaller network and most health-damaging for men with a larger network.

Conclusions: Supporting social capital theory, we find that having higher accessed status is associated with better health and well-being for older adults in a setting with limited formal support resources. However, the explanatory power of both theories appears to depending on other key factors, such as gender and network size, highlighting the importance of contextualizing theories in practice.

1. Introduction

Following the widespread rollout of antiretroviral treatment (ART) and resulting survival gains, declining HIV-related mortality and declining fertility, rural South Africa is set to age rapidly (Houle et al., 2016; Kabudula, Houle, Collinson, Kahn, Gómez-Olivé, et al., 2017;

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https://doi.org/10.1016/j.ssmph.2022.101154
Received 15 February 2022; Received in revised form 20 June 2022; Accepted 23 June 2022
Available online 6 July 2022
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Kahn et al., 2012). While older adults live longer today than two decades ago, many now spend more years living with HIV, in difficult living conditions, with limited resources and multiple household roles (Harling, Payne, et al., 2020; Nxumalo et al., 2016; Schatz & Madhavan, 2011). Identifying potential ways to improve health and well-being at older ages is an important policy concern.

Existing studies have highlighted the importance of interpersonal connections for well-being among people of older ages. Social support and social engagement with close contacts have received notable attention as potentially modifiable factors in ameliorating age-related deterioration of mental and physical health (Rook & Charles, 2017). However, existing evidence is largely derived from higher income countries. While a few studies in lower- and middle-income countries (LMICs) have begun to unpack the complex relationships between interpersonal connections and older age health (Harling, Kobayashi, et al., 2020; Jennings et al., 2021; Ralston et al., 2021; Story, 2013), less is known about the health effect of accessed status, a form of interpersonal resource, in LMICs.

In post-apartheid rural South Africa, accessed status may be crucial in supporting the livelihoods of older adults, given the combination of scarce institutional resources and a socially sanctioned duty to care for family members within and beyond the individual household or homestead (Mkhwanazi & Manderson, 2020; Perkins et al., 2015; Schatz & Ogunmefun, 2007). Most adults over age 60 are entitled to a state pension, but they are also expected to continue in a productive role to support family well-being, potentially providing both financial and physical aid (Schatz et al., 2015; Schatz & Gilbert, 2012; Schatz & Madhavan, 2011). Existing research in the study area and beyond have focused primarily on shared resources at the household level, limiting our understanding of accessible resources in older adults' wider connections with families, kin, neighbors, and acquittances.

One network-based theory conceptualizes and operationalizes accessed status as a form of social capital, emphasizing that having network members (alters) with more socioeconomic resources has a protective role for individuals' (ego's) health (Lin, 2002). Recent evidence has also found potentially harmful implications of accessed status on health, given the cost and expenses of generating and maintaining social relationships (Song et al., 2021). Prior researchers have tested the two competing theories in different cultural contexts, to show how they might vary across different population subgroups – including by education, employment, and gender (Lee & Kawachi, 2017; Moore, Daniel, Paquet, et al., 2009; Song, 2014; Song et al., 2017; Song, 2020; Song & Pettis, 2020). However, little is known about the dual functions of accessed status on health by varying personal network structure and social support patterns.

In this study, we used personal network data from rural Mpumalanga, South Africa to investigate whether having higher accessed status in personal social networks improves health and well-being at older ages. We examined whether the hypothesized, conflicting association between accessed status and health observed in high-income settings might vary in a rural, low-resource population. We further explored whether the health implications of accessed status could be patterned by network size and the extent of received social supports, as well as with varying individual sociodemographic characteristics.

2. Literature review: Accessed status and health

Lin's (2002) network-based approach to social capital theorized and operationalized accessed status, that is, the socioeconomic status (SES) that network members occupy, as a protective factor for health. Accessed status is commonly measured by using the position generator, which asks respondents to identify whether they are acquainted with individuals of certain social positions based on their occupations, reflecting differing levels of prestige (Lin & Dumin, 1986; Lin et al., 1981). Other network instruments include the name generator, which directly measures accessed status as the SES of named contacts (Song & Chang, 2012), and the resource generator, which measures specific assets (e.g., knowledge or commodities) that alters possessed (Van Der Gaag & Snijders, 2005; for a review, see Song, 2013).

Under the assumption that accessed status provides network resources, social capital theory argues that accessed status can advance instrumental (e.g., wealth and power) and expressive (e.g., health) returns for the ego through multiple material and psychosocial mechanisms. These mechanisms include reinforcing shared identify, exerting social influence, providing social supports, and enhancing psychological resources such as self-esteem, sense of control, and subjective social status (Lin, 2002; Song, 2011; Song & Lin, 2009). Such returns are strongly correlated with alters' socioeconomic position, given the strong SES gradients in resource ownership (Burt, 2000; Lin, 2002).

