

# Physical Activity in Pregnancy: Beliefs, Benefits, and Information-Seeking Practices of Pregnant Women in South Africa

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**Background:** Notwithstanding the benefits of physical activity (PA) during pregnancy, anecdotal evidence suggests ignorance, unscientific beliefs, and lack of awareness about PA among pregnant South African women.

**Aim:** This study examined the beliefs, perceived benefits, and sources of information on PA during pregnancy.

**Methods:** A cross-sectional descriptive study was employed between June and September 2019 using an interviewer-administered questionnaire with 1,082 pregnant women. These women were attending antenatal primary health-care clinics in Buffalo City, Eastern Cape, South Africa. A self-designed questionnaire solicited information on beliefs, benefits, and sources of information regarding PA during pregnancy.

**Results:** A majority of the participants held positive beliefs concerning PA during pregnancy. They maintained that PA was safe for mother and fetus, improved labor and delivery (93.1%), promoted energy (89.0%), and should be discontinued when tired (76.6%). Most held negative convictions that PA during pregnancy increased body temperature (64.5%) and that pregnancy was a time to rest and refrain from PA (56.5%). Predominant sources of information received about PA during pregnancy were television, the radio, and other media (70.2%). Most participants were aware of the benefits of PA during pregnancy — reduction in infant weight (61.4%), lessening of moodiness (90.4%), and decreased risk of gestational diabetes mellitus (92.9%), pregnancy-induced hypertension (92.5%), and complications at birth (97.8%), while common negative perceptions included musculoskeletal discomfort (82.7%), and back pain (85.7%). An overwhelming majority affirmed that PA improved self-image (95.7%), sleep patterns (94.2%), and respiratory function (95.8%).

**Conclusion:** Our findings suggested that women hold positive beliefs and perceive PA as beneficial to their health and the baby; however, they received most of their information from the Internet. Most women regarded pregnancy as a period to relax and rest. Interventions to promote PA during pregnancy are needed.

**Keywords:** physical activity, beliefs, perceived benefits, sources of information, pregnancy

## Introduction

Historically, physical activity participation in pregnant women was frowned upon and discouraged. However, scientific evidence has proven that physical activity in pregnancy is beneficial for the mother and her unborn child. Benefits include reduced risk of excessive gestational weight gain,<sup>1–4</sup> gestational diabetes,<sup>1,5,6</sup> and preeclampsia.<sup>7–10</sup> Physically active pregnant women have lower rates of preterm birth, altered fetal growth,<sup>11,12</sup> miscarriage,<sup>13</sup> prolonged cesarean section and

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postpartum recovery,<sup>14–16</sup> and risk of injury for both mother and baby.<sup>2</sup> These findings reflect a confirmation of the safety of prenatal physical activity and help to clarify beliefs and misconceptions held by some individuals that physical activity during pregnancy is harmful to the baby. Moreover, physical activity during pregnancy improves the sleep of the mother.<sup>17,18</sup> Other benefits include reduced length of labor, delivery complications,<sup>19</sup> birth weight,<sup>12</sup> fatigue, stress, anxiety, depression,<sup>13,20–23</sup> and low-back pain.<sup>7,9,24</sup> A recent study showed that physical activity during pregnancy was associated with improved breastfeeding outcomes.<sup>25</sup> With these benefits, the guidelines recommend that pregnant women engage in physical activity.<sup>26</sup> However, low prenatal physical activity is shaped by multiple factors at play in sociocultural, economic, political, and environmental contexts in different settings across countries.

The literature abounds with the manifold benefits of prenatal physical activity for maternal and fetal health;<sup>27</sup> therefore, determining beliefs about prenatal physical activity will provide useful information to inform the development of successful and appropriate intervention strategies.<sup>28</sup> However, beliefs and attitudes of women toward prenatal physical activity varies among cultures,<sup>29</sup> and understanding these variations across different cultures and settings is important to tailor context-specific physical activity interventions to promote optimal physical activity participation during pregnancy. In addition, providing pregnant women with accurate and sufficient advice on the type and prescription of physical activity during pregnancy might influence their attitude in terms of initiating and engaging in physical activity. Understanding where women get advice on physical activity during pregnancy and what advice they act upon is necessary for improving the health-care support already in place.<sup>30</sup> Physical activity plays a significant role in maternal health; therefore, creating awareness of its benefits and contraindications may change women's negative attitudes toward physical activity and promote it for better maternal outcomes, which might decrease the burden of preventable pregnancy-related conditions on the health-care system.<sup>31</sup>

