Self-harm with suicidal and non-suicidal intent in young people in sub-Saharan Africa: a systematic review

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Abstract

Background: Self-harm, whether attributed to suicidal or non-suicidal motives, is associated with several poor outcomes in young people, including eventual suicide. Much of our understanding of self-harm in young people is based on literature from Europe (particularly, the UK), North America, and Australia. We aimed to synthesise the available evidence on prevalence, the commonly reported self-harm methods, correlates, risk and protective factors, and reasons for self-harm, in adolescents (aged 10–25 years) in sub-Saharan Africa.

Method: We searched MEDLINE, PsycINFO, PubMed, African Journals OnLine, and African Index Medicus for records from 1950 through August 2019, without language restrictions. We supplemented the database searches by searching relevant portals for postgraduate theses, reference harvesting, contacting authors for unpublished studies, and hand searching relevant print sources. We applied narrative synthesis to the evidence.

Results: Seventy-four studies from 18 sub-Saharan African countries met the inclusion criteria. The median lifetime prevalence estimate was 10·3% (interquartile range [IQR] 4·6% – 16·1%); median 12-month prevalence estimate was 16·9% (IQR: 11·5% – 25·5%); median 6-month prevalence estimate was 18·2% (IQR: 12·7% – 21·8%); and the median 1-month prevalence estimate was 3·2% (IQR: 2·5 – 14·8%). Studies from Western sub-Saharan Africa reported the highest 12-month prevalence estimates (median = 24·3%; IQR = 16·9% – 27·9%). Clinical samples commonly reported overdose, whereas self-cutting was most commonly reported in non-clinical samples. Academic failure, sexual, emotional, and physical abuse, romantic relationship problems, family conflict, depression, and previous self-harm were identified as key correlates of self-harm. No study reported protective factors against self-harm.

Conclusion: Variation in estimates was explained by small sample sizes and variation in definitions and measures used. Exploration of associations, risks and protective factors was based upon concepts and measures derived from high income countries. More detailed and culturally sensitive research is needed to understand the context-specific risks and protective factors for self-harm in adolescents in sub-Saharan Africa.

Keywords: Adolescents, Attempted suicide, Self-harm, Sub-Saharan Africa, Suicide
Background
The World Health Organisation (WHO) defines self-harm as “an act with non-fatal outcome in which an individual deliberately initiates a non-habitual behaviour, that without intervention from others will cause self-harm, or deliberately ingests a substance in excess of the prescribed or generally recognised therapeutic dosage, and which is aimed at realising changes that the person desires via the actual or expected physical consequences” [1, 2].

This definition does not distinguish acts of self-harm according to intent, and for brevity in this review we use the term “self-harm” to refer to acts that are attributed to suicidal and non-suicidal motivations. Self-harm among young people is a recognised problem in the mental health of populations in high income countries, where it is associated with a number of poor outcomes including eventual suicide [3, 4]. By comparison we know little about self-harm in young people in sub-Saharan Africa; instead much of our understanding is based on extrapolation from literature from Europe, particularly the UK, North America, and Australia [5–8]. Earlier regional reviews have either included only a few selected studies of young people from Africa, [9–11] or included only studies involving adult population samples from the region [12]. Thus, we have found no existing review that has systematically appraised the available published and unpublished evidence specifically on self-harm among adolescents in countries in sub-Saharan Africa.

The aims of the present review were to:

1) Describe the lifetime, 12-month, 6-month, and 1-month prevalence estimates of self-harm in young people (aged 10–25 years) across sub-Saharan Africa.
2) Describe the commonest methods of self-harm in young people identified across the previous studies.
3) Identify the commonest associations, risks, and protective factors associated with self-harm in young people observed in previous studies across sub-Saharan Africa.
4) Describe the self-reported reasons for self-harm in young people across sub-Saharan Africa.

