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Associations between neighbourhood social cohesion and subjective well-being in two different informal settlement types in Delhi, India: a quantitative cross-sectional study

Steve Humble ![ORCID],[1] Aditya Sharma ![ORCID],[2] Baladevan Rangaraju ![ORCID],[3] Pauline Dixon ![ORCID],[1] Mark Pennington ![ORCID] [4]

[1]Faculty of Humanities and Social Sciences, Newcastle University, Newcastle upon Tyne, UK
[2]Faculty of Medical Sciences, Newcastle University, Newcastle upon Tyne, UK
[3]Indus Information Initiatives, New Delhi, India
[4]Centre for the Study of Governance and Society, King's College London, London, UK

Correspondence to
Dr Steve Humble;
steve.humble@ncl.ac.uk

ABSTRACT

Objectives To evaluate the relationships between neighbourhood cohesion and subjective well-being (SWB) in two different informal settlement types.

Design Cross-sectional analysis of a community-based survey.

Setting Communities in two districts, Sanjay Colony, Okhla Phase II and Bhalswa in Delhi, India.

Participants 328 residents in Bhalswa and 311 from Sanjay Colony.

Measurements Neighbourhood social cohesion scale measured on an 18-point scale and the SWB scale made up of four subjective measures—hedonic, eudaemonic, evaluative and freedom of choice. Sociodemographic characteristics and trust were used as covariates.

Results In both neighbourhood types there was a statistically significant positive bivariate correlation between neighbourhood cohesion and SWB (Sanjay: r=0.145, p<0.05; Bhalswa: r=0.264, p<0.01). Trust and neighbourhood cohesion were strongly correlated (Sanjay: r=0.618, p<0.01; Bhalswa: r=0.533, p<0.01) and the longer the resident had lived in the community the greater the feeling of neighbourhood cohesion (Sanjay: r=0.157, p<0.01; Bhalswa: r=0.171, p<0.05). Only in the resettlement colony (Bhalswa) was SWB negatively correlated with length of residency (r=−0.117, p<0.05). Residents who chose their settlement type (Sanjay residents) were 22.5 percentage points (pp) more likely to have a feeling of belonging to their neighbourhood than residents that had been resettled (Bhalswa) (Cohen's d effect size 0.45). Sanjay residents had a greater likelihood to feel more satisfied with life (4.8 pp, p<0.01) and having greater perceived freedom of choice (4.8 pp, p<0.01).

Conclusions Our findings contribute to the general knowledge about neighbourhood cohesion and SWB within different informal settlement types in a mega-city such as New Delhi, India. Interventions that promote sense of belonging, satisfaction with life and freedom of choice have the potential to significantly improve people's well-being.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The study was able to examine multiple dimensions of subjective well-being (SWB, evaluative, hedonic, eudaemonic and freedom) with 639 residents in slum areas of Delhi, India.

⇒ To the best of our knowledge this is the first study to evaluate the impact around neighbourhood cohesion and SWB of residents that have been resettled compared with those who chose their informal settlement.

⇒ Cross-sectional design implying that only correlations between neighbourhood social cohesion and SWB were established. Causal associations could not be proven.

⇒ Results were subject to possible selection bias with regard to the colonies participating. Sanjay Colony, Okhla Phase II and Bhalswa resettlement colony were already known to the research team and therefore convenience sampling owing to our long-term relationship.

INTRODUCTION

A neighbourhood is a district of an urban city where neighbours live and come together through social and cultural networks. For some, a 'neighbourhood' defines who they are in terms of social position and identity. Neighbourhoods can form boundaries as well as promote rich cultural diversity.[1–3] Social cohesion is defined as the presence of societal features such as trust, networks, support and societal norms.[4–6] A neighbourhood with strong social cohesion can empower individuals within communities to support each other through residential bonds, create coordinated actions and networks for a collective good.[7 8] Research has shown that neighbourhoods with higher levels of social cohesion can be beneficial to the well-being of their inhabitants.[9–14] Well-being is key to the creation

and maintenance of healthy and productive societies.[15 16] High levels of well-being have been shown to result in better health and longevity.[17] Low levels of neighbourhood social cohesion and trust are associated with stress, depression and anxiety.[18 19] Studies suggest that friendship, support and advice are associated with well-being and that social cohesion relates positively to psychological health.[20–26] The length of residency, income and age of the individual have been shown to be closely associated with a feeling of positive neighbourhood cohesion.[2 27–33] Some studies find no correlations[2 34] and others negative correlations concerning education level.[30 32]