Supporting the social capital theory, existing studies have found a positive association between accessed status and various self-reported health outcomes, including life satisfaction and self-rated health (Acock & Hurlbert, 1993; Moore et al., 2011), and are a protective factor for depression, physical inactivity, and overweight/obesity (Legh-Jones & Moore, 2012; Moore, Daniel, Paquet, et al., 2009; Song & Lin, 2009). Empirically, these direct associations may be explained by the way in which alters' SES serves as social credentials and resources in acquiring health-related information (Song & Chang, 2012). Other possible mechanisms include enhancing subjective social status and esteem when surrounded by higher SES social actors (Song, 2011), and encouraging engagement in heathy behaviors and norms, such as promoting smoking cessation (Christakis & Fowler, 2008; Moore et al., 2014).

However, accessed status is not without cost. Social cost theory has recently been proposed to explain the detrimental role of accessed status for health (Song et al., 2021; Song & Pettis, 2020; Song, 2020). In contrast with social capital theory, social cost theory emphasizes the adverse health consequences of social networks, related to obligation, investment, stress, and possible conflict associated with generating and maintaining social relationships (Song et al., 2021). Prior work has identified various mechanisms to explain the harmful effects of accessed status on health, such that having a higher accessed status may trigger negative self-evaluation (Moore et al., 2009; Lee & Kawachi, 2017; Song, 2020), reinforce stressful unsolicited social exchanges (Song & Chen, 2014), and involve greater networking expenses (Bian, 2019). The burden of having many higher SES personal contacts may be greater for those with lower SES, who may lack resources to redress asymmetric social exchanges, and have greater opportunity for negative, upward self-evaluation (Festinger, 1954; Song et al., 2021). US and Canadian studies, for example, have found an inverse association between accessed status and mental health outcomes, life satisfaction and self-esteem, among people who are unemployed or with lower educational levels (Moore et al., 2009; −Song, 2014; see also, Song & Lin, 2009).

The network-based approach to social capital is particularly relevant to this study, as it establishes a clear theoretical distinction with other network concepts (Song, 2013), including social cohesion (norms), social integration (network size and embeddedness) and social support (resources transactions). All these network concepts have been broadly conceived to protect against the deterioration of mental and physical health (Berkman et al., 2000; Thoits, 2011), especially among people of older ages (Stoeckel & Litwin, 2016; Rook & Charles, 2017; Tomini et al., 2016), in both higher and lower income settings (Perkins et al., 2015; Smith & Christakis, 2008). However, harmful implications from these structural aspects of social networks have also been reported, such as the adverse psychological consequences of having a larger personal network (Falci & McNeely, 2009), and the negative effect of received social support on older adults' mental well-being due to a possible suppression in one's sense of mastery and control (Ang & Malhotra, 2016). A follow-up question is whether the conflicting association between accessed status and health may be additionally explained by its interplay with these structural and functional aspects in personal social networks. This has yet to be empirically examined.

2.1. Accessed status and health in rural South Africa

The reliance on social connections for various forms of aid and resources may be substantial in many LMICs, given a mixture of a lack of institutional support and limited economic opportunities (Posel, 2001; Knight et al., 2016). In many LMIC settings, like rural South Africa, accessed status may be a vital resource and source of support. Today, nearly three decades after the end of apartheid, many older adults continue to be the sole income-generator and are expected to perform multiple household roles (Posel, 2001; Hosegood et al., 2007; Schatz et al., 2015). Formal employment was and remains extremely limited in rural areas, and households lack the presence of working-age members because of both HIV and circular migration for work (Collinson et al., 2016). Older members are responsible for providing care and maintaining household livelihoods, largely via the monthly means-tested non-contributory public-sector old-age pension ("grant") received by adults aged over 60 (Madhavan et al., 2017; Schatz et al., 2015). These caregiving responsibilities can add financial and social stress for older adults (Ice et al., 2012), which is likely to worsen when labor migrants return home due to HIV-related or other illness (Clark et al., 2007). For older adults, having available social ties for care and resources may become crucial for improved livelihood and well-being; however, in a context with limited economic opportunities and HIV, a larger network may be more stressful, demanding, and difficult to maintain (Manderson & Block, 2016).

2.2. Theories and hypotheses

In this study, we analyzed baseline data from a cohort of middle- and older-aged adults in a rural South African setting to test for the possible association between accessed status and health. We focused on two self-reported measures, self-rated health and life satisfaction, to capture the physical and mental health dimensions of older age health, respectively.

The existing literature in South Africa has suggested the importance of intra- and inter-household connections for improved family livelihood and household members' overall well-being, specifically in a high HIV-prevalence setting with constrained economic opportunity (Gómez-Olivé et al., 2018; Mkhwanazi & Manderson, 2020; Schatz et al., 2011). Applying social capital theory (Lin, 2002; Song & Lin, 2009), we therefore expected accessed status to be positively associated with health and well-being.

