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Post-migration emotional well-being among Black South Africans

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Abstract

Internal migration has been an institutionalized part of life for Black South Africans from the 1800s, when men left their rural homes to work in mines, through apartheid and into the present. Like other settings in the Global South, we know surprisingly little about the emotional well-being of migrants, especially in sub-Saharan African contexts. We investigate changes in the emotional well-being of 2281 working-age Black South Africans after migration, drawing on four waves of data, from 2008 to 2015, from the nationally representative National Income Dynamics Study. Fixed-effects regressions show that migrants exhibit changes in life satisfaction as well as proclivity towards depression but that these outcomes vary by distance of move and type of move—moving within or between provinces. As South Africa's health policies expand beyond addressing infectious diseases, it is important to consider mental health particularly of those who face the necessity of migration to sustain a livelihood.

Keywords

Depression; Life satisfaction; Mental health; Migration; South Africa

1. Introduction

1.1. Background

Internal migration has been institutionalized for Black South Africans, from the late 1800s and through apartheid when Black men left their rural homes to work in the mines that gave

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Tyler W. Myroniuk: Conceptualization, Methodology, Software, Formal analysis, Writing – original draft, Writing – review & editing, Visualization, Funding acquisition. **Michael J. White:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing, Visualization, Funding acquisition. **Sangeetha Madhavan:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing, Visualization, Funding acquisition.

Declaration of competing interest

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South Africa its wealth (Van Onselen, 1996). Migration to-and-from rural and urban areas, as a strategy to meet the financial needs of family members, has persisted since the collapse of apartheid in the early 1990s (Collinson et al., 2006; Kok & Collinson, 2006), albeit with differences in the composition of migrants as well as destination (Collinson et al., 2007; Fourie, 2022; Hunter and Posel, 2012; Posel, 2004). Migration has become more feminized due to HIV/AIDS and changes in gender norms and aspirations for social mobility by both men and women (Camlin et al., 2014; Hunter, 2010; Hunter, 2016; Morrell, 2002; Spiegel et al., 1996). These moves encompass a range of destinations within the same province as well as across provinces.

Black South Africans—who account for roughly 80% of the population—remain economically disadvantaged compared to other racial groups in the post-apartheid era (Posel, 2021; Reed, 2013). As under apartheid, demand for “unskilled” labor and a dearth of employment opportunities in rural communities continues to drive these migration flows (Ginsburg et al., 2016). In a recent labor force participation survey, more than half of internal migrants reported work-related reasons for undertaking a move (Statistics South Africa, 2019). Not surprisingly, most of South Africa’s internal migration is geared towards urban contexts more generally, as urbanization typically accompanies economic development (Spence et al., 2008; White and Lindstrom, 2019). Movement was directed toward Gauteng Province, the economic hub of the country anchored by Johannesburg. While recent analysis has made the case for the economic value of geographic mobility both for household well-being and for national economic development (Visagie and Turok, 2020), the lack of stable employment combined with sub-optimal living conditions and limited access to services have tempered the positive view of migration and urbanization (Mberu, 2016). Indeed, these trends have fed into a mode of “disjointed modernization” (Fox, 2014) whereby countries appear to be benefiting as a whole as their economies grow, but, in reality, urbanization has not been effectively managed as seen by extreme infrastructural and livelihood differences among the poor and wealthy.

South Africa’s White population has continued to benefit from entrenched inequalities in the ability to build wealth and attain upward mobility stemming from the apartheid era. South Africa is one of the world’s most unequal countries, based on the Gini coefficient, in addition to having high income inequality between *and within* racial groups (Statistics South Africa, 2019a,b). Municipalities like Sandton—north of Johannesburg and South Africa’s financial hub—or Hout Bay—just south of Cape Town and wedged between Table Mountain and the Atlantic Ocean—are mostly, but not exclusively, White, highly educated, segregated communities (Statistics South Africa, 2022) with single-family detached homes resembling Arlington, Virginia and North Vancouver, respectively. In contrast, there are places like Alexandra—a large, pre-dominantly Black, low-income township with informal settlements directly east of Sandton. Beyond Cape Town’s inner-suburbs, and in the geographically undesirable, sandy, Cape Flats, lies the Black South African township of Khayelitsha—which includes one of the largest informal settlements in the world; the Coloured (formal term for mixed-race South Africans) township of Mitchell’s Plain is nearby too, and was developed with the purpose of forced relocation from Cape Town proper, under apartheid (Statistics South Africa, 2022). Such places tend to offer substandard schools and few long-term economic opportunities for residents. In this highly racialized context, Black migrants

must navigate challenges with labor market mismatches between skill and availability in the formal sector and often need to take on high-risk informal sector jobs such as street vending and commercial sex work (Bozzoli 1991; Collinson et al., 2006; Madhavan and Landau 2011; Myroniuk, 2016; Pick, Ross, & Dada, 2002; Posel and Casale 2006; von Fintel and Moses 2017). While health risks linked to migration—especially HIV transmission—have received considerable attention in the literature (Bärnighausen et al. 2007; Coffee et al., 2007), mental health has not.

Mobility has long been known to disrupt migrants' social support systems in South Africa, at least in the short term, as migrants attempt to establish social connections in destination areas (Bozzoli, 1991; Casale and Posel, 2002; Seidman, 1999). The mental health consequences faced by children living away from migrant parents (Hickson and Kriegler, 1991), women forced to undertake domestic work to sustain their families (Hickson and Strous, 1993; Mohutsioa-Makhudu, 1989), and men living in mining compounds separated from partners and families for extended periods (World Health Organization, 1977) have been well documented. More recent scholarship has focused on the mental health consequences of living in unsafe informal settlements outside major cities (Oyekunle et al., 2022), widespread poverty among young people (Petersen et al., 2010), and persistent high levels of violence throughout the country (Kaminer et al., 2008). Migration, in conjunction with economic and physical precarity, is likely to take an emotional toll on Black migrants and this analysis is an attempt to provide evidence.