Research from around the world has demonstrated that maintaining well-being is important for those who are living in difficult circumstances.[35 36] Around one-quarter of the world's urban population (over half of whom reside in Asia) live in informal, slum and squatter settlements, which typically are unauthorised.[37] New Delhi is currently the third largest mega-city in the world and second to Tokyo in Asia, with just over 32 million people living around and in New Delhi.[38 39] With a growth rate of 3% and 800 000 poor rural migrants arriving in the city every year looking for better economic opportunities, forecasts suggest that in the next 5 years, the population could outstrip Tokyo making it Asia's biggest megacity.[40] The Delhi Master Plan divides the city into three categories—planned, special and unplanned. Due to rapid population growth residents have bought and constructed houses on land which is not zoned in the Master Plan for residential purposes.[41–44] In this paper we investigate similarities and differences in neighbourhood social cohesion and well-being for households living in two different settlement types in Delhi—Sanjay Colony, Okhla Phase II a squatter settlement (unplanned) and Bhalswa a resettlement colony (planned). Squatter settlements are unauthorised occupations of vacant land, mostly public, with minimum access to civic services and amenities. Resettlement colonies are made up of families 'evicted' from their original squatter settlement to plots allotted by the Slum Rehabilitation Authority. Resettlement colonies, reflect the systematic process of relocating poor residents to the periphery to facilitate the gentrification of urban spaces. Consequently, they experience low levels of amenity provision by public agencies owing to scarcity of funds.[42 45–51] Residents in resettlement colonies have expressed concerns around community cohesion. Studies of resettlement areas in India have found residents reporting greater social alienation, their homes lacking both security of tenure and a socioeconomic livelihood base because resettlement sites are large distances from residents' former homes.[48 49 52–56] Residents started to live in Bhalswa in 2000, having been evicted from 11 slum locations in and around Delhi including Nizamuddin, Dakshinpuri and Rohini.[57]

We examine the relationships between subjective well-being (SWB) and neighbourhood cohesion, taking into consideration the socioeconomic backgrounds of the households as well as levels of trust in two different

Figure 1 Map of Bhalswa Resettlement Colony, Delhi, India (Google Earth Digital Globe Image, 2022).

informal settlement types. As neighbourhoods are bounded urban areas, they offer an important opportunity to understand individual's and community's perceptions within a finite region. Different neighbourhoods can be investigated, explored and compared.[58–61] We consider the association between neighbourhood social cohesion and well-being for residents living in different colony types, one where the residents have chosen to make their home in a squatter colony and the other where squatter colonies have been demolished and the residents uprooted to reside in a resettlement colony. In the present study, we evaluate the psychometric properties of the Neighbourhood Cohesion Index (NCI) and the SWB items initially through a pilot in Bangalore, India. Our findings may inform whether interventions, such as promoting a sense of belonging, respect and inclusion are required in specific neighbourhoods to promote community cohesion and potentially well-being. They may also help in identifying potential policy problems as well as better understanding the drivers of SWB.[62]

METHODS
Study design and setting
This is a community-based, cross-sectional study carried out with residents in two informal settlements, Sanjay Colony, Okhla Phase II and Bhalswa resettlement colony, in New Delhi, India from 28 March to 9 April 2022 (figures 1 and 2).

Figure 2 Map of Sanjay Colony, Okhla Phase II, Delhi, India (Google Earth Digital Globe Image, 2022).

Sample size calculation and sampling techniques

Sanjay Colony and Bhalswa were selected through convenience sampling owing to our long-term relationships with the communities in these areas. Sanjay Colony, Okhla Phase II, has a total population of 66 820 over an area of 1.99 km² with a population density of 33 659 people per km².[63] Bhalswa covers an area of 10.38 km² with a population 102 701 and population density of 9892 people per km².[64] Households were selected by multi-stage random sampling, stratified on the population and geographic area. The sample size (n) calculation was performed using $n = \frac{Nx}{((N-1)E^2+x)}$ and margin of error $E = \sqrt{\frac{(N-n)x}{n(N-1)}}$ with $x = Z\left(\frac{c}{100}\right)^2 r\left(100 - r\right)$ where N is the population size, r is the fraction of responses required and $Z(c/100)$ is the critical value, with the calculation based on the normal distribution. This calculation gave a target sample size of 311 in Sanjay Colony and 328 in Bhalswa, at the 95% CI level for 5.1%–5.3% margin of error, with at least 80% power.[65] In order to achieve the power calculation, 660 households were approached. In total 21 households did not agree to participate, with an overall response rate of 97% –94% and 99% in Sanjay Colony and Bhalswa, respectively.

