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Improving educational and reproductive outcomes for adolescent mothers in South Africa: A cross-sectional analysis towards realising policy goals

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ABSTRACT

Adolescent mothers face numerous challenges. This study aimed to address the operationalisation of the new South African national policy for young mothers by testing the associations of potential protective provisions with three policy goals: School return, grade promotion, and pregnancy/HIV prevention. Adolescent mothers aged 12–24 from rural and urban communities of South Africa's Eastern Cape completed study questionnaires between 2017–2019. Using multivariate multi-level analysis, we simultaneously estimated associations between hypothesized provisions and protective variables and all policy-aligned goals. School return was associated with using formal childcare services, higher confidence and self-efficacy scores, and remaining in school throughout pregnancy. Grade promotion was associated with greater exposure to friendly and respectful health staff, using formal childcare services, higher confidence and self-efficacy scores, and remaining in school throughout pregnancy. Pregnancy/HIV prevention (condom use) was moderately associated with greater exposure to friendly and respectful health staff. There was evidence of synergies of provisions whereby a combination of protective characteristics showed larger positive effects than receipt of any single factor alone. This study provides essential evidence for operationalising South Africa's new policy on the Prevention and Management of Learner Pregnancy in Schools, and points to implementation strategies that provide low-cost opportunities to promote educational and health outcomes for adolescent mothers.

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The population of adolescent girls (aged 10–19) living in sub-Saharan Africa is projected to double over the next thirty years, from 120 million to 300 million (United Nations Department of Economic and Social Affairs, 2022). With about half of adolescent girls becoming a parent before

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entering adulthood, over 50 million young mothers will rely on policies to improve positive health outcomes for them and their children (Huda et al., 2021; Kassa et al., 2018; Neal et al., 2018; United Nations Population Fund, 2022).

The education sector can prevent and respond to adolescent pregnancy

Adolescent motherhood poses many challenges and is associated with poor health, education and socioeconomic outcomes for mothers and the next generation alike (Amongin et al., 2021; Branson et al., 2014; Fall et al., 2015; Noori et al., 2022; Steventon Roberts, Sherr, et al., 2022; Steventon Roberts, Smith, et al., 2022). Despite the slow and fragile decline to reduce adolescent birth rates and the scale of this ongoing challenge (Huda et al., 2021), adolescent mothers have not been a central focus of international development agendas. However, countries across sub-Saharan Africa – where adolescent birth rates remain the highest in the world – are increasingly realising that the support of pregnant adolescents and adolescent mothers requires urgent attention (Hall, 2022; Huda et al., 2021; Kassa et al., 2018). The education sector can play an important role in reducing adolescent pregnancies, through addressing some of its underlying causes, and resourcing schools as platforms for comprehensive sexuality education and health promotion (George, 2022). It is also well placed to respond to the support needs of adolescent mothers to continue their education after birth, which offers opportunities to promote good health and gender equity for the mother, (Chae et al., 2020; Maslowsky et al., 2021; Taylor et al., 2019) whilst mitigating risks for mortality, poor development for the infant, repeat pregnancy in adolescent and adolescent childbearing in the next generation (Andriano & Monden, 2019; Balaj et al., 2021; Coughlin et al., 2022; Gakidou et al., 2010; Hendrick & Maslowsky, 2019; Sullivan et al., 2011).

The effective implementation of policies for pregnant girls and adolescent mothers

Today, about half of the countries in the African Union have national laws or policies in place to protect pregnant girls and adolescent mothers' right to education (Martínez & Odhiambo, 2018), with progressive policy developments in at least five countries since 2019 (Hall, 2022; Odhiambo, 2021). However, achieving the objectives of these policies remains often compromised because of inconsistent adherence to their implementation and lacking monitoring strategies (Martínez & Odhiambo, 2018; Ngabaza & Shefer, 2013). Concerted government-led policy efforts, and their effectiveness, to promote good outcomes are also often limited by a lack of clear evidence on how to best operationalise policies and the paucity of data on which services realise the largest gains. Ensuring that adolescent mothers can fully benefit from favourable policy-environments requires innovative ways to generate evidence to shape evidence-based policies and inform their implementation plans.