In this paper, we investigate the emotional well-being of Black internal migrants using nationally representative, longitudinal data. Our primary objective is to estimate changes in emotional well-being after migration episodes, based on their timing, distance, and provincial jurisdictions; our secondary objective is to analyze the extent to which changes in household composition and relationships buffer the adjustment process in the destination. In carrying out this research, we endeavor to better separate the manifestation of selection and composition—in migration—from the effect of change in residence—typically to an urban location—itsself.

1.2. Migration and health

In almost all geographic and socioeconomic settings across the globe, those who migrate and those who are left behind differ in observable demographic characteristics, such as age, gender, family structure, and educational level. A substantial literature attests to further differences of migrants along health dimensions but has mostly measured physical health, through self-rated health items, biomarkers such as hemoglobin or HIV/AIDS status, and anthropometric indicators such as height and body mass index (e.g., Anglewicz, 2012; Hosegood et al. 2004; Rubalcava et al. 2008; Singh and Hiatt 2006; Singh et al. 2011). Further, the extant literature on migrant health selection is deeply rooted in longitudinal studies of Latin American migration to the US and has shown that it is the healthiest who tend to move (e.g., Markides and Eschbach, 2011; Palloni and Arias, 2004; Rubalcava et al. 2008; Ullmann, Goldman, and Massey, 2011). These findings have informed studies of internal migration and health selection in China, Indonesia, Thailand, and South Africa (e.g., Ginsburg et al., 2016; Lu, 2010; Lu and Qin, 2014; Nauman et al., 2015). Emotional

well-being of migrants is most often found in the context of forced migration because of war or natural disaster (e.g., Bhugra 2004; Ingleby, 2004). Thus, we know comparatively little about emotional well-being in voluntary internal migration episodes, which are, by far, the more common form of movement globally.

We expect that migrants also differ by characteristics that go beyond these fundamental demographic, socioeconomic, and physical health dimensions; migration is likely an emotional event and we seek to understand this additional dimension. Although it has long been identified that migration usually induces stress, especially for migrants' adapting to new urban environments in low-income countries (Harpham, 1994), virtually no research has examined migration and multiple measures of emotional well-being, longitudinally, with nationally representative data (see an exception set in China: Zheng et al., 2021), and certainly in Africa. Evidence from the China Health and Retirement Longitudinal Study found that earlier-life internal migration was linked to greater chances of experiencing depression later in life (Zheng et al., 2021). The few, non-nationally representative, studies that have examined emotional well-being have found that, in Indonesia, those who migrate from rural to urban areas experience more sadness compared to those who remain in rural areas (Lu, 2010), and, in Malawi, only women who migrate to urban areas experience negative emotional well-being (Anglewicz et al., 2018). In Peru, having social support and work status have been identified as a potential mechanism for emotional regulation among internal migrants (Espinoza et al., 2021). We build on this important work by identifying differences in emotional well-being outcomes among migrants—after accounting for unobservable characteristics to minimize bias—and innovatively measure different elements of migration such as, simply, the act itself, the distance, and then whether jurisdictional boundaries were crossed; the latter two which add further logistical complexities to resettling.

2. Methods

2.1. Data

The National Income Dynamics Study (NIDS) is one of the few longitudinal, nationally representative datasets that includes high quality data on migration in sub-Saharan Africa (SSA). These data are ideal for our analysis because longitudinal data allows us to examine change in both the observable dimensions, e.g., residence, and invoke methods that effectively account for bias-inducing unobservable characteristics. We utilize the first four waves of NIDS data in this paper: 2008, 2010–11, 2012, and 2014–15 (Southern African Labour and Development Research Unit, 2018a–d). The data used in this paper are even more distinctive, as we received access to the restricted data housed in a secure data center—DataFirst—at the University of Cape Town and are not accessible remotely. These secure data contain detailed geographic information not available in the publicly accessible NIDS data for all four waves: 2008, 2010–11, 2012, and 2014–15. The data include geocodes and names of the village, town, suburb, or city individuals live in. These data offer a unique opportunity to make a significant contribution to migration research with geospatial data and emotional well-being indicators. Access to the NIDS data was approved by the University of

Cape Town’s DataFirst Secure Research Data Center, in addition to appropriate IRBs in the US. Analyses of these data took place between October 2017 and December 2018.

2.2. Sample

The analytic sample for this paper is first restricted to Black South African residents (including 1.1% born outside of South Africa)—hereby called “Black South Africans” even though some may have other citizenship. Additionally, only those 15 years and older, *who migrated from their origin household* (the house they started at in Wave 1) to another housing unit within South Africa—i.e., internal migration events—*after they began participating in NIDS* form our primary analytic sample. Further, the sample is limited to *only those who participated in all four of the NIDS waves*, in accordance with the NIDS recommendation, to utilize the Wave 4 panel weights that were designed to adjust for attrition *and* maintain nationally representative estimates (Branson and Wittenberg, 2019). The decision tree for sample selection is illustrated in Fig. 1. Statistics South Africa classifies individuals as “working age” once they reach age 15, which, as found in other African settings, is linked to one’s eligibility to migrate for work (Statistics South Africa, 2022), which would be expected to induce greater propensity to migrate (Ginsburg et al., 2016). Migration episodes prior to respondents’ participation in NIDS are not captured in our analyses and could be a potential source of unobserved heterogeneity. We also identified only 10 participants who engaged in international migration episodes and were in all four waves; they were excluded from models. We recognize that borders with Botswana, Lesotho, Mozambique, Namibia, Swaziland, and Zimbabwe are porous and South Africans of some ethnic groups may be more like those on the other side of the border than those within South Africa; we also recognize that the exclusion of such individuals—who engaged in international migrations—from the analytic sample could induce another, unintended, form of selection bias.