However, in rural South Africa, the positive health effect of accessed status may vary by network structure and functions. With a combination of scarce institutional resources, limited formal employment, and HIV, many adults continued in a productive role of care even at older ages (Schatz et al., 2015; Schatz & Gilbert, 2012; Schatz & Madhavan, 2011). Consequently, having more personal contacts may lead to increased, often accumulative, physical and financial hardships (Manderson & Block, 2016). Aligned with social cost theory (Song et al., 2021), we thus expected a less positive effect of accessed status on health for those with a larger personal network.

Similarly, supporting propositions from social cost theory, we expected accessed status to have less impact on health if only a few (or none of the) high SES contact(s) provided support to older adults. In other words, the cost of maintaining higher accessed status may outweigh the return; conversely, receiving support from high SES alters may lessen social and financial demands for older adults, therefore contributing to a positive health effect of accessed status.

Apart from effect-modification by network structure and functions, we additionally investigated whether the health effect of accessed status may vary by individuals' socio-demographics, including personal capital and gender. Prior work has proposed two competing hypotheses to explain the varying effects of accessed status on health based on individuals' personal capital (i.e., ego's SES): the compensation-based hypothesis suggests that those with less personal capital may depend more upon social contacts for health resources/support. As a result, people with less personal capital are more likely to benefit from having higher accessed status than those with more personal capital. On the other hand, those with more personal capital may have more resources to invest in social relationships. Therefore, the cumulative advantage hypothesis posits that accessed status may be efficiently and effectively utilized by those with more personal capital (Song & Lin, 2009). We thus examined whether the health effects of accessed status were greater among older adults with a lower, or potentially higher, SES.

Lastly, as caregiving and social relations are highly gendered among older South Africans (Harling, Morris, et al., 2020; Schatz & Gilbert, 2012; Schatz & Ogunmefun, 2007), we may expect the health effects of accessed status varied by men and women. For example, older women are largely responsible for maintaining and improving family livelihood and well-being in rural home, while simultaneously caring for their children, grandchildren, and other household members (Schatz & Ogunmefun, 2007). The existing literature in South Africa has also suggested that women are better at utilizing within and beyond household ties to retrieve resources and supports (Schatz & Gilbert, 2012; Schatz & Ogunmefun, 2007). South African norms of masculinity led us to hypothesize that having more accessed status may damage men's health and well-being via the psychological mechanism of invidious upward self-evaluation (Morrell et al., 2012). In sum, we expected that the health benefits of accessed status may be greater for women than men.

3. Data and methods

Data were drawn from the baseline wave of HAALSI ("Health and Aging in Africa: A Longitudinal study of an INDEPTH community") cohort study (Gómez-Olivé et al., 2018). The HAALSI study was conducted in 27 of the 31 villages in the rural Agincourt sub-district of the Bushbuckridge district, Mpumalanga Province, South Africa, where long-term health and socio-demographic surveillance (HDSS) of the Agincourt population is conducted (Kahn et al., 2012). The study site is close to the Mozambique border, and about one-third of the population are Mozambican migrants and their descendants. The Agincourt sub-district shares similarities with other areas of rural South Africa in several respects. These include (1) poor quality of education; (2) limited employment opportunities and a high degree of circular labor migration; (3) limited access to healthcare and sanitation, due both to costs and geographic barriers; and (4) after the introduction of ART in early 2007, increased life expectancy (Kabudula, Houle, Collinson, Kahn, Gómez-Olivé, et al., 2017; Kahn et al., 2012).

The HAALSI baseline round was conducted in 2014–2015. About 40% of all residents aged 40 years and over were randomly sampled from 27 villages, with a baseline response rate of 87%. Specifically, 6,281 men and women were sampled from these villages, with a total of 5,059 completed home interviews: remaining were either unable to participate/refused (478), not found (353), or ineligible due to death or out-migration (391) (Gómez-Olivé et al., 2018). The study consisted of an approximately 3-h household visit including a structured Computer-Assisted Personal Interview (CAPI), anthropometric and psychological measures, and blood draws.

The survey included a social network module modelled on the network data collection of the US-based National Social Life, Health, and Aging Project (McCallister & Fischer, 1978; Burt, 1984; Smith et al., 2009). The social network module included one name generator question: *Please tell me the name of 6 adults with whom you have been in communication either in person or by phone or by internet in the past* 6 months*, starting with the person who is most important to you for any reason*. The respondent named up to six contacts (alters). If they were married and did not name a spouse as one of their alters, the spouse's name was added as an additional (in some cases, seventh) alter.

Following the name generator question, name interpreters were used, with egos asked a series of questions relating to each named alter, including alters' socio-demographics (age, gender, literacy, and

residency location), frequency of contact (in-person, phone/text/others), types of support received by ego (emotional/financial/physical), ego-alters conflicts, and perceived relationships between alters (Harling, Morris, et al., 2020).