There is a dearth of research on physical activity in pregnancy in South Africa. Specifically, research seeking to understand beliefs about, sources of information, and perceived benefits of physical activity during pregnancy is lacking. The only known study involved a small, homogeneous sample of urbanized black South African women and did not represent other races, cultures, or

communities.<sup>32</sup> Therefore, the present study aimed to examine the beliefs about and perceived benefits of physical activity during pregnancy, and to identify sources of information on physical activity among a diverse pregnant South African women attending antenatal health facilities in Eastern Cape province.

## Methods

### Design and Setting

This cross-sectional study was conducted on 1,082 pregnant women from June to September 2019 at 12 randomly selected primary health-care clinics offering antenatal health services in Buffalo City, Eastern Cape province. Buffalo City is one of four municipalities within Eastern Cape, and is located on the east coast of the Province. It has a population of 884,000, with women constituting around 48.01%. Eastern Cape is economically one of the poorest provinces in South Africa.<sup>33</sup> The municipality has two provincial hospitals two district hospitals, five community health centers, 72 primary-health clinics, and 12 mobile health services.<sup>33</sup> Antenatal health-care services are free for all women attending the community health centers and primary-health clinics. On average, these health centers register five to six newly pregnant women per day. An estimated 17,000 pregnant women visit the 12 selected primary-health clinics for antenatal services annually. The 72 primary-health centers were numbered, and using random number-generator software 12 centers were selected.

### Sample-Size Determination and Sampling Procedure

Sarmah et al<sup>34</sup> formulae was applied to calculate the sample size at a confidence level of 95%±3%, and with physical activity or exercise participation during pregnancy of 50% ( $p=0.5$ ):

$$p = 0.5, \text{ hence } q = 1 - 0.5 = 0.5; e = 0.03, \text{ and } z = 1.96,$$

$$\text{so } n_0 = \frac{(1.96)^2(0.5)(0.5)}{(0.3)^2} = 1067 = 1067$$

At a 10% nonresponse rate, the final sample size was 1,215 women, accounting for possible attrition and data loss.

Participants were convenience-selected by the principal investigator during antenatal visits. Eligibility criteria were age: 18 years or older, receiving antenatal care, single pregnancy (not multiple), and ability to read or understand Xhosa, Afrikaans, or English. Conversely, women with

disabilities or preexisting health conditions limiting prenatal activity at the time of recruitment or with one or more contraindications for physical activity (severe chest pain, persistent shortness of breath, and vaginal bleeding) were excluded. Participants were interviewed in a quiet room provided by the facility manager.

## Data Collection

Data were collected using an interview-administered questionnaire between July and October 2019. The questionnaire was interview-administered in order to maximize accuracy and ensure completeness of information from the participants. It focused on socio-demographic, obstetric, maternal, and lifestyle characteristics. Demographic variables comprised age (<19, 19–34, >34 years), residence (rural, semiurban, urban), ethnicity (black, colored), marital status (married, single, cohabiting), education (primary, secondary, tertiary), employment status (unemployed, employed), religion (Christian, other), and family support (adequate, moderate, none). Behavioral and lifestyle characteristics included current exposure to alcohol and smoking. Women were categorized as smokers if smoking cigarettes during pregnancy and nonsmokers if not smoking. Women who reported any alcohol use during pregnancy were classified as drinkers, while ‘nondrinkers’ were women reporting no drinking. Information on parity (nulliparous, primiparous, multiparous), mode of delivery (vaginal, cesarean section or both), and pregravid body-mass index (low <19.8, normal (19.8–<26), overweight 26–<30) was obtained from antenatal medical records. In addition, we solicited information on antepartum hemorrhage in their first trimester, perceived health in pregnancy (very good, good, bad) presence of any chronic illness, prenatal physical activity advice received from health professionals, and whether they engaged in physical activity before pregnancy.