South Africa's national policy on learner pregnancy prevention and management in schools

In 2021, the South African Department of Basic Education (DBE) launched the National Policy on Learner Pregnancy Prevention and Management in Schools, hereafter referred to as 'the Policy', which aims to prevent adolescent pregnancies and strengthen the support to adolescent mothers and enable their return to school following childbirth (Department of Basic Education, 2021). They approached researchers, seeking out robust evidence to inform the implementation of this policy. Consequently, this paper aims to assess, using real world evidence, the access of the provisions aligned with the Policy, and their synergies, and quantify their associations on select goals of the Policy. We identified possible provisions and protective characteristics in three stages: First, we leveraged data from a community-based observational study, which had been co-designed

with the DBE prior to conceptualisation of the Policy. This sample – the largest of its kind – allows the testing of multiple potential protective provisions available to adolescent mothers and evaluate their combined impact. Second, we reviewed the literature for evidence on key services that have shown associations with improved schooling for adolescent mothers in South Africa to test their synergy effects with the variables outlined in the Policy. Third, we refined the analyses based on feedback from DBE consultations, and conversations with experts in the field and adolescent mothers themselves.

Methods

Participants and procedures

Data for this study were collected as part of a cohort study of adolescent mothers and their children residing in the Eastern Cape province of South Africa ($N = 1,046$). Adolescent and young mothers (aged 10–24) living in urban, peri-urban, and rural locations were recruited between 2017 and 2019. Six parallel sampling strategies were deployed and involved recruitment via health facilities ($n = 73$), randomly selected quintile 1–3 secondary schools ($n = 43$), maternity obstetric units ($n = 9$), service provider referrals, door-to-door community recruitment, and adopted snowball sampling by seeking referrals from adolescent mothers themselves. All participating girls and young women had their first pregnancy before the age of 20. Our inclusion criteria therefore align with the World Health Organization definition of ‘adolescence’ (World Health Organization, 1998) and describes an adolescent pregnancy as the occurrence of a pregnancy among girls and young women at the age of 19 or below. The period of time since the mothers gave birth varied among participants: some mothers completed the interviews a few months postpartum whilst several years had passed for others. Informed consent was sought from adolescents who were above the age of 18 and assent was provided by underage participants in addition to consent from their adult caregiver. All consent forms and questionnaires were available in English and isiXhosa.

Ethical approval was provided by the University of Oxford and the University of Cape Town (R48876/RE001; R48876/RE002; HREC REF: 226/2017), and the Eastern Cape Provincial Departments of Health, Basic Education, and Social Development. Participants were interviewed in private spaces in and around their own home, but they were given the option to conduct the interview in a local restaurant if the privacy in the home was compromised.

Assisted by trained interviewers, adolescents completed two complementary questionnaires, each taking about 60 min. Confidentiality was maintained throughout the study except where participants requested help or were at risk of significant harm. In this study, 25 referrals were made to health or counselling services with follow-up support. There were no monetary incentives, but all participants received a certificate, refreshments, and a participant pack containing useful items (e.g. washcloth and soap).

Measures

Policy-aligned goals

Based on the DBE policy goals, and our available data, we chose three outcomes: (1) School return after birth was assessed by one binary item which captured whether the adolescent mother returned to school after the birth of their first-born child; (2) Grade promotion was defined in alignment with South Africa’s Promotion and Progression Policy (Department of Basic Education, 2012) and assessed with one binary item which assessed whether mothers who had not already completed primary and secondary education had passed a grade in the year prior to the data collection; (3) Pregnancy/HIV prevention was assessed by one binary item which captured that the participant practised safe sex (i.e. condom use) during their last

sexual experience. This variable was chosen to capture both preventing pregnancies as well as the transmission of HIV.