Under these criteria, we have a sample of 2281 Black South Africans, aged 15 years and older, who contribute 9124 person-waves over the four waves (see Table 1, below, for a breakdown of person-waves). In each wave, some respondents’ data were recorded by someone else due to respondents’ unavailability in waves 2 through 4. Since “proxy” respondents could not accurately depict the actual respondents’ life satisfaction and depression survey items, those years are excluded ($N_{\text{wave } 2} = 135$, $N_{\text{wave } 3} = 273$, $N_{\text{wave } 4} = 80$) for that individual in the total availability of person-waves (see Appendix Table 1 for sensitivity analyses). Further, there are 5466 Black South Africans, age 15 years and older, who never migrated while a NIDS participant—and were present in all four waves—who are not part of our sample; differences between these individuals and our analytic sample can be found in Appendix Table 2. Notably, there were few discernible or substantive differences in the emotional well-being of migrants and never-migrants-during-NIDS at Wave 1—baseline; these two groups were thus similar *on the outcome variables* at the onset of the study. Still, there is a strong possibility that those considered to be non-migrants in our analyses—who differed from migrants on other variables—previously engaged in migration before the start of first NIDS wave and/or short, temporary, migration spells were not captured between Waves 1 and 4 for the “non-migrants” excluded here.

2.3. Estimation procedures and variables

To estimate the extent to which *changes* in migration behavior, household composition, and family presence are associated with *changes* in emotional well-being, we employ fixed-effects ordinary least squares (OLS) and logistic regressions found in Equations (1) and (2) below, respectively. Thus, all variables measured, and listed below, are time-varying. These procedures remove bias stemming from unmeasured and unobservable, individual-level, time-invariant characteristics, and leverage the strengths of the NIDS longitudinal data. Fixed-effects regressions have the straightforward advantage of minimizing the error stemming from many of individuals' innate, fixed, characteristics, such as one's upbringing, past health experiences, gender, and ethnic group, that often impact migration estimates; still fixed-effects models do not preclude the possibility that individuals select into migration because of their fixed characteristics.

To reduce the chance of reverse-causality, we lagged the migration variables described below. Thus, the migration indicator in a given wave is the change—or lack thereof—in migration behavior between the previous and current wave. This allows for changes in migration status to precede changes in emotional well-being—thus allowing for post-migration estimates of emotional well-being—but at the cost of not using Wave 1 observations in the models; Wave 1 information on residence is still used to derive Wave 2 migration indicators though.

In Equation (1), $LifeSatisfaction_{it}$ measures the 10-point integer outcome variable—treated as continuous—of one's life satisfaction where 1 indicates no satisfaction and 10 indicates complete satisfaction, for an individual (i) in a given year (t). Our primary predictors include: a) whether individuals have moved in the prior two years (=1 yes; =0 no); b) the number of kilometers individuals moved in the prior two years—if they moved (natural logarithm); and, c) if an individual moved between provinces, within their province, or not at all are modeled separately and noted by the term $Migration_{it}$. Although long distances of migration could imply interprovincial migration, this is not always the case due to the large size of some provinces; differences in legal requirements of residence and other issues pertaining to resettlement are more likely to be found in another provincial jurisdiction than moving within a province. The secondary predictor, $DependencyRatio_{it}$ (natural logarithm) is respondents' household dependency ratio—the total number of individuals less than 15 years old and 65 years and older over the number of working age individuals (15–64 years)—in their origin households; more dependents could anchor prospective migrants due to day-to-day responsibilities at home, or the need to feed and provide for more dependents could push prospective migrants to move; it is important measure and account for these possibilities. Control variables include $MaritalStatus_{it}$ dichotomized into Not Married (=1) and Married/Living with Partner (=0) and $EmploymentStatus_{it}$ broken into the categories of Employed, Unemployed, and Not Active in the Economy (an important consideration given it is the pre-eminent reason for voluntary migration). Age is excluded as it is functionally a fixed characteristic. The term α_i captures time-invariant individual characteristics—the fixed-effects—in this equation, while μ_{it} accounts for time-varying model error. Missing values (detailed in Table 2) are excluded, list-wise, in regression models.

$$LifeSatisfaction_{it} = \beta_1 Migration_{it} + B_2 DependencyRatio_{it} + B_3 MaritalStatus_{it} + B_3 Employment_{it} + \alpha_i + \mu_{it} \quad (1)$$

Equation (2) estimates the logistic probability of an individual's risk of depression—for relative simplicity (see Katz 2001)—though, in the results tables, we transform our estimates into log odds for ease of interpretation. Here, $DepressionRisk_{it}$ is a dichotomized score that indicates high risk of depression (1) versus not (0) for an individual (i) in a given wave (t). This measure originates from the CES-D-10, an externally validated, *self-reported*, 10-item scale where the lowest score, 0 is the lowest risk of being depressed and 30 being the highest risk of being depressed (Björgvinsson et al., 2013; Miller et al., 2008; Radloff, 1977). Research in South Africa has identified scores of 13 or higher as an appropriate indicator of high risk of depression among the Xhosa population with 12 as an appropriate indicator among the Zulu population (Baron et al., 2017). We chose the more conservative estimator of 13 as the cut-off in this study. It is important to note that, while externally validated, this is not a clinical indicator of depression; when we refer to this as the *risk* of depression in the results, it pertains to the CES-D-10 cut-off. The other variables remain the same as in Equation (1) and, again, α_i captures time-invariant individual characteristics. The parameter measuring change in values, β , is estimated by the conditional maximum likelihood (Chamberlain, 1984) in this fixed-effects model. Interaction effects between the type of migration and respondents' origin household dependency ratios or marital status are derived from Equations (1) and (2) and presented in the regression results. As in Equation (1), missing values (detailed in Table 2) are excluded, list-wise, in regression models.