3.1. Dependent variables

3.1.1. Life satisfaction and self-rated health

We utilized two self-reported measures – life satisfaction and self-rated health – to capture older adults' health and well-being. Both measures have been conceptualized as key components of successful aging (Bowling & Dieppe, 2005; Rowe & Kahn, 1997), since they reflect the psychological state of older adults in response to various life course events (e.g., retirement), stress (e.g., death of loved ones), and deterioration of physical health (Idler & Benyamini, 1997; Maier & Smith, 1999, pp. P44–P54; Koivumaa-Honkanen et al., 2000; Berenbaum et al., 2013; St. John et al., 2015). Life satisfaction was constructed as the mean of two Cantril Ladder questions (Cantril, 1965). Respondents were first asked to place themselves on a 10-step ladder to represent how they felt today, with the bottom rung representing the worst possible life (0) and the top rung the best possible life (10). The second indicator utilized the same approach, but asked respondents to evaluate their life compared to others in the same village.

For self-rated health respondents were asked *In general, how would you rate your health today?* with response options on a five-point Likert scale. Following Kawachi et al. (1999), we binarized this item (very poor/poor/moderate vs. good/very good).

3.2. Explanatory variables

3.2.1. Accessed status

Past research has measured accessed status as the mean education level of alters (Acock & Hurlbert, 1993; Song & Chang, 2012), the proportion of alters who were employed (Haines et al., 2011), and the diversity of alter occupations (Moore et al., 2014; Song & Lin, 2009). In rural South Africa, a major reason for unemployment is competition for the few available jobs requiring little or no literacy skills (McKay, 2007). Literate adults may have a greater advantage accessing jobs and information than those with lower literacy levels (Aitchinson, 2003; Aitchison & Harley, 2006). Given limited local employment and low accessibility of education in the HAALSI study site, largely due to pre-1994 apartheid policies, we measured accessed status as the proportion of alters who were literate, operationalized by asking egos *Can this alter read or write?*

3.2.2. Social integration

We used network size to represent the degree of social integration (Brissette et al., 2000; Song & Chang, 2012). This structural attribute of personal networks indicates the number of alters that older adults had contacted over the past six months, which ranged from 1 to 7. We also created an *isolates* variable to account for those who reported zero versus any contacts.

3.2.3. Social support

For social support, we focused on the interaction between received instrumental support (information and goods) and accessed status on health. Instrumental support was derived by asking if egos had been *borrowing money, receiving food, given a job or anything else related to money or in-kind transfer* from alters in the past six months. We also controlled for emotional support since it may be associated with improved health status for older adults; this was derived by asking egos if they had received *emotional* support *while feeling sad, anxious or upset*. We calculated the proportion of alters who had provided this support for each measure, giving a value between 0 and 1.

3.3. Covariates

3.3.1. Tie strength

Stronger ties are linked to a higher level of support and a lower sense of isolation and disengagement from society (Berkman et al., 2000). In rural South Africa, support from spouse and family are typically the primary sources and determinants for older adults' living conditions and well-being (Schatz et al., 2011, 2015). Therefore, we controlled for tie strength with two indicators: the proportion of alters that were family and the proportion of alters with at least weekly in-person communication.

3.3.2. Daily well-being

To account for the possibility that respondents' subjective well-being during the day of interview may influence their perceived health status, we controlled for negative experiences. We used the day reconstruction method to measure whether the respondent felt physical pain, worry, or anger the previous day (Kahneman et al., 2004). The score was multiplied by 100, a higher score indicating that respondents had more negative experiences the preceding day.

3.3.3. Other socio-demographic variables

We controlled for five demographic variables: gender; country of origin; marital status; household size; and age. We also included four variables related to respondents' personal capital: household assets (see Kabudula et al., 2017); education; literacy; and employment status. Considering the severity of the HIV epidemic in this setting (about 40% for population aged 35–45 in 2010, Gómez-Olivé et al., 2013), we controlled for respondents' HIV serostatus based on blood draws.

3.4. Analytical strategy

We used a complete case approach to analysis, dropping respondents missing information on the above predictors, outcomes, or covariates. To evaluate potential selection bias, we conducted a series of bivariate comparisons of the excluded and analyzed samples in terms of key predictors and covariates; we ignored proxy responses for these tests.

Previous research has shown that the interviewer identity and month of interview affected HAALSI baseline social network responses, particularly in predicting the reported number of named contacts (Harling et al., 2018). We thus controlled for month of interview using month-specific fixed effects and included random effect intercepts for interviewer identity, with respondents nested within interviewers. We then used a series of two-level hierarchical linear and logistic regression models to predict life satisfaction and self-rated health, respectively.

To assess the association between accessed status and health, we included accessed status to predict life satisfaction and self-rated health, adjusting for all covariates. For simplicity, we only present our main predictors in Table 3. The complete results are presented in Supplementary Table 1. For life satisfaction, we present standardized coefficients (β) for continuous predictors and outcome standardization for categorical predictors. For self-rated health, we present results as adjusted odd ratios (OR). To investigate whether the interrelationship of accessed status with other interpersonal factors may help to explain the conflicting association between accessed status and health, we examined a series of mean-centered, interaction effects of accessed status with network size and social support.