Outcome measures were beliefs, benefits, and information-seeking practices of pregnant women about physical activity and exercise during the pregnancy questionnaire, which was developed based on information in the literature.<sup>35–37</sup> Women completed the questionnaire while waiting for their antenatal appointments. The questionnaire contained 19 items on beliefs on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), and the questionnaire on perceived benefits of physical activity during pregnancy contained 17 item statements on a 5-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Finally, participants

indicated sources of information (friends, family, other women, health professionals, social media, television, radio, books, newspapers, magazines, other) on physical activity during pregnancy with the response options “often, rarely, and never”.

The content and face validity of the questionnaire was ascertained by two experts in the field and revisions made. In addition, it was pilot-tested with 20 pregnant women to establish whether the questions seemed clear and concise to the participants. Samples from the pilot study were excluded from the main study. Additional revisions pertaining to wording were made to ensure clarity. The estimated Cronbach’s  $\alpha$  was 0.69.

## Data Analysis

Data were analyzed using descriptive statistics, ie, frequency and percentage. Statistical analysis was conducted using SPSS 23.0 for Windows.

## Results

Participants’ mean age was  $27.0 \pm 6.2$  years. A vast majority of women were aged 19–34 years (75.1%), living in an urban location (48.3%), black (86.4%), had never married (66.3%), with secondary education (74.2%), unemployed (67.7%), Christian (89.1%), and had family support (77.4%). Nulliparous women comprised 47.8% of participants, 93.6% had had antepartum hemorrhage, 42.% vaginal, and 49.7% both vaginal and Cesarean section deliveries, perceived their health as good (59.3%), had no chronic illness (93.5%), did not smoke (91.7%) or drink alcohol (86.4%), and had normal pregravid body-mass index (84.0%). A majority had not received any physical activity advice or counseling (65.1%) and never participated in physical activity (69.6%) during pregnancy (Table 1).

## Physical Activity and Exercise Beliefs

Key beliefs of participants concerning physical activity during pregnancy are presented in Table 2. These were mostly positive. For instance, 77.6% of participants disagreed and strongly disagreed with the statement that physical activity was not safe for the mother or fetus, reduced placental circulation (66.7%), could lead to abortion or miscarriage, preterm birth, and intrauterine growth retardation (75.1%), and was harmful (64.9%). A majority affirmed pregnant women should not exercise while lying on their back (75.5%) and held the view that standing in one place for a long time without

**Table 1** Sociodemographic, Obstetric, and Lifestyle Characteristics of Participants

	n (%)
<b>Age (years)</b>	
<19	118 (10.9)
19–34	812 (75.1)
>34	152 (14.0)
<b>Residence</b>	
Rural	118 (10.9)
Semiurban	441 (40.8)
Urban	523 (48.3)
<b>Ethnicity</b>	
Black	935 (86.4)
Colored	147 (13.6)
<b>Marital status</b>	
Married	236 (21.8)
Never married	717 (66.3)
Cohabiting	129 (11.9)
<b>Education</b>	
Primary	84 (7.8)
Secondary	803 (74.2)
Tertiary	195 (18.0)
<b>Employment</b>	
Unemployed	733 (67.7)
Employed	349 (32.3)
<b>Religion</b>	
Christian	964 (89.1)
Other	118 (10.9)
<b>Family support</b>	
Adequate	837 (77.4)
Moderate	223 (20.6)
None	22 (2.0)
<b>Parity</b>	
Nulliparous	517 (47.8)
Primiparous	322 (29.8)
Multiparous	243 (22.4)
<b>Delivery mode</b>	
Vaginal	457 (42.2)
Cesarean section	87 (8.1)
Both	538 (49.7)
<b>Antepartum hemorrhage</b>	
Yes	69 (6.4)
No	1013 (93.6)
<b>Perceived health</b>	
Very good	440 (40.7)
Good	631 (58.3)
Bad	11 (1.0)

(Continued)