Policy-aligned provisions and protective characteristics

Seven potential services, following the guiding principles of the Policy, were tested: (1) Friendly and respectful health staff was assessed by a series of items, co-developed with young people during piloting, which captured how adolescent mothers were treated when they visited clinics (e.g. ashamed, scared, worried) and their experiences with staff when using health services to access contraception (e.g. unhelpful, too busy, angry). We conducted a factor analysis of all 19 items and calculated a composite score of the final 13 items with the highest factor loadings to capture this construct (final scale range between 0 and 13); (2) Antenatal care services was assessed by two items which captured the timing of the first antenatal appointment during the pregnancy and how many visits were attended during the pregnancy, respectively. A final binary item was coded as '1' if participants had their first antenatal care appointment for the first-born child within the first trimester and received at least five visits throughout their pregnancy; (3) Formal childcare use was assessed for each child. The final item for the analyses captured formal childcare use of the first-born child in each family (0 = *Not enrolled in formal childcare services*; 1 = *Enrolled in formal childcare*). The item focussing on the oldest child was chosen (over the use of formal childcare use for all children within a family) to ease the interpretation of all outcomes; (4) Confidence and self-efficacy was assessed by four items capturing self-efficacy (e.g. I can achieve my goals) and four items assessing positive attitudes towards the future (e.g. I will have a good job). After determining the psychometric properties, sum scores were calculated to create a final continuous scale (final scale range between 0 and 24); (5) School attendance during pregnancy was assessed by one item assessing how long adolescent mothers continued to stay in school during the pregnancy. A final binary item was calculated for the analyses (0 = *Dropped out of school any time before the 8th month*; 1 = *Stayed in school until the 8th month*); (6) Child support grant receipt was assessed by items assessing the recipient of the child support grant for the first-born child as well as the child's age when the start of the grant receipt. One final binary item was created to capture receipt child support grant for the oldest child in the family; (7) Community-based collaborations and support was assessed by one item which captured if the participant had any interaction with local organizations, community-health workers, or social workers.

Covariates

Thirteen sociodemographic covariates were included in all analyses. They comprised participants' age at pregnancy of the oldest child, age at the time of the interview, child age, being the primary caregiver of the child, HIV status, rural/urban residency, orphanhood (maternal or paternal), poverty (living in informal housing and past-week food insecurity), distance to school, household size, number of children per adolescent mother, and grade delay at the onset of the pregnancy.

Statistical analyses

Participants were eligible for inclusion in the analysis if they had not already completed secondary school at the onset of the pregnancy or throughout pregnancy (49 participants were excluded based on this criteria). An additional 12 participants were excluded from the analyses because they had not received all relevant questions on schooling. Mothers whose first-born child was younger than four months were also excluded from the analyses ($n = 133$). The final analyses were based on 851 participants.

Analyses were completed in STATA 15.1 and took place in five steps used in previous papers (Cluver, Rudgard et al., 2020). First, we determined frequency distributions for all outcomes,

hypothesized protective factors and covariates. Where possible, we also investigated the differences between eligible participants included in the analyses and those excluded for sociodemographic characteristics using χ^2 tests and t-tests as appropriate. Second, we calculated correlations between the seven hypothesized protective variables to gain a better understanding of their associations with each other. Third, we evaluated univariable associations between the services and all outcomes. Fourth, we tested associations of services with all outcomes. For this, we used a multivariate multi-level analysis which simultaneously estimated the effects on all three Policy-aligned outcomes, controlling for sociodemographic variables. Using the xtgee command, the analyses account for within-individual clustering of the outcomes by allowing for correlated residuals and, therefore, provide a superior approach than estimating each outcome in a separate regression model. Fifth, we estimated adjusted probabilities and marginal effects for those services which showed associations the assessed outcomes for three scenarios: (1) no exposure to any of the identified services; (2) exposure to only one of the assessed services; and (3) experiencing all services simultaneously.

Results

Descriptive data

Table 1 shows that the average age of participating adolescent mothers was 18.4 years (*SD* 1.8) at the time of the interview, and the mean age at birth of the first child was 16.6 years (*SD* 1.7). The first-born children were on average two years old (*SD* 1.7). One in eleven adolescent mothers had had multiple births. Nearly one third of participants lived in rural communities and a quarter resided in informal housing. Just under 30% of adolescent mothers in the sample were living with HIV. About 40% of participants indicated being either maternally or paternally orphaned, but the majority of adolescent mothers (91%) continued to live with a caregiver (either the biological parent or another

Table 1. Characteristics of study participants.