Methods
This systematic review followed PRISMA guidelines [13] (see Additional files 1 and 2). We searched MEDLINE, PsycINFO, PubMed, African Journals OnLine, African Index Medicus, and the South African national Electronic Theses and Dissertations (SA-ETD) portal, (Additional file 3) between January 1950 and August 2019, without language restrictions. The geographic search filter included names of the countries in English and languages relevant to the countries [14]. When a country’s name had changed after 1950 [15], both current and earlier names were included. We searched grey literature, institutional and organisational reports and national and international government reports (e.g., WHO, World Bank, UNICEF, UNDP) [16]. We hand searched edited books, the West African Journal of Medicine, Ghana Medical Journal, South African Medical Journal, Ethiopian Medical Journal, and the East African Medical Journal. We contacted academics with a research interest in self-harm and authors who published two or more articles on self-harm identified during our review (see Additional file 4). Reference harvesting used Science Citation Index, Google Scholar, and manual search. Criteria for inclusion and exclusion of studies are shown in Table 1.

We used EndNote (version X9.2) to collate and handle the identified records. All records were screened for eligibility by reading the titles, abstracts, methods, and results sections by EQ, with consensus discussion of 10–20% of studies with co-authors. Appraisal of the methodological quality of records used the mixed method appraisal tool (MMAT) [17]. There was substantial heterogeneity across the studies. We applied narrative synthesis to the evidence in the final set of studies; we present the prevalence estimates as median values and interquartile ranges (IQRs). We report pooled estimates (median and IQR) to aid presentation of the data, but note should be taken of the substantial heterogeneity in studies included [18, 19].

Results
Seventy-four studies involving adolescents aged 10–25 years were included after removing duplicates - one national report on adolescent health behaviour, seven (9.4%) postgraduate theses, one book chapter and 65 (87.8%) peer-reviewed articles published in indexed academic journals (see Additional file 5).

Characteristics of included studies
The majority of the studies, 54 (73%), used the terms “suicide attempt”, “suicidal attempt”, or “attempted suicide”, to describe self-harm. Although included studies distinguished between suicidal self-harm and non-suicidal self-harm in their findings none of the studies indicated if a definition or explanation of the core question was provided to participants [20]. Because we wanted to include all acts that meet the WHO definition, which does not include a requirement for a specific intent, given the contention about the soundness of the distinction between self-reported suicidal and non-suicidal acts [21], which is likely to be a particular problem in countries where suicide is illegal and where different languages may not readily reflect the distinction, and as individual suicide risk is known to reside in all
acts of self-harm regardless of attribution, we have included all studies in our estimates of prevalence where it was clear that self-harm was the question put to participants, regardless of apparent intent.

Data were available from all four geographical sub-regions of sub-Saharan Africa. The majority (44·6%) were from five countries within Southern sub-Saharan Africa (eSwatini, Mozambique, Namibia, South Africa, and Zambia) - South Africa ranked the highest with more than half \( (n = 37) \) of the total included records; 30·4% were based on data from six Western sub-Saharan African countries (Benin, Ghana, Ivory Coast, Mauritania, Nigeria, and Togo); 1·1% from Congo-Brazzaville in Central sub-Saharan Africa; and 23·9% of data obtained from six countries within Eastern sub-Saharan Africa (Ethiopia, Malawi, Rwanda, Seychelles,
### Table 2: Prevalence Estimates of Self-harm (by year and country of publication)