**Table 1** (Continued).

	n (%)
<b>Smoking status</b>	
Yes	90 (8.3)
No	992 (91.7)
<b>Alcohol use</b>	
Yes	147 (13.6)
No	935 (86.4)
<b>Pregravid body-mass index (kg/m<sup>2</sup>)</b>	
Underweight (<18.5)	22 (2.0)
Normal weight (18.5–24.9)	917 (84.8)
Overweight (25.0–29.9)	143 (13.2)
<b>Planned pregnancy</b>	
Yes	351 (32.4)
No	731 (67.6)
<b>Physical activity advice</b>	
Yes	382 (35.3)
No	700 (64.7)
<b>Physical activity before pregnancy</b>	
Yes	378 (34.9)
No	704 (65.1)
<b>Physical activity timing</b>	
First trimester	188 (17.4)
Second trimester	114 (10.5)
Third trimester	27 (2.5)
Never	753 (69.6)

moving was not advisable in pregnancy (94.0%). Most pregnant women had a negative conviction that participation in physical activity during pregnancy increased body temperature (64.5%). Most participants did not support the notion that physical activity increased the risk of maternal musculoskeletal injuries and diversion of maternal oxygen and nutrients to skeletal muscle, rather than to the fetus (51.6%). However, a majority held positive beliefs: regular physical activity during pregnancy is permissible (87.4%), women not previously engaging in exercise can commence exercise during pregnancy (81.0%), and exercise improves labor and delivery (93.1%) and the health of the baby (93.1%) and promotes energy (89.0%). Interestingly, a majority held the positive view that it is not recommended to continue exercising when tired (76.6%), endorsed exercise at least three times per week (85%) However, 56.5% indicated that pregnancy was a time to just rest and refrain from physical activity.

**Table 2** Beliefs About Physical Activity and Exercise During Pregnancy

	Responses				
	SA	A	N	D	SD
	n (%)	n (%)	n (%)	n (%)	n (%)
Not safe for mother or fetus	89 (8.2)	84 (7.8)	69 (6.4)	456 (42.1)	384 (35.5)
Reduces placental circulation	31 (2.9)	126 (11.6)	203 (18.8)	429 (39.6)	293 (27.1)
Leads to abortion or miscarriage, preterm birth, intrauterine growth retardation	49 (4.5)	248 (22.9)	81 (7.5)	490 (45.3)	214 (29.8)
Regular exercise during pregnancy is harmful	39 (3.6)	267 (24.7)	74 (6.8)	429 (39.7)	273 (25.2)
No exercise while lying on back during pregnancy	89 (8.2)	728 (67.3)	142 (13.1)	97 (9.0)	26 (2.4)
Avoid long periods of standing in one place without moving while pregnant	459 (42.4)	558 (51.6)	35 (3.2)	24 (2.2)	6 (0.6)
Physical activity increases body temperature	92 (8.5)	606 (56.0)	153 (14.1)	187 (17.3)	0 (0)
Physical activity increases the risk of maternal musculoskeletal injuries and diversion of maternal oxygen and nutrients to skeletal muscle, rather than to the fetus	81 (7.5)	279 (25.8)	164 (15.1)	461 (42.6)	97 (9.0)
Women can continue regular exercise during pregnancy	155 (14.3)	791 (73.1)	26 (2.4)	94 (8.7)	16 (1.5)
Women who have never exercised can begin an exercise program during pregnancy	176 (16.3)	700 (64.7)	95 (8.8)	88 (8.1)	23 (2.1)
Improves a woman's labor and delivery	214 (19.8)	793 (73.3)	32 (3.0)	38 (3.5)	5 (0.4)
Improves the health of the baby	215 (19.9)	792 (73.2)	44 (4.1)	26 (2.4)	5 (0.4)
Feel more energetic	216 (20.0)	747 (69.0)	36 (3.3)	69 (6.4)	14 (1.3)
A pregnant woman can continue to exercise even if she becomes tired	45 (4.2)	180 (16.6)	28 (2.6)	455 (42.0)	374 (34.6)
During pregnancy, regular exercise at least three times per week is better than activity done irregularly or less often	204 (18.8)	716 (66.2)	81 (7.5)	64 (5.9)	17 (1.6)
Pregnancy is a time to rest	210 (19.4)	401 (37.1)	13 (1.2)	317 (29.3)	141 (13.0)

**Abbreviations:** SA, strongly agree; A, agree; N, neutral; D, disagree; SD, strongly disagree.

## Perceived Benefits

Figure 1 presents the perceived benefits of physical activity during pregnancy. A majority of participants maintained that physical activity was beneficial in improving cardiovascular function (86.2%) and reduction in infant weight (61.4%), musculoskeletal discomfort (82.7%), back pain (85.7%), and incidence of muscle cramps and edema in lower limbs (91.3%). In addition, most indicated physical activity in pregnancy improved labor and delivery (96.9%), health of the baby (96.9%) and the mother (98.2%), and mood (90.4%). A majority affirmed that physical activity during pregnancy decreased the risk of gestational diabetes mellitus (92.9%), pregnancy-induced hypertension (92.5%), and complications at birth (97.8%). An overwhelming majority affirmed that physical activity