We reran our fully adjusted models by including interaction terms for accessed status with respondents' gender, age, education, literacy, employment status, and household assets to test for other moderating factors stemming from personal capital and demographic characteristics. Additional models where network size was operationalized as a categorical variable were examined to investigate possible non-linear interaction effects between accessed status and network size. Gender-stratified models were also examined to test for whether the above effects functioned differently for men and women.

4. Results

The HAALSI sample comprised 5,059 respondents aged 40 years and over. Listwise deletion led us to drop item-level missing data on life satisfaction (n = 196), self-rated health (n = 3), negative experiences index (n = 106), respondents' literacy (n = 106), marital status (n = 4), country of origin (n = 5), education (n = 17), employment (n = 14) and HIV serostatus (n = 499). Responses that were answered by others (proxy indicator) were excluded (n = 116). Therefore, our final analyses included 4,379 respondents. In preliminary analyses, non-proxy respondents dropped from our analytic sample had smaller networks and were more likely to be over age 80 (Supplementary Table 2).

The demographic characteristics of the HAALSI respondents comprised about 45% with no formal education, 30% from Mozambique or other countries, and about 23% who were living with HIV. On average, respondents named three important contacts over the past six months, with only about 3% reporting no contacts. A majority of these close contacts were kin, literate, and had provided slightly more emotional than financial/instrumental supports. From these personal network indicators, only accessed status and network size appeared to be correlated with self-rated health. Those who reported better health had a greater proportion of contacts who were literate and had slightly more social contacts than those who reported poorer health. Similarly, only accessed status and network size showed a significant correlation with greater life satisfaction ($p < .001$). Descriptive results are presented in Tables 1 and 2.

We next included accessed status along with other covariates and personal network factors to test for the association between accessed status and health. Model 1 (Table 3) confirmed this association, indicating that a one-standard-deviation (35 percentage point) increase in the proportion of literate alters was associated with about a 0.03 standard deviation increase in life satisfaction (95% CI: 0.000, 0.052). Similarly, compared to those with zero literate alters, being in a personal network of all literate alters was associated with 28% higher odds to report better health status (95% CI: 0.991, 1.644), though the association was not statistically significant at the 5% level. Beyond accessed status, we found few other personal network factors associated with our outcomes.

To investigate whether the protective role of accessed status on health was modified by the structural attributes of personal networks, we added interaction terms of accessed status and network size to our models (models 2 and 5, Table 3). These models showed a significant interaction between social capital and network size on life satisfaction ($\beta = -0.048$, 95% CI: 0.092, −0.004) and self-rated health (OR = 0.849, 95% CI: 0.729, 0.988; (see predictive values, Table 4). Among those who reported one network contact, having a literate contact was associated with a 0.43 point higher life satisfaction, and a 50% higher probability of reporting better health, compared to those whose contact was not literate. These interaction effects were no longer significant once network size exceeded two contacts for both outcomes. Alternative models using network size as a categorical variable, and a series of network size stratified models, showed similar findings, with a positive, significant association for those with a smaller network size (Supplementary Tables 3 and 4).

To test whether different support patterns change the association of accessed status and health, models 3 and 6 (Table 3) examined the interaction between accessed status and instrumental support on life satisfaction and self-rated health. Results showed a non-significant interaction between accessed status and instrumental support on life satisfaction and self-rated health. Similarly, when we considered effect-modification by respondents' age, education, literacy, employment status, and household assets, most associations were unchanged (Supplementary Table 5), but there was a significant interaction between accessed status and employment, such that having more literate contacts was associated with a higher probability to report better health for those who were unemployed.

In addition, we stratified the fully adjusted models by gender to test for gender-specific variations in effect-modification of accessed status on health by network size (Supplementary Table 6). The interaction effects were consistent with the main models for women, showing a positive association between accessed status and health for those with fewer

Table 1
Summary of sample characteristics (N = 4,379), HAALSI, South Africa.

	Mean or Percent (SD)
Dependent variable	
Life-satisfaction	6.60 (2.20)
Self-rated health	
Poor	30.58%
Good	69.42%
Daily well-being	
Negative experiences index[1]	11.05 (20.97)
Demographic variables	
Sex	
Male	46.15%
Female	53.85%
Marital status	
Never married	5.11%
Separated/divorced	12.74%
Widowed	29.60%
Currently married/partnered	52.55%
Household size	
Living alone	10.37%
Living with 1 person	10.32%
Living with 2–6 people	47.89%
Living with 7+ people	31.42%
Country origin	
South Africa	70.08%
Mozambique/others	29.92%
Age	
40–49 years	18.33%
50–59 years	28.16%
60–69 years	26.65%
70–79 years	17.31%
80+ years	9.55%
Personal capital	
Household assets	
Lowest quintile	20.62%
Quintile 2	19.78%
Quintile 3	19.66%
Quintile 4	19.78%
Highest quintile	20.16%
Education level	
No formal education	44.83%
Some primary (1–7)	35.51%
Some secondary (8–11)	11.51%
Secondary or more (12+)	8.15%
Employment status	
Not working	72.96%
Full/part time work	16.26%
Homemaker	10.78%
HIV test result	
Positive	23.27%
Negative	76.73%

Note for variables.[1]Negative experience index = higher score indicates to higher level of negative experiences for the past day.