Measures

Neighbourhood Cohesion Index

The NCI is used in this research to measure social cohesion with a focus on neighbourhood networks and the degree of neighbourliness; that is the emotional social support within the neighbourhood which includes visiting neighbours and friendships.[66 67] Higher mean total scores indicating a greater level of neighbourhood social cohesion.[20 68] All items were measured on a 5-point Likert scale with 5 (strongly agree) to 1 (strongly disagree). The total scores for NCI were calculated by taking the average of the 18 items with 5 and 15 being reverse scored. The NCI measure can be divided into three subscale dimensions: 'sense of community' (SOC), 'neighbourliness' (NEI) and 'attraction to neighbourhood' (ATTR).[67 69–71] It has been well-validated and used in a range of country settings with various communities.[24 68–70 72 73]

Subjective well-being

Subjective rather than objective well-being has been used in this study to explore the individual's internal subjective assessment of their own life as a whole, based on cognitive judgments and affective reactions. Diener, one of the leading scholars in SWB research, defines SWB as how 'a person feels and thinks his or her life is desirable regardless of how others see it' (p1).[74] This definition highlights the thinking and feeling dimensions of SWB. To gain an understanding of how an individual's perceived SWB is associated with neighbourhood social cohesion four subjective measures of well-being were used. These four subjective measures of well-being are hedonic well-being (feeling of happiness), eudaemonic well-being (sense of purpose), evaluative well-being (life satisfaction) and freedom of choice (life control) (table 1).[75–81]

Sociodemographic characteristics

Individual-level characteristics include sociodemographics (age, education, employment status, income, length of residence, ethnicity, religion and caste). For neighbourhood characteristic we have settlement type.

Patient and public involvement

This research was done with public involvement and built on existing long-term relationships with the communities of Sanjay Colony, Okhla Phase II and Bhalswa. Community representatives were informed of the purpose of the study and were consulted on the research instrument. There was no patient involvement.

Informed consent

Verbal informed consent was provided by participants who were willing to take part. All participants were informed before the start of the household survey that participation was voluntary and anonymous with no personal identifiable data captured and the results would be kept strictly confidential and for research purposes only. Data were transferred and stored securely at Newcastle University. No incentives were provided for participation.

Procedures

The data reported in this article were collected from 311 residents in Sanjay Colony, Okhla Phase II and 328 residents in Bhalswa. These areas were chosen as they represent two different types of informal settlements, Sanjay Colony Okhla II categorised by the Delhi Master Plan as a 'slum' and Bhalswa categorised as a Resettlement Colony. A team of 18 survey administrators under the supervision of a researcher from Newcastle University collected the data. Indus Information Initiatives provided in country support. A systematic household survey was carried out by administrators that were grouped into pairs and trained specifically for this project. The main household wage earner was interviewed by the survey administrators in a random sample of households. When the main household wage earner was not available a repeat visit was made at a time suitable to the resident. Where there was a non-response, the team moved onto the next 'available'

Table 1 Measures: Neighbourhood Cohesion Index and subjective well-being (NCI and SWB)

Item	Item description
Neighbourhood Cohesion Index (NCI)	
NCI1 (ATTR)	Overall, I am very attracted to living in this neighbourhood
NCI2 (ATTR)	I feel like I belong to this neighbourhood
NCI3 (NEI)	I visit with my neighbours in their homes
NCI4 (NEI)	The friendships I have with people in my neighbourhood mean a lot
NCI5 (ATTR)	Given the opportunity, I would like to move out of this neighbourhood (R)
NCI6 (NEI)	If people in my neighbourhood were planning something I'd think of it as something 'we' were doing rather than 'they' were doing
NCI7 (NEI)	If I need advice, I could go to someone in my neighbourhood
NCI8 (SOC)	I agree with most of my neighbourhood about what's important in life
NCI9 (SOC)	I believe my neighbours would help me in an emergency
NCI10 (SOC)	I feel loyal to people in my neighbourhood
NCI11 (NEI)	I borrow things and exchange favours with my neighbours
NCI12 (SOC)	I'd be willing to work with others to improve my neighbourhood
NCI13 (ATTR)	I plan to remain a resident of this neighbourhood for a number of years
NCI14 (SOC)	I think of myself as similar to people who live in this neighbourhood
NCI15 (NEI)	I have never invited neighbours over to my house to visit (R)
NCI16 (SOC)	A feeling of fellowship runs deep in this neighbourhood
NCI17 (SOC)	I regularly stop to talk with people in my neighbourhood
NCI18 (SOC)	Living in this neighbourhood gives me a sense of community
Subjective well-being (SWB)	
Satisfaction	Overall, how satisfied are you with life as a whole these days? (0 not at all satisfied to 10 completely satisfied)
Freedom	How much freedom of choice and control do you feel you have over the way your life turns out? (0 no freedom and control to 10 complete freedom and control)
Happiness	How happy did you feel yesterday? (0 not at all happy to 10 completely happy)
Purpose	Do you feel your life has important purpose or meaning? (0 not at all worthwhile to 10 completely worthwhile)
Trust	
Trust	How much trust do you have in your neighbours? (0 do not trust at all to 4 trust completely)