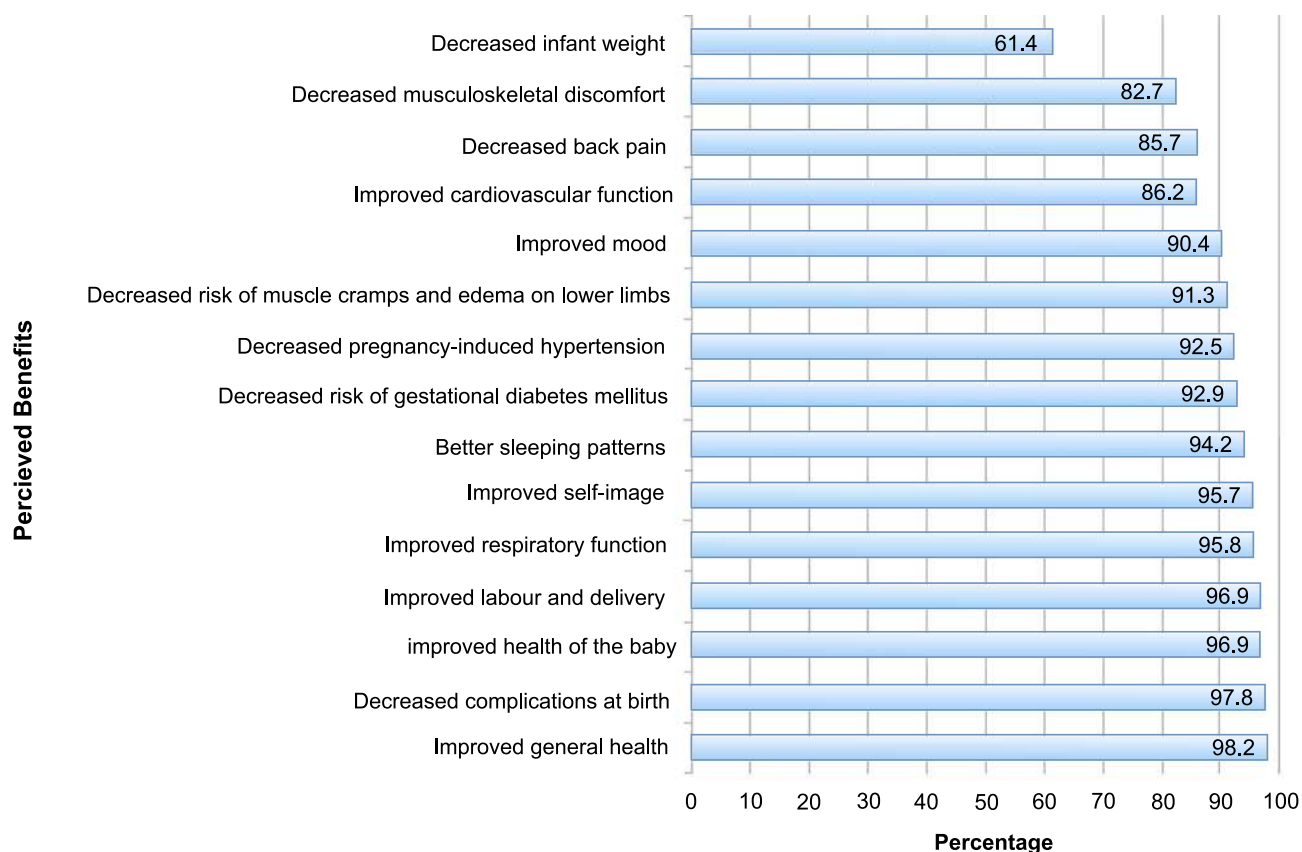
improved self-image (95.7%), sleep patterns (94.2%), and respiratory function (95.8%).