Table 2
Descriptive statistics of accessed status and personal network indicators, by life satisfaction and self-rated health (N = 4,379).

	Mean (SD)/ percent	IQR	Life satisfaction	Self-rated health	
			r/mean	Mean/percent	
				Average & poor	Good & excellent
Accessed status[a]	0.729 (0.345)	[0.5, 1]	0.115	0.701	0.742
Network size	3.197 (1.638)	[2, 4]	0.102	3.093	3.228
Family ties[b]	0.752 (0.335)	[0.5, 1]	0.029	0.755	0.751
Weekly ties[c]	0.675 (0.344)	[0.4, 1]	0.001	0.666	0.68
Instrumental supports[d]	0.800 (0.327)	[0.67, 1]	0.026	0.798	0.801
Emotional supports[e]	0.907 (0.235)	[1, 1]	−0.008	0.912	0.905
Isolates					
No reported contact	2.58%		6.841	28%	72%
At least 1 contact.	97.42%		6.6	31%	69%

Note for variable.
Note. r: Pearson's correlation coefficient; SD: Standard deviation; IQR: Interquartile range.
[a] Accessed status = % of literate alters.
[b] Family ties = % of family/relatives within network.
[c] Weekly ties = % of weekly communication with alters.
[d] Instrumental support = % of material/economical supports from alters.
[e] Emotional support = % of emotional aids from alters.

Table 4
Average marginal effects of accessed status and network size on life satisfaction and self-rated health (N = 4,379).

	Life satisfaction		Self-rated health	
Network size	b/(SE)	95% CI	Probabilities/ (SE)	95% CI
1	0.427** (0.158)	[0.117, 0.736]	0.499** (0.176)	[0.154, 0.844]
2	0.255** (0.099)	[0.059, 0.449]	0.335* (0.136)	[0.069, 0.600]
3	0.082 (0.087)	[-0.090, 0.254]	0.171 (0.134)	[-0.092, 0.433]
4	−0.091 (0.135)	[-0.356, 0.175]	0.007 (0.172)	[-0.33, 0.343]
5	−0.264 (0.205)	[-0.665, 0.137]	−0.157 (0.231)	[-0.609, 0.295]
6	−0.436 (0.279)	[-0.985, 0.112]	−0.321 (0.298)	[-0.905, 0.263]
7	−0.609† (0.357)	[-1.308, 0.090]	−0.485 (0.369)	[-1.209, 0.239]

Note. Prediction based on the fixed portion of the hierarchical linear and logistic regression models on life satisfaction and self-rated health, respectively. Results are presented as unstandardized coefficients (b) for life satisfaction and predicted probabilities of reporting better self-rated health. Predicted values were based on the average marginal effects that compared the absolute values between those whose contacts were all literate (1) versus all illiterate (0).
†p < .10, *p < .05, **p < .01, ***p < .001 (two-tailed tests).

Table 3
Accessed status, personal network effects and health (N = 4,379), HAALSI, South Africa.

	Life satisfaction			Self-rated health		
	Linear model			Logistic model		
	β [95% CI]			OR [95% CI]		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Accessed status[a]	0.026* [0.000, 0.052]	0.011** [-0.018, 0.040]	0.024† [-0.001, 0.049]	1.277† [0.991, 1.644]	1.940** [1.222, 3.079]	0.927 [0.471, 1.825]
Network size	0.042 [-0.01, 0.094]	0.046** [-0.003, 0.095]	0.042 [-0.010, 0.094]	1.005 [0.939, 1.074]	1.132† [0.994, 1.288]	1.004 [0.939, 1.074]
Family ties[b]	−0.014 [-0.061, 0.033]	−0.013 [-0.060, 0.033]	−0.014 [-0.061, 0.034]	0.946 [0.725, 1.234]	0.951 [0.729, 1.241]	0.953 [0.731, 1.244]
Weekly ties[c]	0.02 [-0.018, 0.059]	0.02 [-0.019, 0.058]	0.021 [-0.018, 0.059]	1.013 [0.786, 1.304]	1.01 [0.784, 1.301]	1.014 [0.788, 1.306]
Instrumental supports[d]	0.019 [-0.025, 0.064]	0.02 [-0.024, 0.064]	0.019 [-0.026, 0.063]	1.15 [0.808, 1.637]	1.157 [0.813, 1.647]	0.87 [0.453, 1.671]
Emotional supports[e]	−0.002 [-0.064, 0.059]	0.003 [-0.059, 0.065]	0.000 [-0.062, 0.062]	1.304 [0.789, 2.155]	1.364 [0.823, 2.259]	1.372 [0.822, 2.288]
Isolates *(Ref: at least 1 contact)*	−0.176† [-0.380, 0.024]	−0.372* [-0.621, −0.123]	−0.229† [-0.483, 0.024]	0.693 [0.327, 1.471]	0.497† [0.220, 1.120]	0.828 [0.361, 1.899]
Interaction						
Accessed status * Network size		−0.048* [-0.092, −0.004]			0.849* [0.729, 0.988]	
Accessed status * Instrumental supports			0.008 [-0.495,0.322]			1.464 [0.693, 3.093]