| Author (year) | Term Setting (sample) | Prevalence estimate | Study quality |
|---------------|-----------------------|---------------------|--------------|
| **Country**   | **Author (year) 1**   | **Country** | **Setting** | **Prevalence estimate** | **Study quality** |
| South Africa. | Flisher et al. (1993) [34]. | Attempted suicide School (7340) | - | OV = 572/7340 (7.8%) | 2/5 |
| Ethiopia. | Kebede & Ketsela (1993) [35]. | Attempted suicide School (519) | OV = 74/519 (14.3%) | 5/5 |
| South Africa. | Peltzer et al. (2000) [36]. | Attempted suicide School (366) | OV = 46/366 (12.6%) | 3/5 |
| South Africa. | Madu & Matla (2003) [37]. | Attempted suicide School (435) | OV = 91/435 (21%) | 4/5 |
| South Africa. | Wild et al. (2004) [38]. | Suicidal attempt School (939) | OV = 95/939 (10%) | - |
| South Africa. | Sommer (2005) [39]. Cross-national (South Africa & Germany) | Suicidal behaviour School (299) | OV = 48/299 (16.1%) | 2/5 |
| South Africa. | Flisher et al. (2006) [40]. | Suicidal attempt School (10669) | OV = 9.1% | 3/5 |
| Ethiopia. | Shiferaw et al. (2006) [41]. | Suicidal attempt School (667) | OV = 39/667 (5.8%) | 2/5 |
| Nigeria. | Omigbodun et al. (2008) [20]. | Attempted suicide School (1429) | OV = 167/1429 (11.7%) | 4/5 |
| South Africa. | Peltzer (2008) [42]. | Suicide attempt School (1157) | OV = 278/1157 (24%) | 4/5 |
| South Africa. | Mashego & Madu (2009) [43]. | Suicidal behaviour School (142) | OV = 21/142 (14.8%) | 4/5 |
| Uganda. | Kinyanda et al. (2011) [28]. | Self-injury & Suicide attempt Community (897) | Self-injury: 13/897 (1.4%) | 5/5 |
| Ghana. | Nanewortor (2011) [44]. | Attempted suicide School (383) | OV = 31/383 (8.1%) | 4/5 |
| South Africa. | Campbell (2012) [45]. | Attempted suicide School (1033) | OV = 129/1033 (12.5%) | 3/5 |
Table 2 Prevalence Estimates of Self-harm (by year and country of publication) (Continued)