ATTR, attraction to neighbourhood; NEI, neighbourliness; SOC, sense of community.

household. To avoid any literacy issues administrators read out the household survey to the participants in their local language.

Initially, a pilot was carried out with 150 residents in Hawadigar Colony, Karnataka, India (Delhi being in COVID-19 lockdown in early 2022) to test the cross-cultural transferability of the survey. Hawadigar Colony is an unplanned squatter settlement made up of 308 households. Four researchers working in pairs interviewed the main household wage earner in a random sample of households. The psychometric properties of the NCI and SWB are reported in the Results section.

Data processing and analysis
Data were collected by the administrators who inputted, in real time, the responses into Qualtrics during the household survey, which were then exported into Stata V.17 for analysis. Initially, descriptive statistical analysis was undertaken to obtain means and SD for the data. Statistical tests were then carried out to ascertain if any significant differences existed between the two community's demographic variables. Independent t-tests were used for continuous outcomes and χ^2 tests for dichotomous outcomes. Structural equation modelling (SEM) was used to establish the construct validity of the NCI and the SWB measures. The Cronbach's alpha was used to measure the internal consistency of the NCI. For the SWB internal reliability was considered through correlations between the NCI and its subscores. To understand the differences between residents in Sanjay Colony, Okhla Phase II and Bhalswa individual items on both the NCI and

SWB measures were analysed using the estimated average marginal components effect (AMCEs). The ACME is the average causal effect of changing the community variable from Bhalswa (=0) to Sanjay Colony (=1) for a given resident while averaging over the other factors is given by,

$$\tau\left(1,0;\Pr\left(t_{ij,-l}, t_{i,-j}\right)\right) = \sum_{\left(t_{ij,-l}, t_{i,-j}\right)\epsilon\tau} E\left[Y_i\left(1, t_{ij,-l}, t_{i,-j}\right) - Y_i\left(0, t_{ij,-l}, t_{i,-j}\right)\right]$$
$$\times \Pr\left(t_{ij,-l} t_{i,-j}\right)$$

where $t_{ij,-l}$ is an (L–1) dimensional vector representing levels of all the factors except the factor L of the jth item answered by respondent i, $t_{i,-j}$ denotes the levels of all factors for the remaining other than j, and τ is the choice of $\Pr\left(t_{ij,-l}, t_{i,-j}\right)$. The expectation ($\mathbb{E}$) is over a random sample of the respondents and item responses.[82] A major advantage of this statistical method is that it is fully non-parametric and so does not require any functional choice probability assumptions.

RESULTS

Characteristics of participants

We collected sociodemographic information from 328 residents in Bhalswa and 311 from Sanjay Colony, Okhla, Phase II between March and April 2022. The majority in both colonies were Hindu, belonging to the scheduled caste, migrating from Uttar Pradesh (UP). However, there were statistically significant differences between the two colonies with a higher proportion of Muslims in Bhalswa (22.6% Bhalswa vs 5.5% Sanjay), a higher proportion of general and 'backward' caste in Bhalswa (42.4% Bhalswa vs 31.9% Sanjay) and a higher proportion of migrants from UP in Sanjay Colony (71.7% Sanjay vs 63.7% Bhalswa). For the 639 participants the mean number of years of education (8.78 years) and the age of the main household wage earner (38.62 years) were not statistically significantly different in the two colonies. Almost one-third of households in Sanjay Colony reported their main occupation as a self-employed business owner, whereas in Bhalswa this was true for less than one-fifth of households. The average monthly income in Sanjay Colony was statistically significantly less at ₹16 681.70 (£172.82 (£1=₹96.52 conversion rate)) compared with Bhalswa at ₹18 935.98 (£196.18). Monthly income was positively correlated with the household owning a refrigerator with a freezer (r=0.280, p<0.01), washing machine (r=0.331, p<0.01) and scooter/motorcycle (r=0.367, p<0.01) in both communities. These wealth indicators show positive associations with monthly income. Those in Sanjay Colony were more likely to carry out employment within their own community compared with those in Bhalswa (35.4% Sanjay vs 12% Bhalswa). Where a statistically significant difference was found regarding wealth indicators only the ownership of a smartphone was more likely in Sanjay than in Bhalswa. For scooter, bicycle, electricity, refrigerator and washing machine Bhalswa residents were statistically more likely to own these items than those in Sanjay (table 2).