	Total <i>N</i> = 851 %(<i>n</i>); <i>M</i> (<i>SD</i>)
Sociodemographic characteristics	
Age at first pregnancy, years	16.6 (1.7)
Current age, years	18.4 (1.8)
First-born child age, years	2.0 (1.7)
Living with HIV	29.85% (254)
Adolescent mother lives with their caregiver	90.83% (773)
Rural residency	29.96% (255)
Orphanhood (maternal or paternal)	40.07% (341)
Food security	69.10% (588)
Informal housing	22.41% (186)
Household size	6.3 (2.7)
Adolescent mother is the primary caregiver	92.13% (784)
Adolescent mothers with more than one child	9.75% (83)
Grade delay preceding the pregnancy	51.70% (440)
Policy-aligned provisions and protective characteristics	
Friendly and respectful health staff	3.9 (1.3)
Antenatal care services	35.96% (306)
Formal childcare use	31.29% (266)
Confidence and self-efficacy	20.60 (3.48)
School attendance during pregnancy	74.90% (576)
Child support grant receipt	95.96% (688)
Community-based collaborations and support	1.18% (10)
Selected policy-aligned outcomes	
School return	68.20% (562)
Grade advancement	50.75% (406)
Pregnancy/HIV prevention	59.60% (503)

Table 2. Correlations between proposed provisions and protective characteristics.

	1.	2.	3.	4.	5.	6.	7.
1. Friendly and respectful health staff	–						
2. Antenatal care services	–.042	–					
3. Formal childcare use	.076*	–.026	–				
4. Confidence and self-efficacy	.174*	.027	.128*	–			
5. School attendance during pregnancy	–.022	.111	.088	.057	–		
6. Child support grant receipt	–.086*	–.152	.276*	–.035	.19	–	
7. Community-based collaborations and support	–.006	–.091	.080	.050	.13	–.271	–

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

adult caregiver). Receipt of the child support grant was notably high at almost 96%, which led us to interpret the results on this variable with caution. Table 2 shows correlations between all proposed provisions and protective characteristics, showing moderately significant correlations between friendly health staff and formal childcare use and other hypothesized provision variables, respectively. However, the strength of the correlations give no concern for multicollinearity (Cohen et al, 2002).

Multivariable associations between policy-aligned outcomes for adolescent mothers and hypothesized provisions and protective characteristics

Of the seven hypothesized service variables, four were significantly associated with higher likelihood of at least one outcome (Table 3). First, higher odds of school return were associated with using formal childcare services (AOR: 3.07. 95% CI 1.72–5.46, $p < .001$), higher confidence and self-efficacy (AOR: 1.09, 95% CI 1.01–1.17, $p = .020$), and school attendance during pregnancy (AOR: 7.05, 95% CI 4.33–11.47, $p < .001$). Second, higher odds of grade promotion were associated with greater scores of exposure to friendly and respectful health staff (AOR: 1.25 95% CI 1.08–1.46, $p = .004$), using formal childcare services (AOR: 1.61. 95% CI 1.02–2.51, $p = .038$), higher

Table 3. Multivariable associations between hypothesized provisions and protective characteristics and outcomes for adolescent mothers.

	Adjusted Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]	
School return						
Friendly and respectful health staff	0.96	0.08	−0.41	.678	0.81	1.15
Antenatal care services	1.04	0.24	0.17	.866	0.66	1.65
Formal childcare use	3.07	0.90	3.81	.000	1.72	5.46
Confidence and self-efficacy	1.09	0.04	2.32	.020	1.01	1.17
School attendance during pregnancy	7.05	1.75	7.86	.000	4.33	11.47
Child support grant receipt	0.33	0.21	−1.72	.085	0.09	1.17
Community-based collaborations and support	0.98	1.14	−0.02	.983	0.09	9.71
Grade promotion						
Friendly and respectful health staff	1.25	0.09	2.92	.004	1.08	1.46
Antenatal care services	1.22	0.24	0.99	.320	0.83	1.79
Formal childcare use	1.61	0.37	2.08	.038	1.02	2.51
Confidence and self-efficacy	1.07	0.03	2.18	.029	1.01	1.14
School attendance during pregnancy	2.69	0.62	4.30	.000	1.71	4.23
Child support grant receipt	1.33	0.64	0.58	.559	0.51	3.42
Community-based collaborations and support	0.69	0.58	−0.43	.666	0.12	3.61
Pregnancy/HIV prevention						
Friendly and respectful health staff	1.14	0.08	1.92	.054	0.99	1.31
Antenatal care services	0.79	0.14	−1.35	.178	0.56	1.11
Formal childcare use	1.33	0.27	1.43	.152	0.89	1.97
Confidence and self-efficacy	0.96	0.03	−1.42	.155	0.91	1.02
School attendance during pregnancy	1.09	0.23	0.40	.693	0.72	1.65
Child support grant receipt	0.69	0.31	−0.81	.417	0.30	1.67
Community-based collaborations and support	0.49	0.39	−0.88	.381	0.10	2.39