| Author (year) | Term | Setting (sample) | Prevalence estimate | Study quality |
|---------------|------|------------------|---------------------|---------------|
| (country) | | | Lifetime | 12-month | 6-month | 1-month |
| Swahn et al. (2012) [30]. | Suicidal attempt | Community (457) | OV = 90/457 (19.8%) | - | - | - | 4/5 |
| Uganda. | | | F = 67/313 (21.4%) | M = 23/144 (16.2%) |
| van Niekerk et al. (2012) [46]. | Suicidal attempt | University (810) | OV = 47/810 (5.8%) | - | - | - | 3/5 |
| South Africa. | | | - | - | - | - |
| Vawda (2012) [47]. | Suicide attempt | School (219) | OV = 12/219 (5.5%) | - | - | - | 3/5 |
| South Africa | | | - | - | - | - |
| Gage (2013) [25]. | Suicide attempt | Community (2709) | - | - | OV = 62/2709 (2.3%) | - | 4/5 |
| Ethiopia | | | - | - | - | - |
| Muula et al. (2013) [48]. | Self-inflicted serious injury | School (2136) | OV = 254/2136 (11.9%) | - | - | - | 5/5 |
| Zambia. | | | - | - | - | - |
| Shilubane et al. (2013) [49]. | Suicidal attempt | School: 2002 SAYRBS (10449) 2008 SAYRBS (10097) | - | - | 2002 SAYRBS: OV = 18.5% F = 19.5% M = 17.3% 2008 SAYRBS: OV = 21.8% F = 22.7% M = 20.8% | - | 5/5 |
| South Africa. | | | - | - | - | - |
| van Rooyen (2013) [50]. | Deliberate self-harm | University (603) | OV = 291/603 (48.3%) | OV = 223/603 (7.0%) | - | - | 3/5 |
| South Africa. | | | - | - | - | - |
| Cheng et al. (2014) [33]. | Suicidal attempt | Community: Nigeria (449) South Africa (496) | - | - | Nigeria: OV = 73/449 (16.3%) F = 33/229 (14.3%) M = 40/220 (18.3%) South Africa: OV = 54/496 (10.9%) F = 22/224 (10%) M = 32/272 (11.8%) | - | 4/5 |
| Cross-national (Nigeria, South Africa, China, India, USA). | | | - | - | - | - |
| Chinawa et al. (2014) [51]. | Attempted suicide | School (764) | - | OV = 96/764 (12.5%) | - | - | 2/5 |
| Nigeria. | | | - | - | - | - |
| Lippi (2014) [52]. | Deliberate self-harm | University (603) | OV = 278/603 (46.1%) F = 219/483 (45.3%) M = 59/120 (49.2%) | OV = 216/603 (35.8%) | - | - | 3/5 |
| South Africa. | | | - | - | - | - |
| Penning & Collings (2014) [53]. | Self-injury | School (716) | - | OV = 20/716 (2.8%) | - | - | 5/5 |
| South Africa. | | | - | - | - | - |
| Randall et al. (2014) [54]. | Attempted suicide | School (2690) | - | OV = 761/2690 (28.3%) | - | - | 5/5 |
| Benin. | | | - | - | - | - |
| Shilubane et al. (2014) [55]. | Suicide attempt | School (591) | - | - | OV = 134/591 (22.7%) F = 52/297 | - | 4/5 |
| South Africa. | | | - | - | - | - |
| Author (year) Country | Term | Setting (sample) | Prevalence estimate | Study quality |
|-----------------------|------|------------------|---------------------|--------------|
| Cluver et al. (2015) [56]. South Africa | Suicide attempt | Community (3401) | – | OV = 111/3401 (3.3%) M = 77/294 (27%) F = 79/1926 (4.4%) M = 32/1475 (2.2%) |
| Ng et al. (2015) [57]. Rwanda | Suicidal behaviour | Community (237) | – | OV = 30/237 (12.6%) |
| Giru (2016) [58]. Ethiopia | Suicide attempt | School (722) | OV = 90/722 (12.5%) F = 47/336 (14%) M = 43/386 (11.1%) | 3/5 |
| Shaikh et al. (2016) [59]. Malawi. | Suicide attempt | School (2225) | OV = 287/2225 (12.9%) F = 157/1188 (13.2%) M = 130/1037 (12.4%) |
| van der Walt (2016) [60]. South Africa | Self-harm | University (201) | OV = 39/201 (19.4%) |
| Akanni et al. (2017) [61]. Nigeria | Attempted suicide | School (300) | OV = 17/300 (5.7%) F = 8/135 (5.9%) M = 9/165 (5.5%) |
| Asante et al. (2017) [62]. Ghana | Suicide attempt | School (1973) | OV = 438/1973 (22.2%) F = 213/908 (23.5%) M = 225/1065 (21.1%) |
| Asante & Meyer-Weitz (2017) [31]. Ghana. | Suicidal attempt | Community (227) | – | OV = 60/227 (26.4%) F = 36/105 (37.5%) M = 24/122 (20.3%) |
| James et al. (2017) [63]. South Africa. | Suicidal attempt | School (10997) | – | OV = 17.8% |
| Nyandindi (2017) [64]. Tanzania | Suicide attempt | School (3793) | OV = 436/3793 (11.5%) F = 230/1931 (11.9%) M = 192/1862 (10.3%) |
| Peltzer & Pengpid (2017) [65]. Namibia | Suicide attempt | School (4531) | OV = 1029/4531 (22.7%) F = 604/2406 (27.4%) M = 577/2125 (24.5%) |
| Stansfeld et al. (2017) [66]. | Suicide attempt | School (1034) | OV = 139/1034 (13.4%) | 4/5 |
Table 2 Prevalence Estimates of Self-harm (by year and country of publication) (Continued)