## Information Sources

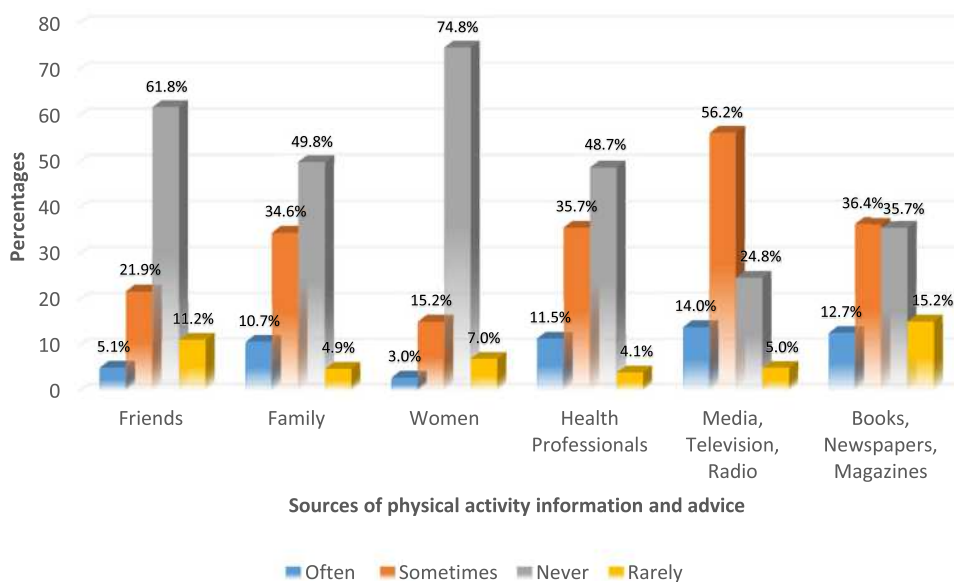
Sources of information and advice received by the participants about physical activity are shown in Figure 2: friends (27.0%), family (45.3%), other women (18.2%), health-care professionals (47.2%), and books, newspapers and magazines (49.1%). The predominant source of information they received about physical activity in pregnancy was from television, the radio, and other media (70.2%).

## Discussion

To our knowledge, this is the first study exploring the beliefs, sources of information, and perceived benefits of



**Figure 1** Perceived benefits of physical activity during pregnancy.



**Figure 2** Sources of information on physical activity.

physical activity among pregnant women in a low-income and diverse sample in Eastern Cape, South Africa. Physical activity plays an important role in maternal health; therefore, understanding beliefs, where women

get advice, and perceived benefits of physical activity during pregnancy may help in designing educational interventions to encourage, promote, and sustain physical activity among pregnant women. Our study revealed



general positive beliefs about physical activity among the women. Notably, they affirmed the physiological and psychological benefits of being physically active, alongside helping to relieve anxiety or improve mood and consequently correct negative perceptions of prenatal physical activity risk during pregnancy. An overwhelming majority held the positive beliefs that regular exercise during pregnancy was permissible (87.4%), women not previously engaging in exercise could commence exercise during pregnancy (81.0%), and that it improved labor and delivery (93.1%) and the health of the baby (93.1%), and promoted energy (89.0%), and endorsed regular exercise at least three times weekly (85%). These positive beliefs about physical activity align with a previous study in South Africa<sup>32</sup> and others elsewhere, in which pregnant women have expressed the benefits of prenatal physical activity,<sup>28,30,38,39</sup> which serves as an enabling influencer to engage in prenatal activity during pregnancy. If women are informed about the importance of physical activity during pregnancy, this will invariably challenge their traditional beliefs about pregnancy-related risk. Therefore, interventions to improve perceptions of women regarding the benefits of prenatal physical activity are crucial to promote such activity.

In contrast, 56.5% of the women in this study indicated that pregnancy was a time to rest and refrain from physical activity, which contradicts international guidelines on exercise in pregnancy. This suggests somewhat of an element of negative belief and ignorance versus positive beliefs, which is difficult to explain. Suffice it to say that the women might have had prior positive beliefs about physical activity, but seemingly did not have adequate knowledge about the benefits of physical activity during pregnancy. Studies have reported women's lack of knowledge about the benefits of physical activity during pregnancy.<sup>40,41</sup> Perhaps the belief that pregnancy is a "rest time" among women in our study could be shaped by social or cultural underpinnings, which is in itself speculative here. Further studies should endeavor to elucidate on social and cultural elements shaping physical activity beliefs with qualitative research.