confidence and self-efficacy (AOR: 1.07, 95% CI 1.01–1.14, $p = .029$), and school attendance during pregnancy (AOR: 2.69, 95% CI 1.71–4.23, $p < .001$). Third, higher odds of pregnancy/HIV prevention were moderately associated with greater scores of exposure to friendly and respectful health staff (AOR: 1.14, 95% CI 0.99–1.31, $p = .054$).

Adjusted probabilities of adolescent mother outcomes comparing access and lack of access to provisions and protective characteristics

Table 4 shows that the adjusted probability for each policy goal was estimated to be higher for a scenario in which participants receive all of the identified provisions and protective services versus none. Without any services, the adjusted probability of school return was 39.72%, whereas with all four services it was 92.09% (ARD: 52.37%points; 95%CI 41.16 to 63.60, $p < .001$). Without any services, the adjusted probability of grade promotion was 36.62%, whereas with all four services it was 78.67% (ARD: 42.06%points; 95%CI 30.20 to 53.92, $p < .001$). Without any services, the adjusted probability of pregnancy/HIV prevention was 55.22%, whereas with all four services it was 66.76% (ARD: 11.54%points; 95%CI –2.35 to 25.44, $p = .103$). Please see Appendix 1 for adjusted probabilities of the outcomes only for those provisions and protective characteristics with significant odds ratios.

Discussion

The present study set out to provide much-needed evidence on the associations between hypothesized provisions and protective characteristics to improve school outcomes whilst preventing further pregnancies among adolescent mothers. Our findings suggest that South Africa's Policy on 'Learner Pregnancy Prevention and Management in Schools' includes highly promising ingredients to boost positive health and education outcomes for adolescent mothers. Among the selected policy-aligned goals and identified key provisions and protective characteristics from the literature that were tested, we identified that improved outcomes across education and pregnancy/HIV prevention could be influenced by the receipt of friendly and respectful health staff, school attendance during pregnancy, strengthening or improving confidence and self-efficacy, and the use of formal

Table 4. Summary of adjusted probabilities and probability differences for policy-aligned outcomes.

	Exposure versus no exposure	
	Adjusted probability	Adjusted probability difference
School return		
No services	39.72 [30.55–48.88]	–
Friendly and respectful health staff	38.21 [26.42–49.99]	–1.50 [–8.56–5.56]
Formal childcare use	63.04 [51.71–74.37]	23.32 [11.61–35.04]***
Confidence and self-efficacy	45.60 [35.05–56.16]	5.89 [0.83–10.95]*
School attendance during pregnancy	77.75 [73.21–82.28]	38.03 [28.28–47.78]***
All services	92.09 [87.78–96.40]	52.37 [41.16–63.60]***
Grade promotion		
No services	36.62 [28.26–44.97]	–
Friendly and respectful health staff	46.28 [35.27–47.28]	9.66 [3.07–16.24]**
Formal childcare use	46.53 [35.66–57.39]	9.91 [0.60–19.21]*
Confidence and self-efficacy	41.34 [31.65–51.04]	4.73 [0.40–9.06]*
School attendance during pregnancy	57.52 [52.06–62.98]	20.90 [11.51–30.30]***
All services	78.67 [71.78–85.57]	42.06 [30.20–53.92]***
Pregnancy/HIV prevention		
No services	55.22 [46.19–64.24]	–
Friendly and respectful health staff	61.56 [50.63–72.49]	6.34 [0.01–12.67]*
Formal childcare use	61.96 [51.51–72.41]	6.74 [–2.37–15.86]
Confidence and self-efficacy	67.91 [56.54–79.28]	–3.34 [–7.97–1.27]
School attendance during pregnancy	57.25 [51.69–62.81]	2.03 [–7.93–11.99]
All services	66.76 [57.62–75.90]	11.54 [–2.35–25.44]

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

childcare services. Furthermore, we provide evidence for the synergies of services whereby a combination of multiple provisions or protective factors showed larger positive effects on the outcomes compared to use of any single factor. For example, access to formal childcare alongside continued school attendance during pregnancy and confidence building showed much higher probabilities for school return than childcare use alone. A participatory study with young research advisors in the Eastern Cape (Cluver et al., 2021) similarly identified the importance of school-directed systems of support and constellations of responsive community-based services for learners, from early pregnancy through early motherhood; advisors also identified childcare as critical for returning to school and securing future goals (Coakley et al., *In preparation*).