| Author (year) Country | Term          | Setting (sample) | Prevalence estimate | Study quality |
|-----------------------|---------------|------------------|---------------------|--------------|
|                       |               |                  | Lifetime            |              |
|                       |               |                  | 12-month            | 6-month       | 1-month       |
| South Africa          |               |                  |                     |              |
| Amare et al. (2018)   | Suicide attempt | School (573)     | OV = 93/573 (16.2%) | –            | –            | OV = 18/573 (3.1%) | 5/5 |
| Ethiopia              |               |                  | F = 44/296 (14.8%)  |              |              |                | |
|                       |               |                  | M = 49/277 (17.7%)  |              |              |                | |
| Khuzwayo et al. (2018)| Suicide attempt | School (1687)    | –                   | OV = 256/1687 (15.2%) | –            | –            | 3/5 |
| South Africa          |               |                  | F = 196/854 (22.9%) |              |              |                | |
|                       |               |                  | M = 60/833 (7.2%)   |              |              |                | |
| Liu et al. (2018)     | Suicide attempt | School: Benin (2649) Ghana (3543) Malawi (2212) Mauritania (1976) Namibia (4410) eSwatini (3612) | – | Benin: OV = 747/2649 (28.2%) | – | – | 5/5 |
| Cross-national (Benin, Ghana, Malawi, Mauritania, Namibia, & eSwatini). | | | F = 260/927 (28%) | M = 486/1722 (28.2%) | | |
|                       |               |                  | Ghana: OV = 935/3543 (26.4%) | F = 449/1637 (27.4%) | M = 486/1906 (25.5%) | |
|                       |               |                  | Malawi: OV = 246/2212 (11.1%) | F = 128/1175 (10.7%) | M = 118/1037 (11.4%) | |
|                       |               |                  | Mauritania: OV = 334/1976 (16.9%) | F = 173/1045 (16.6%) | M = 160/931 (17.2%) | |
|                       |               |                  | Namibia: OV = 1129/4410 (25.6%) | F = 565/2329 (24.2%) | M = 564/2081 (27.1%) | |
|                       |               |                  | eSwatini: OV = 585/3612 (16.2%) | F = 305/1896 (16.1%) | M = 280/1716 (16.3%) | |
| van der Wal & George (2018) | Self-harm | School (962)     | OV = 167/962 (17.4%) | –            | –            | –            | 3/5 |
| South Africa.         |               |                  | F = 109/557 (19.4%) |              |              |              | |
|                       |               |                  | M = 58/405 (14.5%)  |              |              |              | |
| Baiden et al. (2019)  | Suicide attempt | School (1633)    | –                   | OV = 349/1633 (21.1%) | – | – | 5/5 |
| Ghana                 |               |                  | F = 187/807 (23.2%) |              |              |              | 
| Author (year) | Term | Setting (sample) | Prevalence estimate | Study quality |
|--------------|------|------------------|---------------------|---------------|
|              |      |                  | Lifetime            | 12-month | 6-month | 1-month |              |
|              |      |                  |                     | M = 162/826 (19.6%) |        |        |        |              |
|              |      |                  |                     | Self-harm: 3/110 (3%) |        |        |        | 4/5          |
|              |      |                  |                     | Attempted suicide: 1/110 (0.9%) |        |        |        |              |
|              |      |                  | OV = 46/941 (4.9%)  | F = 31/753 (3.3%) | M = 15/188 (1.6%) |        |        |        |              |
|              |      |                  |                     | Benin: OV = 337/1170 (28.8%) |        |        |        | 5/5          |
|              |      |                  |                     | Ghana: F = 104/397 (26.4%) | M = 233/773 (30.1%) |        |        |        |              |
|              |      |                  |                     | Mauritania: OV = 295/1110 (26.6%) |        |        |        |              |
|              |      |                  |                     | F = 154/565 (27.5%) | M = 141/545 (25.9%) |        |        |        |              |
|              |      |                  |                     | Malawi: M = 128/1145 (11.2%) |        |        |        |              |
|              |      |                  |                     | Mauritania: OV = 227/1285 (17.7%) |        |        |        |              |
|              |      |                  |                     | F = 98/601 (16.3%) | M = 126/684 (18.4%) |        |        |        |              |
|              |      |                  |                     | Mozambique: OV = 112/668 (16.8%) |        |        |        |              |
|              |      |                  |                     | F = 56/337 (16.7%) | M = 57/331 (17.1%) |        |        |        |              |
|              |      |                  | OV = 507/1936 (26.2%) | F = 260/1106 (23.5%) | M = 247/830 (29.7%) |        |        |        | 5/5          |
|              |      |                  | Seychelles: OV = 435/2061 (21.1%) | F = 215/1041 (20.7%) | M = 220/1020 (21.6%) |        |        |        |              |
|              |      |                  | Swaziland: OV = 202/1318 (15.3%) | F = 121/803 (15.1%) |        |        |        |              |
Table 2 Prevalence Estimates of Self-harm (by year and country of publication) (Continued)