Nevertheless, as with other studies, pregnant women have expressed the belief that pregnancy is a period to rest. For example, Guelfi et al<sup>29</sup> compared beliefs about exercise during pregnancy between pregnant Chinese and Australian women, and reported that the Chinese women attached more importance to the sedentary behaviors of sleeping and resting/relaxing than exercise and having an

active lifestyle. Conversely, the Australian women regarded resting/relaxing to be less important than exercise and having an active lifestyle. Other studies have reported women regarding resting and recuperation during pregnancy a priority.<sup>32,42</sup> Interventions to help disabuse women of the erroneous belief that pregnancy presents a time for resting rather than physical activity practice is needed. A potential strategy to promote awareness about prenatal physical activity is through technology-assisted programs. The MomConnect technology initiative in South Africa is a classic example to use. MomConnect is a program to provide maternal health-related information for pregnant women that can be used to share knowledge of prenatal physical activity benefits to women. Applying technology-assisted (mobile health) programs confers several benefits to the target population, as health information can be delivered at any place and time, is participatory, uses real-life settings, and is accessible to a vast population, regardless of their socioeconomic status or geographic setting.<sup>43,44</sup> In a systematic review, the utilization of mobile phone-based health-behavior interventions in pregnancy correlated with positive beliefs, behaviors, and health outcomes.<sup>45</sup>

Interestingly, our findings revealed that a majority of the women knew the benefits of physical activity during pregnancy. However, knowledge about a health phenomenon does not necessarily translate into positive practice. It remains to be seen whether the knowledge is put to use or not. In this regard, pregnant women need encouragement, guidance, and advice to initiate and maintain a healthier lifestyle behavior. Evidence-based physical activity advice should come from health-care providers, who serve as intermediary between the pregnant woman and her child during pregnancy. Research has shown that maternal advice from health-care providers is more desirable and motivating to women to exercise during pregnancy.<sup>32,46</sup> As in other studies elsewhere, women indicated awareness of the physiological and psychological<sup>28,30,39,47</sup> benefits of physical activity. Even with such awareness, studies have reported low physical activity among women in both developed<sup>48–51</sup> and developing nations,<sup>52–55</sup> with few women meeting the 150-minute/week exercise recommendation. One salient feature of this finding is that knowledge of the benefits of physical activity during pregnancy signals an important message to health-care providers that it is inconsequential directing effort and resources to increasing current levels of education.<sup>56</sup> Instead, it would be appropriate and prudent to apply the theory of planned

behavior,<sup>57</sup> which incorporates other variables, such as barriers, enablers, and social factors, as influencers of intention and subsequent behavior.<sup>57,58</sup> In this context, factoring in the aspects of social support, time efficiency, fun, and enjoyment as interventional efforts is important to ignite desirable behavioral change.<sup>59</sup> Initiating such action may prove more effective in improving pregnant women's participation in physical activity than knowledge or education strategies alone.<sup>56</sup>

Our findings revealed that a majority of the women received information about physical activity in pregnancy from social media, television, and radio (70.2%), and books, newspapers, and magazines (49.1%). Similarly, other studies have reported that apart from health professionals, books, the Internet, and social media form a substantial proportion of pregnancy-related sources of information for women.<sup>60–62</sup> In Mercado et al's<sup>63</sup> study, pregnant women reported receiving prenatal physical activity information mostly from books and the Internet. A majority of the women (65.1%) in the present study indicated receiving no physical activity advice from the midwives responsible for their antenatal care at clinics. This is similar to other studies<sup>30,63–66</sup> and an earlier study in South Africa.<sup>67</sup> Similarly, another study reported that only 19% of South African medical practitioners provided information on physical activity during prenatal visits.<sup>68</sup> Where advice was provided, it was conflicting and misleading, and did not extend beyond telling them “to walk”,<sup>69</sup> or the advice is minimal and ineffective.<sup>70</sup> Studies have shown that health-care professionals lack the confidence and knowledge to deliver physical activity advice during routine care.<sup>66</sup> Bearing this in mind, it is unsurprising to discover the disconnect that exists between the evidence for the benefits of physical activity and corresponding behaviors during pregnancy, largely because of a lack of effective information on physical activity from the health-care providers.