Psychometric properties of the NCI and SWB measure

Pilot

A pilot was carried out with 150 residents of Hawadigar Colony, Bangalore City, Karnataka, India to test for reliability. The composite reliability was good (NCI, α=0.90; SWB, α=0.78). To establish the construct validity of the measures SEM was undertaken. In general, good models should have root mean square error of approximation (RMSEA) <0.06 and Comparative Fit Index (CFI) >0.9. The NCI (RMSEA=0.024, CFI=0.995) and SWB (RMSEA=0.051, CFI=0.980) measures both show good validity.[83 84]

Current study

The NCI (α=0.89) and SWB (α=0.80) in this present study show good composite reliability. Very good convergent validity of the NCI is seen through correlations with its subscores of SOC (r=0.947, p<0.01), NEI (r=0.896, p<0.01) and ATTR (r=0.779, p<0.01). For the SWB internal reliability was considered through correlations between the NCI for Sanjay Colony (r=0.145, p<0.05) and Bhalswa (r=0.264, p<0.001). Group level construct validity was established with values of CFI>0.94 and RMSEA<0.05 for both Sanjay Colony and Bhalswa. Reliability of the measures was also demonstrated by loadings on to each of the factors; SOC (0.54 to 0.74), NEI (0.30 to 0.77), ATTR (0.30 to 0.79) and well-being (0.33 to 0.82). Factor loadings greater than or equal to 0.3 are said to be salient and relate meaningfully to primary factors.[84–86]

Neighbourhood Cohesion Index

Eight statistically significant differences were seen between the responses from residents in Sanjay Colony and Bhalswa on the NCI, four in 'SOC', and two in each of the themes 'NEI' and 'ATTR' as shown in figure 3 with additional details in online supplemental table 1.

Regarding the SOC, residents in Sanjay Colony were 9.3 percentage points (pp) more likely to believe their neighbours would help them in an emergency (NCI9, p<0.001) and 9.5 pp more likely to have a greater willingness to improve their neighbourhood than residents in Bhalswa (NCI12, p<0.001). Residents of Sanjay Colony were 10.2 pp more likely to feel a greater SOC than those residents of Bhalswa (NCI18, p<0.001). Sanjay Colony residents were 5.48 pp less likely to feel that their neighbours agree with them about what is important in life (NCI8, p<0.05).

In the subscale 'neighbouring' (NEI) residents in Sanjay Colony were 4.76 pp less likely to invite neighbours to their home (NCI15, p<0.01) and 9.7 pp less likely to feel that neighbourhood friendships meant a great deal to them (NCI 4, p<0.001).

Regarding 'attraction to the neighbourhood' (ATTR) respondents from Sanjay Colony were 7.3 pp less likely to say they were attracted to living in the neighbourhood (NCI1, p<0.01). They were 22.5 pp more likely to have a feeling of belonging (NCI2, p<0.001). Given that the base probability is 50%, the effect size of this result is

Table 2 Sociodemographic characteristics of main household wage earner in the two settlements