| Author (year) Country | Term | Setting (sample) | Prevalence estimate | Study quality |
|-----------------------|------|------------------|---------------------|--------------|
| Koyanagi, Stubbs et al. (2019) [75]. Cross-national (including Benin, Ghana, Mauritania, Mozambique, Namibia, Seychelles, Swaziland, & Tanzania). | Suicide attempt | School: Benin (2690) Ghana (1684) Mauritania (2063) Mozambique (1918) Namibia (4531) Seychelles (2540) Swaziland (3680) Tanzania (3793) | – | Benin: 761/2690 (28.3%) Ghana: 485/1684 (28.8%) Mauritania: 359/2063 (17.4%) Mozambique: 363/1918 (18.9%) Namibia: 1178/4531 (26.0%) Seychelles: 511/2540 (20.1%) Swaziland: 607/3680 (16.5%) Tanzania: 436/3793 (11.5%) | 5/5 |
| Nguyen et al. (2019) [76]. Cross-national (Nigeria, Uganda, & Zambia). | Self-injury | Households: Nigeria (4203) Uganda (5804) Zambia (1819) | – | – | – | 5/5 |
| Quarshie et al. (2019) [77]. Ghana | Suicide attempt | College (305) | OV = 7/305 (2.3%) F = 6/277 (2.3%) M = 1/28 (3.6%) | – | – | 5/5 |
| Shayo & Lawala (2019) [78]. Tanzania | Suicide attempt | School (3793) | OV = 422/3793 (11.1%) F = 230/1974 (11.7%) M = 192/1819 (10.6%) | – | – | 5/5 |
| Thornton et al. (2019) [79]. Cross-national (South Africa & Guyana) | Suicide attempt | Households: South Africa (175) | – | South Africa: 14/175 (7.4%) | 2/5 |
| Tolulope et al. (2019) [80]. Nigeria. | Suicide attempt | School (1015) | OV = 30/1015 (3%) | – | – | 4/5 |
| Uddin et al. (2019) [81]. Cross-national (Benin, Ghana, Malawi, Mauritania, Mozambique, Namibia, Swaziland, & Tanzania). | Suicide attempt | School: Benin (2579) Ghana (2195) Malawi (2191) Mauritania (1867) Mozambique (1248) | – | Benin: OV = 720/2579 (27.9%) Ghana: 254/902 (28.2%) Malawi: 466/1667 (28%) Mauritania: 607/2195 (27.7%) Malawi: 304/1029 (29.5%) | 5/5 |

M = 78/515 (15.2%) Tanzania: OV = 290/2615 (11.1%) F = 159/1391 (11.4%) M = 126/1224 (10.3%)
Table 2 Prevalence Estimates of Self-harm (by year and country of publication) (Continued)