Antenatal health-care professionals, primarily midwives, are the key sources of information for pregnant women in South Africa. They have regular contact with pregnant women who routinely visit antenatal health clinics for checkups. It may be possible that the lack of information about physical activity from the midwives would definitely propel the women to resort to seeking information or advice on physical activity from friends, family, magazines, and largely the Internet. There is a potential risk if pregnant women are not receiving evidence-based physical activity advice from health-care

professionals, but predominantly from the Internet. Online information cannot necessarily be trusted and can be misleading. Some studies have shown that Internet-based physical activity advice often lacked accuracy and was in most instances misleading.<sup>71–74</sup> This suggests the need for training of midwives and other health professionals to deliver evidence-based physical activity advice during pregnancy. Such training should start at the undergraduate level, and continue after graduation with professional practice training. With training, time, and resource allocation to physical activity as part of maternal health-care, the desired change in physical activity behavior and practice might occur. Physical activity during pregnancy should be viewed as a holistic and integrative approach to maternal care. A synergistic working attitude among health professionals saddled with the responsibility of advising pregnant women is imperative to support physical activity during and beyond pregnancy.

## Implications for Practice and Research

The finding that pregnant women perceived physical activity as beneficial to their health and the baby's, received most of their physical activity information through Internet sources, rather than from midwives, who maintain face-to-face contact with women during antenatal health-care sessions, highlights two scenarios. Firstly, there is a need to design interventions that will create prenatal awareness among women, and secondly a need to assess the quality of Internet-based physical activity advice, in order to educate pregnant women accordingly to avoid misinformation. As can be seen from this present study, an overwhelming majority of the women had positive belief and understood the benefits of physical activity, yet considered pregnancy a period of no physical activity, but to rest. A recent study reported that women viewed pregnancy as a time to relax and received encouragement from families and peers to avoid physical activity.<sup>70</sup> This suggests that more interventions are needed to change the physical activity behavior of women during pregnancy. Providing adequate training to midwives and other health professionals on physical activity in pregnancy could be a powerful intervention in promoting the uptake of physical activity among pregnant women, as these health professionals would in turn provide accurate advice and information about physical activity during pregnancy. Counseling has a strong influence in changing women's health beliefs and behaviors.<sup>75,76</sup> The findings of this study underscore the importance of designing interventions to improve



prenatal physical activity in an understudied, low-income, and diverse sample of pregnant women in the Eastern Cape, and further highlight the need for future study involving pregnant women seeking antenatal health care in the private health sector.

## Limitations

One obvious limitation of the study was the use of a self-reported questionnaire to solicit information from participants, where the possibility of response bias cannot be ruled out. In addition, the study was limited to pregnant women attending public primary-health clinics; therefore, the findings cannot be generalized to women attending private health facilities. Future studies should endeavor to include women attending private health facilities. Notwithstanding, this study provides insight into the beliefs, perceived benefits, and sources of physical activity information during pregnancy among a diverse and large sample of pregnant women in an understudied, low-resource setting. The data might inform interventions on changing perceptions about physical activity and the need to provide health facility-based physical activity advice and counseling for pregnant women during antenatal visits.

## Conclusion

Notwithstanding the fact that a majority of the women did not participate in physical activity before or during pregnancy, they had positive perceptions about the advantages of prenatal physical activity for their health and the baby's; however, most regarded pregnancy as a period to relax and rest. The predominant source of prenatal physical activity advice was gleaned from the Internet, which can be potentially misleading or contradictory to evidence-based physical activity practice. Interventions targeted at promoting prenatal physical activity, specifically to address erroneous beliefs about prenatal physical activity, are warranted. Given the scarcity of information on this topic in low-income and diverse samples, our data serve as a baseline for future comparative studies on the matter.

## Ethicals

The study was conducted according to the Declaration of Helsinki. Informed consent was obtained from participants before data collection. The purpose, nature, and procedures of the study were explained to the participants before they signed the informed-consent form to participate in the study. The Health Research Ethics Committee

of the University of Fort Hare approved the study (#2019=06=009=OkaforUB).

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## Author Contributions

All authors made a significant contribution to the work reported, whether in conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas, took part in drafting, revising, or critically reviewing the article, gave final approval to the version to be published, agreed on the journal to which the article has been submitted, and agree to be accountable for all aspects of the work.

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## Disclosure

The authors declare no conflicts of interest for this work.

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