$$P(DepressionRisk_{it} = 1 | \alpha_i, \beta) = \frac{\exp(\alpha_i + \beta_1 Migration_{it} + B_2 DependencyRatio_{it} + B_3 MaritalStatus_{it} + B_3 Employment_{it})}{1 + \exp(\alpha_i + \beta_1 Migration_{it} + B_2 DependencyRatio_{it} + B_3 MaritalStatus_{it} + B_3 Employment_{it})} \quad (2)$$

3. Results

Table 2 provides descriptive statistics of the analytic sample, by wave. Most evidently, the largest share of moves are short distances, and respondents are, on average, moderately satisfied with their lives and most are not at high risk of being depressed. Further, the substantial decline of respondents living in rural areas from the 2008 to 2014–15 wave characterizes participants' *intra*-provincial mobility to urbanized areas. Most participants were born in the location they were residing at in 2008. There are large increases in the percentage of respondents who migrated between each wave too; it is unclear why this is the case but could be due to the movement of younger cohort members through more migration-prone ages or unknown period effects.

Table 3 shows changes in life satisfaction as a function of: a) whether one migrated since the prior wave (models 1–3); b) the distance of migration (models 4–6); and c) the type of migration (models 7–9). The coefficients on the main effects (models 1, 4, and 7) suggest that there is an association between changes in the main exposure variable and higher life satisfaction scores after accounting for changes in the dependency ratio in one's origin

household, marital status, and employment status. Those who migrated in the previous two years scored 0.37 points higher on the 1–10 life satisfaction score than those who did not migrate in those same two years, on average (model 1). A change in residence distance of one unit in distance (logarithm of km) was associated with a 0.03 increase in life satisfaction (model 4). Compared to not migrating between waves, migrating within province and between provinces are associated with higher life satisfaction scores—0.33 and 0.43, respectively. The small size of the natural logarithm coefficient is deceiving. When exponentiated beyond a one-unit change, the result indicates that a long-distance move was likely more strongly linked to one's life satisfaction than any simple residential intraprovincial change or any interprovincial change itself. Still, even small changes found in life satisfaction instruments in other settings can equate to substantive, meaningful changes in one's life (i.e., Dykens et al., 2014; Pavot and Diener, 2008; Piper et al., 2012); the smaller effect sizes found here should not be discounted as inconsequential given that our estimates stem from a large observational data set.

The interaction effects in Table 3 (in models 2–3, 5–6, and 8–9) convey more nuance about changes in life satisfaction after migration episodes. Despite the higher dependency ratio in the origin household—meaning the greater number of very young and very old individuals relative to working age individuals—being modestly associated with higher life satisfaction across all models, life satisfaction was not moderated by any interactions between the three migration variables and participants' origin household dependency ratios. However, changes in marital status play a key moderating role in life satisfaction changes after migration. Those who transition out of marriage between waves tend to experience declines in life satisfaction; but the act of migrating, moving farther away, and moving to a different location within the same province diminishes the negative effects of marital dissolutions (see models 3, 6, and 9); migrations appear to buffer the blow to satisfaction that accompanies separation, divorce, or widowhood.

The primary goal of Table 4 is to examine the log odds changes in the *risk* of depression, after migration episodes as a function of a) whether one migrated since the prior wave (models 1–3), b) the distance of migration (models 4–6), and c) the type of migration (models 7–9). Changes in all these main effects (models 1, 4, and 7) are associated with a *lower* risk of depression after accounting for changes in the dependency ratio in one's origin household, marital status, and employment status. Those who migrated in the previous two years had lower log odds (–0.34, model 1) of moving into high risk of depression than those who did not migrate in the previous two years. A change in residence distance of one logarithmic unit in distance (km) was associated with 0.03 log odds decrease of moving into a high risk of depression (model 4). Relative to those who did not move between waves, those who moved between provinces had substantially lower log odds (–0.55, model 7) of high risk of depression on the CES-D-10 indicator. Unlike in Table 3, changes in participants' origin household dependency ratios and marital status did not moderate the relationship between changes in migration status and changes in the risk of depression.

4. Discussion

Prior research on internal migration and health selection, in SSA, has only been able to draw upon regionally representative sample data or local migration censuses. Our results, from nationally representative data, suggest that those who migrate have favorable emotional well-being outcomes. Moreover, in the two years prior, moving, moving further away, and moving between provinces is associated with lower risk for depression and higher life satisfaction. Additionally, those who have moved, moved further away, and moved between provinces *and* are no longer married are more satisfied with their lives than others in the sample; of course, these events are most likely happening either concurrently or in close succession, so the lines of causality are difficult to identify. While the effect sizes of the varying dimensions of migration and changes in emotional well-being outcomes are similar, they are most meaningful when it comes to assessing the risk of depression. The act of moving in the previous two years is linked to roughly a one-third reduction in the chances of being at risk for depression, while moving between provinces is associated with over a 50% reduction. Lastly, the distance of a migration episode matters too as it is associated with a lower risk of becoming depressed, especially as the distance substantially increases on the natural logarithmic scaled estimates; the processes and decisions that lead one to undertake a long-distance move are likely to result in better socioemotional outcomes.