Evidence towards a cost-effective support package for adolescent mothers

Supporting school re-enrolment, avoiding further grade-delay following childbirth, and reducing repeat pregnancies is necessary for the long-term health and wellbeing of both adolescent mothers and their children (Balmer et al., 1997; Branson, 2018; Branson et al., 2019; Davies et al., 2018; Freudenberg & Ruglis, 2007; Huebener, 2019; Khatun et al., 2017; Lansford et al., 2016; Mensch et al., 2019; Psacharopoulos & Patrinos, 2018). Internationally, promising programmes exist to improve school achievement, contraception use, and healthy birth spacing (Harding et al., 2020), even though very few interventions successfully improve outcomes across both education and pregnancy prevention (e.g. McDonnell et al., 2007). To our knowledge, this study provides the first evidence on which protective factors may be targeted to support these outcomes among adolescent mothers in South Africa. Beyond pointing to the potential of service components within the Policy, we also provide evidence in favour of a care package which contains a set of complementing services to address educational outcomes and prevent further pregnancies. Of note is that most of the identified protective characteristics can be integrated into already existing services, rendering a potential service package cost-effective. For example, in our study, the use of formal childcare services was reported to cost an average of about \$9 per month (ZAR 154 per month, with a maximum of ZAR1500). The strength of our findings lies in the approach to empirically test select components of South Africa's Policy within a real-world sample which was already exposed to some of these services and provisions to various degrees. The present observational results provide an important first step to guide the implementation of the Policy, even though causal evidence to interrogate the Policy-aligned provisions is desirable to further interrogate the validity of our findings.

Extending or establishing novel structures of support

It remains important to carefully consider how our findings fall under the remit of the Department of Basic Education and acknowledge the resource-constraints that affect the translations of policies into services in sub-Saharan Africa. Some of these policies would be at no or minimal additional cost – for example allowing adolescent girls to remain in school during pregnancy. Extending existing support structures and school-based programmes might be a feasible possibility to ensure that pregnant learners have access to the services they need. Our findings point to the services that might require strengthening to realise the Policy goals, such as School-Based Support Teams and their ability to ensure girls' continued school attendance, or remote learning, over the course of the pregnancy. At the same time, our findings speak to potentially important cross-sectoral liaison and the 'linkages of learners to care' outlined in the Policy to foster routes of access to essential provisions. For instance, ensuring that pregnant adolescents can easily attain medical certificates that allow them to remain in school for as long as possible may be beneficial to their post-pregnancy schooling. Here, our findings also point to the importance of strengthening the Policy alignment with the Integrated School Health Policy and Adolescent and Youth Health Policy which remain the main frameworks to support some identified provisions, such as contraception update and youth-friendly services.

Limitations and strengths of the study

The present study has several limitations. First, we were unable to examine some policy components (e.g. the impact of pregnancy-related bullying) that likely affect girls' school enrolment. At the same time, we did examine additional variables (e.g. formal childcare use) covered in the broader approach of the Policy, which are also emerging as key resources for adolescent mothers within the international literature (e.g. Assini-Meytin et al., 2018). Second, our analyses relied on cross-sectional observational data and, despite being mindful of the temporal sequence of events, bi-directionality is possible. Third, the present data does not capture all adolescents' final achievements in school, even though it is known that adolescent mothers in South Africa continue to catch up on their schooling until the age of 23 (Kakal, 2015; Madhavan & Thomas, 2005; Marteleto et al., 2008). Fourth, our outcome for pregnancy prevention did not assess multiparity, and future research needs to explore the link between contraception use, assessed in this study, and repeat pregnancies. Contraception use and repeat pregnancy are often targeted by disparate services (Harding et al., 2020) and our analyses did not examine whether using methods to prevent pregnancies was associated with reduced repeat pregnancies.