| Author (year) Country | Term Setting (sample) | Prevalence estimate Lifetime | 12-month | 6-month | 1-month | Study quality |
|-----------------------|-----------------------|-----------------------------|---------|--------|---------|---------------|
| Uddin et al. (2019) [81]. | Malawi: OV = 251/2191 (11.5%) | Lifetime 12-month 6-month 1-month | 25.7% | 11.5% | 11.1% | 11.6% | 5/5 |
| | Mauritania: OV = 322/1867 (17.3%) | | | | | 5/5 |
| | Swaziland: F = 161/983 (16.4%) | | | | | 5/5 |
| | Tanzania: M = 153/866 (17.7%) | | | | | 5/5 |
| | Mozambique: OV = 213/1248 (17.1%) | | | | | 5/5 |
| | Mauritania: F = 113/596 (19%) | | | | | 5/5 |
| | Namibia: OV = 836/3235 (25.8%) | | | | | 5/5 |
| | F = 432/1795 (24.1%) | | | | | 5/5 |
| | Mozambique: M = 309/1400 (21.4%) | | | | | 5/5 |
| | Mauritania: O = 260/1285 (16.6%) | | | | | 5/5 |
| | Namibia: OV = 114/668 (16.5%) | | | | | 5/5 |
| | Tanzania: OV = 298/2911 (10.2%) | | | | | 5/5 |
| | Seychelles: 423/2061 (20.5%) | | | | | 5/5 |
| | Tanzania: 282/2061 (10.8%) | | | | | 5/5 |

OV Overall estimate
F Female
M Male
SAYRBS South African Youth Risk Behaviour Survey
Gage’s (2013) [25] reported prevalence period was 3 months. Van Rooyen’s (2013) [50] reported prevalence period was 11 months.
Tanzania, and Uganda). Seventy-two of the studies were in English and two were in French.

The majority of the studies (n = 56; 75.6%) utilised a quantitative cross-sectional design involving questionnaires administered to participants accessed in communities/households, a charity facility, hospitals, schools and universities (see Additional file 6). Five studies included only female participants [22–26]; and one study involved only male participants [27]. The majority (n = 49; 66.2%) of the studies sampled students from schools and universities. Six studies (8.1%) sampled young people who were out of the school environment, including adolescents living in poor, rural, war-affected communities [28], adolescents in children’s homes [29], children and youth living in slums and streets [30, 31], adolescents living in poor urban and rural villages [32], and out-of-school youth who were unstably housed, living in poor urban neighbourhoods [33].

The total sample covered by the studies was 205,132. Thirty-nine (52.7%) of the studies used some form of random selection in recruiting their participants. Across the 74 studies, only 14 (18.9%) provided information on the size of their target population and how their sample sizes were determined.

Six (8.1%) of the studies were rated “average quality” on the MMAT; 21 studies (28.4%) were rated “above average quality”; 22 studies (29.7%) were rated “high quality”, while the remaining 25 studies (33.8%) were rated to be of “very high quality” (see Additional file 7).

### Main findings
Fifty-five (74.3%) of the studies reported prevalence estimates, though none reported lifetime, 12-month, 6-month, and 1-month estimates, with 12-month estimates favoured by the majority (n = 30; 54.5%). As shown in Table 2, the reported lifetime prevalence estimates ranged from 1.4% to 48.3% [28, 50]; the 12-month prevalence estimates varied between 0.9% and 35.8% [52, 72]; the reported 6-month prevalence ranged from 7.4% to 22.7% [55, 79]; and the 1-month reported prevalence estimates varied between 1.9% and 26.4% [31, 58].

The majority of the 55 prevalence studies (n = 46; 83.6%) focused on suicidal self-harm, seven studies (12.7%) focused on non-suicidal self-harm [48, 50, 52, 53, 60, 70, 76], while two studies simultaneously reported the prevalence estimates of both suicidal self-harm (suicidal attempt) and non-suicidal self-harm (self-injury) [28, 72].

Visual inspection of the forest plots and the I² value ranges (98.84% to 99.71%, p < .001) indicate that heterogeneity across each of these summaries is substantial (see Figs. 1, 2, 3 and 4). Median values with interquartile ranges were computed for the overall and sub-regional reported prevalence estimates (see Fig. 5). Considerable variability was found across the ranges of prevalence estimates reported: the median lifetime prevalence estimate was 10.3% (interquartile range [IQR] of 4.6% – 16.1%) and the median 12-month prevalence estimate was 16.9% (IQR: 11.5% – 26.4%).