The circumstances surrounding overall labor migration patterns among Black South Africans are not easy, yet often necessary for survival let alone upward mobility. From a policy perspective, if being able to move is associated with positive changes to one's emotional well-being, then perhaps more resources should be dedicated to supporting the mental health of individuals who would like to, or need to, migrate—but cannot, due to family financial, and/or logistical reasons. A wide-scale public health initiative to target aspiring but otherwise constrained potential migrants would not be feasible though. Population researchers, at a minimum, should expand the array of well-being indicators in new surveys while striving to identify more fine-grain details about migrant outcomes.

4.1. Limitations

There are important data limitations in our analyses of NIDS data. First, as with most longitudinal studies, respondents are lost-to-follow-up, despite the extraordinary efforts of NIDS to track respondents throughout South Africa. Although roughly one-third of all Black South African respondents from 2008 (the first wave) are excluded from these analyses ($N = 4317$) due to attrition; having no participants lost to follow-up would be ideal, even if panel weights adjust for this attrition. Second, among the analytic sample, there are adults in households who were not able to directly speak to NIDS interviewers but for whom other members of the same household provided substantial information on their behalf (found in Appendix Table 1 analyses). They comprise a “proxy” sample. In this proxy sample, information on migration behavior was recorded. However, measures of emotional well-being were not answered by proxy, as noted in the methods. These data are not missing completely at random—as well as being the dependent variable, which is problematic—and we chose to accept these missing data rather than employ multiple imputation techniques. Third, while we present supplementary analyses (found in Appendix Table 2) indicating

that our analytic sample and non-migrants (from Waves 1 to 4) are similar on the outcome variables at Wave 1, we would be hesitant to draw any wider, between-group, inferences without the availability of data that started at an earlier point in their life courses. This data restriction reduces the generalizability of our results to Black South Africans who engaged in a recordable migration between 2008 and 2015, as it is possible that excluded individuals undertook temporary migrations or were migrants before the NIDS waves analyzed here. Fourth, our fixed-effects regressions do not capture all unmeasured or unobservable time-varying characteristics within individuals based on NIDS survey design limitations. Aspects of individuals' lives that change—such as pressures to provide more income to extended family members—or events that change community-level economic prospects for individuals—such as a new major employer arriving in one's hometown—could be linked to emotional well-being, or impact migration selection, in important ways that we are unable to account for. Fixed-effects regressions also do not preclude the possibility of reverse causality—that emotional well-being could also be influencing the decision to migrate—nor account for how one's pre-existing emotional well-being factors in, as with any adult cohort study. However, our built-in migration change lag helps minimize this. Also considering the longitudinal data, our analytic sample inclusion criteria, and fixed-effects choices, we come closer to measuring a causal relationship between migration events and subsequent emotional well-being outcomes than other potential methods and approaches. Fifth, we recognize the vast complexity in Black South African household composition—including that gender roles have undergone significant shifts in recent decades which have likely affected mobility, marriage, and childbearing. Our inclusion of an origin household dependency ratio and marital status fall short of capturing this complexity (see Madhavan et al., 2017 for a comprehensive example of modeling living arrangements with ideal data) but were the best combination available to measure household composition and its complexity. The NIDS data offered no reliable way to pinpoint the geographic location of the spouse and only female participants were asked about the identities of children were living with them. While there is an origin household roster—where our dependency ratio was derived from—unpacking it for further detail depends on who the household head is in, which can change in households.

After our analyses of these data in 2017 and 2018, the DataFirst secure data center at the University of Cape Town was closed due to the COVID-19 pandemic and remains closed at this time (Lynn Woolfrey and Martin Wittenberg, personal communication, October 2022). Had DataFirst been open during the process of revising this manuscript for publication, we would have considered several additional analyses. First, given gendered differences in employment and migrants, gender-stratified analyses may have revealed differential associations between migration changes and emotional well-being changes. Second, as mentioned above, approximately one-third of study participants initially enrolled at baseline were excluded from the analyses due to attrition. We made the decision to include only those who participate in all four waves and use Wave 4 panel weights that were designed by NIDS staff to account for attrition bias (Branson and Wittenberg, 2019), so that we could achieve a nationally representative set of estimates. Unfortunately, there is no way to “mix and match” weights, in the same estimates, e.g. for someone who participated in Waves 1, 3, and 4 only or Waves 1 and 2 only. We tested two alternative approaches with publicly

available NIDS data, by comparing regressions employing no weights, as well as regressions employing inverse probability of attrition weights (IPAWs), to those with the recommended attrition-adjusted panel weights; no substantive differences were found. Third, including employment could have incidentally biased estimates *because* of its intimate connections to migration and emotional well-being; modelling a lagged employment effect, or not at all, could be important for future work. Nonetheless, the four waves of data used in this study still offer the most in-depth longitudinal, nationally representative study in SSA that includes migration, emotional well-being, and household demographic and economic information.

5. Conclusion

Our study isolates the relationship between multiple dimensions of voluntary migration and changes in emotional well-being in a way that virtually no other research in SSA has. In doing so, this work informs a growing academic literature, about the increasing prevalence of non-communicable diseases and their importance to public health initiatives; there is an increasing urgency to understand mental health conditions and the COVID-19 pandemic—although not a focus of this paper—has exacerbated this. Understanding and targeting mental health needs of individuals could be key to improving the quality of longer lives through primary care in South Africa (Mayosi et al., 2009). Recent health policy assessments for South Africa echo this concern in the call to broaden the scope of inquiry from strictly infectious disease to non-communicable diseases and mental/emotional health (Gouda et al., 2019; Mayosi et al., 2009; Posel, 2021).