	Sanjay Colony	Bhalswa	P value	Total
Religion				
Hindu	291 (93.6)	251 (76.5)	0.001***	542 (84.8)
Muslim	17 (5.5)	74 (22.6)	0.001***	91 (14.2)
Other (Christian, Sikh, Buddhist)	3 (0.9)	3 (0.9)		6 (1.0)
Caste*				
General caste	54 (17.4)	74 (22.6)	0.114	128 (20.0)
Scheduled caste	216 (69.5)	185 (56.4)	0.001***	401 (62.8)
Backward caste	45 (14.5)	65 (19.8)	0.026*	110 (17.2)
Education				
Mean number of years of education†	9.00 (5.88)	8.57 (5.86)	0.355	8.78 (5.87)
Main household occupation				
Self-employed business owner	94 (30.2)	61 (18.6)	0.001***	155 (24.3)
Regular salary/wage employee	128 (41.2)	154 (47.0)	0.152	282 (44.1)
Causal worker/daily paid labourer	89 (28.6)	113 (34.5)	0.126	202 (31.6)
Age of the main household wage earner†	38.87 (11.25)	38.37 (10.89)	0.569	38.62 (11.06)
Mean length of residence (years)†	29.05 (12.40)	18.47 (9.44)	0.001***	23.62 (12.18)
Mean monthly income for whole family (₹)†	16 681.70 (7575.32)	18 935.98 (10 567.12)	0.001**	17 838.82 (9294.46)
Work				
Outside community	167 (53.7)	238 (72.6)	0.001***	405 (63.4)
Work inside and outside	34 (10.9)	50 (15.2)	0.128	84 (13.1)
Inside community	110 (35.4)	40 (12.2)	0.001***	150 (23.5)
State of origin				
Bihar	40 (12.9)	48 (14.6)	0.516	88 (13.8)
Rajasthan	23 (7.4)	30 (9.1)	0.422	53 (8.3)
Uttar Pradesh	223 (71.7)	209 (63.7)	0.031*	432 (67.6)
Other	25 (8.0)	41 (12.5)	0.064	66 (10.3)
Wealth items				
Owns car or jeep	4 (1.3)	8 (2.4)	0.385	12 (1.9)
Scooter/motorcycle	80 (25.7)	116 (35.4)	0.008**	196 (30.7)
Auto/mini-3-wheeler	10 (3.2)	14 (4.3)	0.484	24 (3.8)
Bicycle	60 (19.3)	89 (27.1)	0.019**	149 (23.3)
Smart phone	280 (90.0)	260 (79.3)	0.001***	540 (84.5)
House has electricity	298 (95.8)	324 (98.8)	0.020**	622 (97.3)
Computer	8 (2.6)	11 (3.4)	0.561	19 (3.0)
Refrigerator with a freezer	155 (49.8)	251 (76.5)	0.001***	406 (63.5)
Washing machine	89 (28.6)	127 (38.7)	0.007**	216 (33.8)
TV	237 (76.2)	269 (82.0)	0.071	506 (79.2)

*p<0.05, **p<0.01, ***p<0.001
*These are the caste classification used by the Government of India.
†Denotes results that are mean (SD), all others are given as number of cases and percentage in parenthesis. Statistical tests: independent t-test was used for continuous outcomes and χ^2 test was used for dichotomous outcomes. Each of the 'other' states represents individually less than 2% of the population—Delhi, Haryana, Madhya Pradesh, Uttarakhand, Chhattisgarh, Himachal, Jharkhand, Nepal, Punjab, Tamil Nadu and West Bengal.
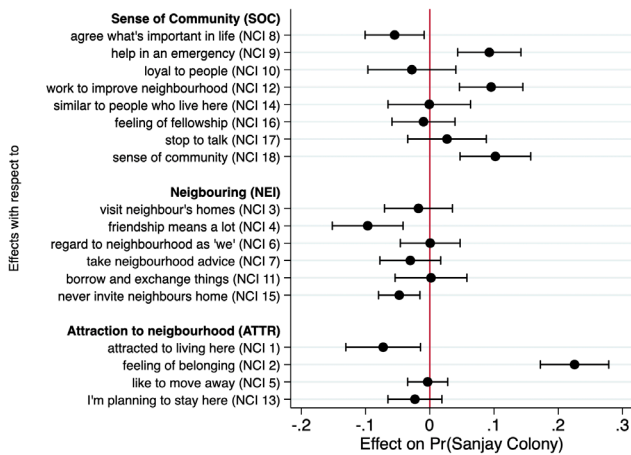
Figure 3 Neighbourhood Cohesion Index (NCI) estimated averaged marginal component effects for Sanjay Colony with 95% CIs. The percentage points (pp) estimates for Sanjay Colony (=1) with the base group being Bhalswa (=0). The marginal effect of each independent variable being averaged over the joint distribution of the remaining variables. The independent variables are in the vertical axis. The horizontal axis gives the prediction of change in the independent variable (points), and the associated 95% CIs (bars).

the most significant of all these results as it increases the base probability by 45% (medium Cohen's d effect size (0.45=0.225/0.5)).