Note for variable.
Note. Two-level hierarchical linear and logistic regressions for life satisfaction and self-rated health. Models contained all covariates and month of interview; Robust standard errors used for models 1–3; β: Standardized coefficient; OR: Adjusted odds ratios.
†$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$ *(two-tailed tests).*
[a] Accessed status = % of literate alters.
[b] Family ties = % of family/relatives within network.
[c] Weekly ties = % of weekly communication with alters.
[d] Instrumental support = % of material/economical supports from alters.
[e] Emotional support = % of emotional aids from alters.

personal contacts. For men, these effects appeared significant only for those with a larger personal network, and only on life satisfaction, indicating by a significant inverse association among men with more than four contacts.

5. Discussion

Older adults in rural South Africa have been part of substantial socio-demographic change in recent years. The legacy of apartheid, circular labor migration, the HIV epidemic and population aging all raise policy concerns about whether sufficient resources are available to meet their health and social needs. In this study we explored how accessed status shapes the health and overall well-being of older adults. Our findings showed that later life health and well-being are influenced by the interrelation of various interpersonal factors, specifically accessed status and network structure.

Given the scarcity of institutional supports, we hypothesized that accessed status may be important for improved livelihood and well-being for older adults in this rural population. We found that older adults with a larger proportion of literate alters in their social networks – a form of social capital – reported better health status. This protective role of accessed status on health (albeit small) may be explained by the relative advantages of having more literate personal contacts for accessing and receiving health information, advice, and support. As documented in prior qualitative studies, health-related care and information exchanges may take place primarily in interpersonal relationships, given the negative stigma and beliefs associated with illnesses and diseases in high HIV prevalence contexts like rural South Africa (Musheke et al., 2013).

We also found that accessed status may particularly benefit unemployed respondents, who were concentrated among the older respondents in HAALSI. This finding supports the compensation-based hypothesis proposed in prior work (Song & Lin, 2009), in which having access to higher SES contacts may benefit those with less personal capital to retrieve health-related resources and supports. This also aligns with other studies conducted in the same area, suggesting that having social ties to adult migrants, extra-household families, and neighbors may create advantages for accessing financial and physical supports (Hosegood et al., 2007; Lu & Treiman, 2011; Schatz et al., 2015). Recent evidence has also shown the importance of social connectivity and supports in relation to older-aged cognitive and mental health, particularly for those with more beyond-household social contacts (Harling, Kobayashi, et al., 2020; Jennings et al., 2020, 2021). The findings from our study thus highlight another important aspect of network members' socioeconomic status that may contribute to the well-being of middle-aged and older populations.

We find that the association between accessed status and health is patterned by social network size, such that accessed status is most protective for health among those with fewest personal contacts. But our findings also indicate an inverse association among those with larger personal networks, particularly in predicting life satisfaction for men. Prior studies suggested that socializing with higher status individuals can be detrimental for psychological well-being given the excessive networking demands and socio-emotional stress regarding upward self-evaluation (Moore et al., 2009; Lee & Kawachi, 2017; Song, 2014; 2020). From a gender perspective, having many high-status contacts may especially damage men's esteem and threaten their subjective social status, given the patriarchal norm associated with wealth and power in close relationships, especially for older men in rural South African communities (Morrell et al., 2012; see also, Song et al., 2017). In addition, as the majority of our respondents' reported ties are kin, this context-specific personal network structure may indicate the increased caring obligations for "strong ties," particularly for (extended) families affected by HIV (Manderson & Block, 2016; Madhavan et al., 2017). The demanding task of support may be exacerbated by the limited and seasonal nature of employment for working-age populations, so that rural households continue to rely heavily on pensions received by older adults (Schatz et al., 2015). In alignment with social cost theory, these formal and informal constraints may all operate to reduce the health benefit of accessed status for those with larger networks.