Moreover, the importance of this research is underscored by the growing interest in better understanding the complexities of migration and health selection in a range of settings in the Global South. Specifically, by exploiting the advantages of longitudinal data and fixed-effects modeling, we are able to advance the scientific understanding of the relationship between migration and emotional well-being—even though there remains plenty of work, in the future, to tease out cause and effect.

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Appendix

Appendix

Appendix Table 1

Differences in Full Analytic Sample and Subset of Individuals Who Never (N = 1851) and Ever (N = 430) Had a Proxy Answer on Their Behalf for NIDS Waves, Key Variables

	Difference W1	Difference W2	Difference W3	Difference W4
	(Never Proxy-Ever Proxy)	(Never Proxy-Ever Proxy)	(Never Proxy-Ever Proxy)	(Never Proxy-Ever Proxy)
Migrated Past Two Years	–	8.22*	24.85***	13.24*
Migration Distance in km (only migrants)	–	28.40	–50.95**	–34.94**
CES-D-10 (Depression Scale 0–30)	0.25	0.04	0.07	0.06
CES-D-10 (High Risk of Depression Cut-Off)	1.65	–0.20	1.16	2.19
Life Satisfaction (Scale 1–10)	–0.07	0.03	–0.21	–0.20
Dependency Ratio, Origin Household	–0.03	0.003	0.02	0.13***
Not Married	8.99***	–7.09**	–5.24	–7.90**
Maximum Observations	2281			

Note: Due to rounding, variable percentage totals might not add up to 100. Differences in observations due to emotional well-being questions not asked for respondent who completed the survey via proxy of another household member.

* p < .05;

** p < .01;

*** p < .001,

two-tailed tests where applicable.

Appendix Table 2

Migrant Analytic Sample vs. Never Migrated, Wave 1 Differences

	Present in Wave 1		
	Migrant Analytic Sample	Never Migrated	Difference
CES-D-10 (Depression Scale 0–30)	8.1 (4.5)	8.5 (4.6)	0.4***
CES-D-10 (High Risk of Depression Cut-Off)	15.1	16.8	1.7
Life Satisfaction (Scale 1–10)	5.1 (2.4)	5.1 (2.4)	0
Dependency Ratio, Origin Household	0.6 (0.6)	0.6 (0.6)	0
Not Married (%)	79.2	62.8	16.4***
Employment Status (%)			
Not Active in the Economy	46.9	44.5	2.4***
Unemployed	22.7	18.7	5.0
Employed	30.4	36.8	6.4
Rural (%)	64.5	62.0	2.5*
Province (%)			
Western Cape	2.0	2.2	0.2**

	Present in Wave 1		
	Migrant Analytic Sample	Never Migrated	Difference
Eastern Cape	12.5	13.4	0.9
Northern Cape	4.3	3.8	0.5
Free State	7.8	7.8	0.0
KwaZulu-Natal	29.3	33.2	2.9
North West	9.3	8.1	1.2
Gauteng	11.1	9.7	1.4
Mpumalanga	8.9	9.5	0.6
Limpopo	15.1	12.3	2.8
Male (%)	40.6	34.5	6.1***
Age	28.4 (13.2)	40.4 (17.5)	12.0***
Born in Wave 1 Location (%)	38.9	39.3	0.4
Maximum Observations	2281	5466	

Note: Due to rounding, variable percentage totals might not add up to 100.

* p < .05;

** p < .01;

*** p < .001,

two-tailed tests where applicable. Values in parentheses are standard deviations presented next to the mean. All other values are percentages.

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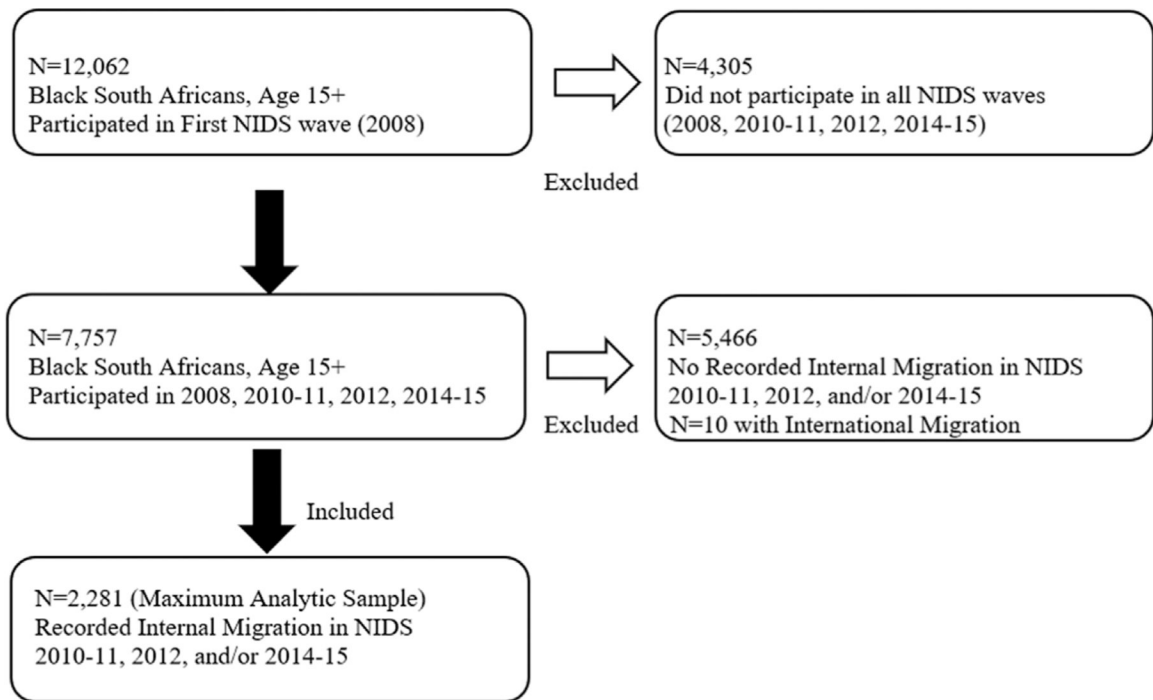


Fig. 1.
Map of NIDS participant inclusion in analyses.