Subjective well-being

There were two statistically significant differences between the responses from residents in Sanjay Colony and Bhalswa on the SWB (figure 4). There was a 4.8 pp
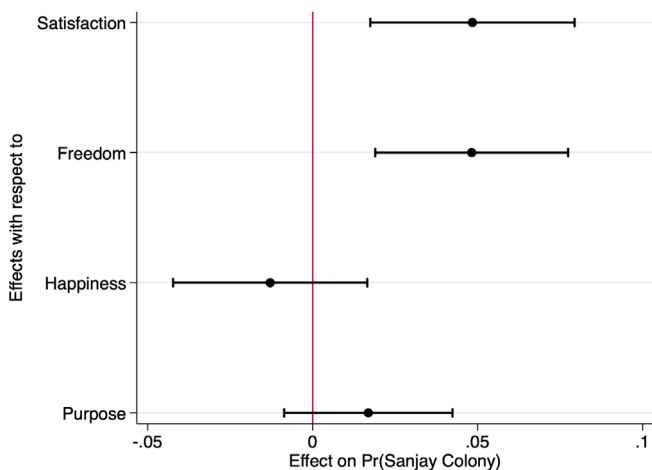

Figure 4 Well-being estimated averaged marginal component effects for Sanjay Colony with 95% CIs. The percentage points (pp) estimates for Sanjay Colony (=1) with the base group being Bhalswa (=0). The marginal effect of each independent variable being averaged over the joint distribution of the remaining variables. The independent variables are in the vertical axis. The horizontal axis gives the prediction of change in the independent variable (points), and the associated 95% CIs (bars).

increased likelihood that residents in Sanjay Colony had a greater likelihood to feel more satisfied with life ($p < 0.01$) and a 4.8 pp increased likelihood of having greater perceived feelings of freedom of choice ($p < 0.001$) than residents in Bhalswa. For additional detail see online supplemental table 2.

Associations between NCI and SWB

Statistically significant positive correlations demonstrated modest associations between NCI and SWB in both Sanjay Colony ($r = 0.145$, $p < 0.05$) and Bhalswa ($r = 0.264$, $p < 0.01$). In both communities there was a strong positive correlation between trust and neighbourhood cohesion (Sanjay $r = 0.618$, $p < 0.01$; Bhalswa $r = 0.533$, $p < 0.01$). However, only in Bhalswa was trust statistically significantly positively related to SWB ($r = 0.121$, $p < 0.05$).

There was a statistically significant positive modest correlation with regard to the length of residence within the neighbourhood and the NCI in both Sanjay and Bhalswa (Sanjay, $r = 0.157$, $p < 0.01$; Bhalswa, $r = 0.171$, $p < 0.05$). The longer a resident had lived in the community the greater the feeling of neighbourhood cohesion. Well-being was also statistically significantly correlated with employment in both communities (Sanjay—income, $r = 0.119$, $p < 0.5$; regular employment, $r = 0.134$, $p < 0.05$: Bhalswa—income, $r = 0.165$, $p < 0.01$; regular employment, $r = 0.109$, $p < 0.05$).

Only in Bhalswa was there shown to be correlations with length of residency, SWB and trust. For SWB there was a negative modest correlation between the length of residency ($r = -0.117$, $p < 0.05$), the longer the resident lived in the community the lower their level of SWB. For the level of trust there was a significant positive modest correlation with length of residency. The longer a resident had lived in Bhalswa the greater the level of trust ($r = 0.145$, $p < 0.01$). Interestingly regarding trust, only in Bhalswa was there a statistically significant correlation between employment and trust (income, $r = 0.132$, $p < 0.05$; regular employment, $r = -0.161$, $p < 0.01$; working outside the community, $r = -0.238$, $p < 0.01$).

Neither age nor education was found to be statistically significantly correlated with NCI, SWB or trust in Sanjay or Bhalswa. For additional detail see online supplemental table 3.

DISCUSSION
Key findings

This research considered two different informal settlement types in Delhi, India, where both communities were built on unauthorised land, with one spontaneously developed by individual families (Sanjay) and the other 'planned' by the government to reallocate slum dwellers away from the city (Bhalswa). We found that in both settlements residents' feelings around community cohesion were associated with their subjective well-being. That is a greater sense of satisfaction, freedom, happiness and purpose was felt by those residents that had rated more

highly their sense of community, attraction to their neighbourhood and neighbourliness. When a community trusted their neighbours there was a greater feeling of cohesion. The longer a resident lived in the community there was a greater sense of cohesion. This could imply that residents who feel there is a greater sense of cohesion are more likely to remain in the neighbourhood. Those with higher incomes and those that undertook regular employment (employee) enjoyed higher levels of subjective well-being. We found that neither age nor education influenced feelings around trust, neighbourhood cohesion or subjective well-being.