In contrast, aligned with social capital theory, accessed status appears protective for health among those with fewer social contacts, particularly for women. One possible explanation may be due to the productive role of women in maintaining a household's livelihood. For example, prior qualitative evidence suggested that a majority of middle- and older-aged women remain responsible for leveraging resources and utilizing support networks to improve living conditions for household members (Schatz & Ogunmefun, 2007). Compared to men, it may be more important for women to have available social ties from which to receive social and financial resources that they do not get from families, community, or government (Schatz et al., 2011; Schatz & Gilbert, 2012). Given that social contacts decline with age in this population, especially for older women (Harling, Morris, et al., 2020), our findings raise the significance for policymakers to consider supporting the generation and maintenance of interpersonal resources for older women, particularly for those with fewer social contacts.

Our findings support the interrelation of various interpersonal factors in shaping the social production of health in a resource-deficit population. With emerging evidence documenting the protective and detrimental roles of accessed status on health, our study provides initial findings highlighting the interaction between network resources and structure in association with the well-being of older adults. Findings here support both social capital and social cost theories in conceptualizing possible functional and psychological mechanisms of accessed status on health. In particular, our findings suggest a potential mental health damaging effect of accessed status for men with a larger personal network via psychological (comparison-based) mechanisms, but possible material (resource-based) mechanisms for women who were less socially integrated at older ages. Beyond variations with cultural contexts and individuals' characteristics (Song & Pettis, 2020), our findings advance our understanding of an empirical concept, accessed status, by showing its interplay with meso-level relational structures in shaping older age health and well-being. Important follow-up questions from this study include whether the health functions of accessed status differ by other structural and functional aspects of personal social networks, such as one's network embeddedness (e.g., network density), network position (e.g., structural hole and network centrality), or the multiplex nature of social ties (e.g., types of exchanges and relations). Examining these interrelationships may contribute to further investigating the relationships between social network and population health, as well as how individual-, network-, and macro-level factors operate to collectively shape the health and well-being of rural populations in LMICs.

6. Limitations

The cross-sectional nature of our data limits our ability to explore the causal relationship between various network factors and older adults' health status. While we highlight the importance of accessed status on health and well-being, it is possible that those who have a better health status are more likely to establish interpersonal ties. Future longitudinal analysis of life course changes in social networks and health can address this limitation. Also, we utilize literate alters as a proxy for accessed status, hypothesizing that literate contacts are in a better socioeconomic position than contacts with low literacy levels. Additional studies that utilize other measures of accessed status, including alters' income, education level, and occupation status, as well as other instruments (e.g., the position/resource generator) to capture other dimensions of accessible resources in personal social contacts (Lin & Dumin, 1986; Lin, 2002; Van Der Gaag & Snijders, 2005), may help to validate the importance of accessed network members' socioeconomic resources in low resource settings. Lastly, the effect of interviewers in this study led

to greater uncertainty in our estimates on the effect from accessed status, network size, and other personal network indicators (Harling et al., 2018). Once we included random intercepts for interviewers in our models, the confidence intervals of social capital on both outcomes increased. Although we have tested the robustness of the relationship between accessed status and health by including it independently with other personal network factors and covariates, a follow-up study is needed to address this limitation. Lastly, our study population is just one of the rural populations that have experienced drastic social-democratic changes in sub-Saharan Africa. Additional studies are needed to confirm our findings in other rural populations in LMIC.

7. Conclusion

Life expectancy has risen rapidly in rural South Africa in recent decades, and many individuals live longer in constrained living conditions with serious chronic diseases. We observed the importance of accessed status (network members' SES) in relation to older adults' health and well-being in a resource-constrained context where formal institutional resources are particularly limited. Of note, we found indications that accessed status was harmful to health and well-being for men with a larger personal network, while it benefited women, the unemployed, and those who were less socially integrated. This study therefore suggests that accessed status may play both a protective and detrimental role in determining older-age health and well-being, and that strengthening interpersonal resources may offer another promising avenue for improved health in rural, resource-constrained populations.

Author statement

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Disclaimer

The funders had no role in study design, data collection and analysis.

Data availability

All data are publicly available at https://doi.org/10.7910/DVN/F5YHML.

Declaration of competing interest

None.

Acknowledgement:

The authors would like to thank the HAALSI study team, participants, and the Agincourt community. HAALSI was supported by the U.S. National Institute on Aging (P01AG041710; 1R01AG051144–01; 3U54HG006938-03S1), the Agincourt Health and Social-Demographic Surveillance System (AHDSS) by the University of the Witwatersrand and Medical Research Council (MRC) in South Africa, and Wellcome Trust, UK (058893/Z/99/A; 069683/Z/02/Z; 085477/B/08/Z). GH is supported by a fellowship from the Wellcome Trust and Royal Society [Grant number 210479/Z/18/Z]. This research was funded in whole, or in part, by the Wellcome Trust [Grant number 210479/Z/18/Z]. For the purpose of open access, the author has applied a CC BY public copyright licence to any Author Accepted Manuscript version arising from this submission.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssmph.2022.101154.

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