Table 1

Typology of the percentage and frequency of participant person-wave contributions by recorded internal migrations in NIDS.

Only Between 2008 and 2010–11	11.7%	n = 1068
Only Between 2010–11 and 2012	18.6%	n = 1700
Only Between 2012 and 2014–15	41.8%	n = 3812
Between 2008 and 2010–11, and 2010–11 and 2012	4.4%	n = 400
Between 2008 and 2010–11, and 2012 and 2014–15	6.0%	n = 544
Between 2010–11 and 2012, and 2012 and 2014–15	14.1%	n = 1284
Between All Waves	3.5%	n = 316
Person-Wave Observations	100%	9124

Note: Unweighted percentages and frequencies are presented.

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Table 2

Black South African sample descriptive statistics.

	Wave			
	2008	2010-11	2012	2014-15
Migrated in the Past Two Years (%)	-	25.5 n = 2281	40.6 n = 2281	65.3 n = 2281
Migration Distance in Kilometres (%)				
Did not migrate	-	74.7	60.0	34.5
<10	-	10.4	14.4	27.1
10-49	-	5.4	8.4	12.6
50-199	-	4.9	8.9	12.9
200+	-	4.6	8.4	12.9
		n = 2251	n = 2249	n = 2275
Migration Distance in Kilometres (only those who migrated)	-	106.6 (193.5)	127.8 (208.2)	112.6 (195.7)
		n = 2251	n = 2249	n = 2275
CES-D-10 (Depression Scale 0-30)	8.1 (4.5)	7.2 (4.2)	7.2 (4.2)	6.9 (4.1)
	n = 2267	n = 1997	n = 2004	n = 2200
CES-D-10; High Risk of Depression Clinical Cut-Off (%)	15.1	11.6	12.5	9.3
	n = 2267	n = 1997	n = 2004	n = 2200
Life Satisfaction (Scale 1-10)	5.1 (2.4)	4.5 (2.4)	4.7 (2.2)	5.3 (2.3)
	n = 1984	n = 2033	n = 2007	n = 2197
Dependency Ratio, Origin Household	0.6 (0.6)	0.6 (0.6)	0.6 (0.7)	0.5 (0.7)
	n = 2281	n = 2281	n = 2281	n = 2281
Not Married (%)	79.2	77.6	73.5	50.5
	n = 2267	n = 2134	n = 2008	n = 2198
Employment Status (%)				
Not Active in the Economy	46.9	49.9	34.7	26.8
Unemployed	22.7	18.8	23.5	17.7
Employed	30.4	31.3	41.7	55.5
	n = 2258	n = 2130	n = 2274	n = 2276
Rural (%)	64.5	60.9	50.5	41.9

	Wave			
	2008	2010–11	2012	2014–15
	n = 2281	n = 2251	n = 2279	n = 2277
Province (%)				
Western Cape	2.0	2.6	3.2	3.9
Eastern Cape	12.5	11.7	11.0	10.1
Northern Cape	4.3	4.4	4.3	4.1
Free State	7.4	7.0	6.5	6.5
KwaZulu-Natal	29.3	29.0	27.9	25.3
North West	9.3	9.6	9.6	9.2
Gauteng	11.1	12.7	16.7	21.4
Mpumalanga	8.9	9.4	9.1	9.1
Limpopo	15.1	13.6	11.8	10.5
	n = 2281	n = 2276	n = 2279	n = 2277
Male (%)	40.6	-	-	-
	n = 2281			
Age	28.4 (13.2)	-	-	-
	n = 2281			
Born in Wave 1 Location (%)	61.1	-	-	-
	n = 2281			
Maximum Observations	2281	-	-	-

Note: Unweighted percentages are presented. Due to rounding, variable percentage totals might not add up to 100. Values in parentheses are standard deviations presented next to the mean. All other values are percentages. Values included even for proxy responses on available variables.

Table 3

Estimating Changes in Life Satisfaction Scores based on Changes in Migration Behavior and Household Composition, Fixed-Effects OLS Regressions.

Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Migrated in the Past Two Years (Ref. Did Not)	0.37*** (0.09)	0.36*** (0.12)	0.06 (0.18)						
Migration Distance in Kilometres (ln)				0.03*** (0.01)	0.03*** (0.01)	0.00 (0.02)			
Migration Type									
Did not move							Ref.	Ref.	Ref.
Intra-Provincial							0.33*** (0.10)	0.32* (0.13)	-0.04 (0.19)
Inter-Provincial							0.43*** (0.15)	0.50* (0.24)	0.32 (0.31)
Dependency Ratio, Origin Household (ln)	0.09*** (0.03)	0.09* (0.04)	0.09** (0.03)	0.09*** (0.03)	0.09** (0.03)	0.09** (0.03)	0.09** (0.03)	0.08# (0.04)	0.09*** (0.03)
Not Married (Ref. Married)	-0.46*** (0.16)	-0.46*** (0.16)	-0.69*** (0.19)	-0.48*** (0.16)	-0.48*** (0.16)	-0.33* (0.17)	-0.46*** (0.16)	-0.46*** (0.16)	-0.71*** (0.20)
Employment Status									
Not Active in the Economy	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Unemployed	0.01 (0.13)	0.01 (0.13)	-0.01 (0.13)	-0.00 (0.13)	-0.00 (0.13)	-0.02 (0.13)	0.00 (0.13)	0.00 (0.13)	-0.00 (0.13)
Employed	0.64*** (0.14)	0.64*** (0.14)	0.60*** (0.14)	0.63*** (0.14)	0.63*** (0.14)	0.59*** (0.14)	0.64*** (0.14)	0.64*** (0.14)	0.61*** (0.14)
Migrated in the Past Two Years*									
Dependency Ratio, Origin Household (ln)									
Migrated in the Past Two Years*			0.47* (0.22)						
Not Married (Ref. Migrated in the Past Two Years * Married)					0.00 (0.00)				
Migration Distance in Kilometres (ln)*									
Dependency Ratio, Origin Household (ln)									

Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Migration Distance in Kilometres (ln) *						0.04*			
Not Married (Ref. Migration Distance in Kilometres (ln) * Married)						(0.02)			
Migration Type *									
Dependency Ratio, Origin Household (ln)								-0.00	
Inter-Provincial*								(0.05)	
Dependency Ratio, Origin Household (ln)								0.03	
Inter-Provincial*								(0.07)	
Migration Type *									
Marital Status (Ref. Did Not Migrate * Married)									0.57*
Intra-Provincial*									(0.24)
Not Married									0.16
Inter-Provincial*									(0.35)
Not Married									4.96***
Constant	4.77***	4.78***	4.96***	5.08***	5.08***	5.02***	4.77***	4.76***	4.96***
	(0.15)	(0.16)	(0.18)	(0.15)	(0.15)	(0.15)	(0.15)	(0.16)	(0.18)
Observations	6164	6164	6164	6113	6113	6113	6164	6164	6164
R ²	0.029	0.029	0.032	0.030	0.030	0.033	0.028	0.028	0.032

Note:

* p < .05,

** p < .01,

*** p < .001,

two-tailed tests; Panel-adjusted population weights were included as part of estimates. Standard errors accounting for individual clustering of observations are in parentheses. Estimates are unstandardized beta coefficients.

Table 4

Estimating Changes in Chances of CES-D-10 Depression Cut-Off based on Changes in Migration Behavior and Household Composition, Fixed-Effects Logit Regressions.

Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Migrated in the Past Two Years (Ref. Did Not)	-0.34 [*] (0.15)	-0.35 [#] (0.19)	-0.39 (0.31)						
Migration Distance in Kilometres (ln)				-0.03 [*] (0.01)	-0.03 [#] (0.02)	-0.04 (0.02)			
Migration Type							Ref.	Ref.	Ref.
Did not move									
Intra-Provincial							-0.26 (0.17)	-0.26 (0.20)	-0.21 (0.33)
Inter-Provincial							-0.55 [*] (0.27)	-0.51 (0.35)	-0.77 (0.50)
Dependency Ratio, Origin Household (ln)	-0.08 (0.05)	-0.08 (0.07)	-0.08 (0.05)	-0.07 (0.06)	-0.07 (0.06)	-0.07 (0.06)	-0.09 [#] (0.05)	-0.09 (0.07)	-0.08 (0.05)
Not Married (Ref. Married)	0.44 [#] (0.26)	0.44 [#] (0.26)	0.41 (0.32)	0.45 [#] (0.26)	0.45 [#] (0.26)	0.51 [#] (0.27)	0.45 [#] (0.26)	0.45 [#] (0.26)	0.47 (0.32)
Employment Status									
Not Active in the Economy	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Unemployed	-0.14 (0.20)	-0.14 (0.20)	-0.15 (0.20)	-0.13 (0.20)	-0.13 (0.20)	-0.13 (0.20)	-0.15 (0.20)	-0.15 (0.20)	-0.15 (0.20)
Employed	-0.52 ^{**} (0.18)	-0.52 ^{**} (0.19)	-0.52 ^{**} (0.19)	-0.50 ^{**} (0.19)	-0.50 ^{**} (0.19)	-0.51 ^{**} (0.19)	-0.52 ^{**} (0.18)	-0.52 ^{**} (0.19)	-0.52 ^{**} (0.18)
Migrated in the Past Two Years[*]		-0.00 (0.08)							
Dependency Ratio, Origin Household (ln)									
Migrated in the Past Two Years[*]			0.08 (0.36)						
Not Married (Ref. Migrated in the Past Two Years * Married)					0.00 (0.01)				
Migration Distance in Kilometres (ln)[*]									
Dependency Ratio, Origin Household (ln)									

Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Migration Distance in Kilometres (ln) *									
Not Married (Ref. Migration Distance in Kilometres (ln) * Married)						0.01			
Dependency Ratio, Origin Household (ln) (Ref. Did Not Migrate * Dependency Ratio, Origin Household (ln))						(0.03)			
Intra-Provincial *							0.00		
Dependency Ratio, Origin Household (ln)							(0.08)		
Inter-Provincial *							0.01		
Dependency Ratio, Origin Household (ln)							(0.11)		
Migration Type *									
Marital Status (Ref. Did Not Migrate * Married)									-0.07
Intra-Provincial *									(0.38)
Not Married									0.30
Inter-Provincial *									(0.59)
Not Married									
Observations	1639	1639	1639	1614	1614	1614	1639	1639	1639
Pseudo R ²	0.031	0.031	0.031	0.030	0.030	0.030	0.031	0.031	0.032

Note:

* p < .05,

** p < .01,

*** p < .001,

two-tailed tests; Panel-adjusted population weights were included as part of estimates. Standard errors accounting for individual clustering of observations are in parentheses. Estimates are unstandardized beta coefficients.