Despite these limitations, strengths of this study lie in the success of the sampling strategy to recruit hard-to-reach adolescents and adolescents who are engaged and not engaged in services. Across all sampling methods, we managed to reach adolescent mothers from approximately 100 different schools within quintiles 1–3, as well as those not in school. Overall, the study is likely to have good generalisability to adolescent mothers living in low-resource settings in South Africa, even though the Eastern Cape might have comparably poor provisions of health, social, and educational services (Morris-Paxton et al., 2020). In addition, the analyses were completed in collaboration with colleagues from the National Department of Basic Education, and adolescent mothers themselves, who provided input on the operationalisation, practicality, and relevance of the examined variables.

Identifying service synergies that improve multiple outcomes

Increasingly, studies are discovering the beneficial effects of being exposed to multiple protective factors or services simultaneously to improve important human development outcomes (Cluver et al., 2019). The current study adds to this growing body of evidence, showing the potential benefits of service synergies to achieve improvements for adolescent mothers across domains, with particularly strong effects on educational outcomes. Especially in resource-limited environments where the experimental evidence on support programmes for adolescent mothers' remains scarce, quasi-experimental research remains crucial for guiding programming aimed at adolescent parents. Future analyses should examine which programme characteristics and implementation strategies increase the effectiveness of interventions. More evidence is also needed from diverse contexts on delivery modes, and specific content or length and frequencies of interventions. Studies need to determine whether there is an ideal timing for these interventions, assess the optimum number of services in terms of cost-effectiveness and examine how differing contexts may impact the relationship between provisions and outcomes. Previous research suggests that programmes focussing on only one domain, either education or health, might be more effective than joint programmes (Harding et al., 2020). Even though our results showed stronger associations between the examined provisions and educational outcomes and few services affected outcomes across domains (e.g. childcare and continued enrolment during pregnancy was only associated with improved school outcomes), our results indicate that combination of services, combined in a care package, could be successful to address multiple domains. Finally, receipt of the child support grant has important benefits for children (Department of Social Development, SASSA, & UNICEF, 2012), but the high prevalence of its receipt in our current sample may have made it difficult to detect an effect. Studies from other countries where the access to grants shows higher variability than in South Africa will be helpful to further interrogate the effect for the outcomes of adolescent mothers.

Conclusion

There are an increasing number of calls for gender-transformative policies within education systems (The Global Partnership for Education, 2017; UNICEF, 2021), and it will remain important to ensure their grounding in strong evidence. The recently launched Policy by the Department of Basic Education introduces an important vision to support pregnant learners and learners with children in their continued schooling. Our findings highlight the potential of this Policy to improve adolescent mothers' outcomes, particularly in the educational domain. Given the persistent absence of adolescent mothers in global development agendas, it will become more important for countries – especially those with higher adolescent birth rates – to develop deliberate and targeted strategies to support this group.

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Data sharing and accessibility

Prospective users, policymakers/government agencies/researchers (internal/external) will be required to contact the study team to discuss and plan the use of data. Research data will be available on request subject to participant consent and having completed all necessary documentation. All data requests should be sent to the Principal Investigator.

Disclosure statement

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Appendix 1. Summary of adjusted probabilities and probability differences for policy-aligned outcomes.

	Exposure versus no exposure	
	Adjusted probability	Probability difference
School return		
No services	39.72 [30.56–48.88]	–
Formal childcare use	63.03 [51.71–74.35]	23.30 [11.61–35.00]***
Confidence and self-efficacy	45.61 [35.06–56.16]	5.88 [0.84–10.93]*
School attendance during pregnancy	77.72 [73.19–82.26]	38.00 [28.26–47.74]***
All services	92.56 [88.85–96.27]	52.84 [41.80–63.87]***
Grade promotion		
No services	36.62 [28.26–44.97]	–
Friendly and respectful health staff	46.28 [35.27–57.28]	9.66 [3.07–16.24]**
Formal childcare use	46.53 [35.66–57.36]	9.91 [0.60–19.21]*
Confidence and self-efficacy	41.34 [31.65–51.04]	4.73 [0.40–9.06]*
School attendance during pregnancy	57.52 [52.06–62.98]	20.90 [11.51–30.30]***
All services	78.67 [71.78–85.57]	42.06 [30.20–53.92]***
Pregnancy/HIV prevention		
No services	77.36 [66.67–88.05]	–
Friendly and respectful health staff	84.28 [72.19–96.39]	6.91 [5.22–8.62]***

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.