Those living in Sanjay (squatter settlement) reported higher subjective well-being and were more likely to feel a sense of belonging to a whole community where they would help and be helped by their neighbours in an emergency. However, Sanjay residents were less likely to be neighbourly with fewer friendships, and less of an attraction to live in the neighbourhood. Part of the reason for this, which we cannot substantiate, may relate to the more cramped living conditions in Sanjay in comparison to those in the 'planned' resettlement community of Bhalswa. That Sanjay residents reported higher subjective well-being than in Bhalswa *despite* such factors may also indicate the independent and over-riding value they place on having chosen where to live and not having been subject to forced relocation—but this needs additional research. In Bhalswa there was a greater feeling of neighbourliness, and the longer the resident had lived in the community the greater level of trust in their neighbours even though residents did not express the sense of community belonging expressed in Sanjay. One explanation for this result could be that the shared feelings associated with the trauma of compulsory relocation allowed the development of strong bonds with immediate neighbours coping with the original sense of helplessness—and with longer terms of residency their trust in neighbours increased independent of their perception of the neighbourhood as a whole. Friendliness and supportiveness among neighbours could have remained independent of any sense of self-esteem or fulfilment within the neighbourhood. Our results showed, however, that the longer the resident had lived in Bhalswa, the greater the negative effect on their subjective well-being. Residents with poor subjective well-being may be those unable to leave owing to lower incomes and employment possibilities. Again, a possible but unsubstantiated explanation for this finding may be the lasting negative impact on sense of belonging and well-being arising from the experience of forced relocation.

Our findings are to some extent in line with the existing literature that reports associations between greater neighbourhood social cohesion and better subjective well-being.[9–14] They show that a greater sense of community cohesion is associated with trust.[6] As in other literature residents with the highest incomes expressed greater subjective well-being.[27 28 33] Interestingly income was only associated positively with trust and neighbourhood cohesion in Bhalswa.

With regards to neighbourhood cohesion residents in Bhalswa, the resettlement colony, were less likely to have a sense of belonging to their neighbourhood, Williams *et al*[56] agree, stating that resettlement housing projects in India produce ghetto effects, which inhibit feelings of belonging and processes of place-making. As in Mahadevia *et al*[49] we found that residents in the resettlement colony of Bhalswa were less likely to feel a sense of community and the desire to improve their neighbourhood owing to greater heterogeneity of the residents. In contrast to the existing literature, we found that education was not correlated with trust, subjective well-being or neighbourhood cohesion. Blanchflower and Oswald[87] in their study on well-being over time showed that education played a role independently of income and Patel *et al*[88] found that higher education significantly decreased the odds of low subjective well-being in older adults in India.

Limitations

The first limitation of our study was its cross-sectional design implying that only correlations between neighbourhood social cohesion and SWB were established. Causal associations could not be demonstrated. Second, the results were subject to possible selection bias regarding the participating colonies. Sanjay Colony, Okhla Phase II and Bhalswa resettlement colony were already well known to the research team. We endeavoured to overcome this through the multi-stage random sampling of households. Third, self-reported and subjective measurements might cause information bias. Fourth, understanding the impact on SWB that having chosen ones' abode has in comparison to forced relocation, requires a more ethnographic and immersive approach to understand the meanings that people attach to the experience of being subjected to compulsory resettlement. Finally, associations between social cohesion and SWB may vary between men and women, one limitation of this study is that data were collected from the main household wage earner, who in the Indian context is typically male.

CONCLUSION

Our analysis in this paper aims to contribute to debates concerning neighbourhood cohesion and SWB for residents living in different informal settlement types in mega-cities. Gathering better local data allowed for a clearer understanding of the differences between residents of two types of slums, both typically devoid of security of tenure and infrastructure, but one on the periphery of the city detached from a socioeconomic livelihood base, and where residents had been evicted from their original homes. Residents of resettlement colonies are forcefully relocated, uprooted from established social and economic networks typically against their will. Additional research is required to understand the impact that this forced relocation may have on the sense of SWB and personal agency. This research should take into account issues of selection bias and requires a significant ethnographic component to explore the value that people attach to having chosen where they live.

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Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by the ethics committee of Newcastle University (NCL: 12353/2020) and local community leaders' approval through Indus Information Initiatives (III), a registered social research data collection organisation, Delhi, India (IRB Certification protocol number of the head of data collection: 35478464). Participants gave informed consent to participate in the study before taking part.

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ORCID iDs
Steve Humble http://orcid.org/0000-0003-3869-2420
Aditya Sharma http://orcid.org/0000-0003-4632-4521
Baladevan Rangaraju http://orcid.org/0000-0002-1134-7312
Pauline Dixon http://orcid.org/0000-0002-3767-6325
Mark Pennington http://orcid.org/0000-0001-6081-838X

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