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**Fig. 1** Lifetime prevalence estimates of self-harm
25-5%). Studies from Western sub-Saharan Africa reported the highest 12-month prevalence estimates (median = 24·3%; IQR = 16·9% – 27·9%), while studies from Eastern (median = 11·5%; IQR = 11·1% – 18·3%) and Southern (median = 16·5%; IQR = 10·9% – 24·0%) sub-Saharan Africa reported relatively similar median 12-month prevalence estimates.

Twenty (27%) of the 74 studies reported on the methods of self-harm (Table 3). Overdose of medication was frequently reported from clinic-based studies, while...
self-cutting was the predominant method reported in the non-clinic based studies.

Overall, 48 (64.9%) of the 74 studies reported on the associates, risks and protective factors. The evidence was organised by reported associates into four main domains: personal, family, school, and interpersonal (non-family). The interpersonal (non-family) included circumstances related to the individuals’ relationships with peers and neighbours, and other social relationships and interactions outside the family and school contexts. Additionally, based on the strong association of abuse and violence victimisation (within and outside the family context) and self-harm [11, 92–94], we created a separate category, abuse and violence, to capture all factors related to psychological, physical, emotional, and sexual abuse items.

Results are shown in Table 4. Common examples of associations included, at the personal level, depression, hopelessness and psychiatric illness; at the family level, conflict with parents, parental divorce; at school level, academic failure, and for the interpersonal level, relationship breakups and problems, and lack of social support. Abuse and violence-related factors included sexual abuse, dating violence, bullying, and physical fights. Only one study reported risk factors related to self-harm [56], while no study reported protective factors against self-harm.

Because of the substantial heterogeneity in samples, definition and measurement of associations, we regard any attempt at comparison or pooling of the reported prevalences of these associations (as opposed to simply their presence or absence) as potentially misleading. We noted, however, the proportion of included studies that reported associations in each category as follows: Personal = 41 / 48; Family = 31 / 48; Interpersonal = 24 / 48; Abuse and violence = 19 / 48; School = 13 / 48.

We further categorised the self-reported reasons for self-harm into “intrapersonal” (i.e., reasons intended to change one’s state or circumstances), and “interpersonal” (i.e., reasons intended to change the state or circumstances of significant others). Eight (10.8%) studies included self-reported reasons for self-harm – see Table 5. Five of these were clinic-based, [22–24, 26, 88] while three were non-clinic based [27, 29, 50].

Across the eight studies reporting reasons for self-harm, participants concurrently reported both intrapersonal and interpersonal reasons for engaging in self-harm with no clear pattern discernible.

The findings of the prevalence studies regarding associates of self-harm were mixed in terms of age, although more reported higher estimates among young people between the ages of 15 and 17 years, compared to those aged 14 years and below, and 18 years or above [35, 39, 43, 73].

The majority of the prevalence studies reported higher estimates among female adolescents than in male adolescents [30, 34, 40, 45, 58, 59, 61, 62, 65, 73, 78], although seven studies (12.7%) found higher prevalence estimates in male adolescents [33, 35, 37, 52, 55, 67, 77].
Discussion

There are clearly problems with the literature we found. Despite the number of reported studies, and the extended search, we identified research from fewer than 40% (18/46) of the countries across the sub-region, and half of all studies came from one country – South Africa. This represents a serious gap in our knowledge about population mental health in those countries from which research is missing.

The reported prevalence estimates showed considerable variations within and between the countries and sub-regions of sub-Saharan Africa. Undoubtedly, real variations are likely to exist but there must also be methodological reasons to explain, for example, that estimates of lifetime prevalence appear lower than 12-month prevalence. One explanation is the origin and contextual relevance of the measures used by the studies, and the lack of consistency in definitions and choice of measures across studies. In this respect it is worth noting the widespread use of the term “attempted suicide” in studies which did not explain the term to those responding to the question. The consequence is that studies cannot be reliably categorised as reporting the prevalence of suicidal or non-suicidal behaviour. For example – as shown on Table 5 respondents in a study about “attempted suicide” might report that they intended to die as the result of an act while others might report that the act was intended to prevent suicide, or that the act was designed to change the nature of their relationships with others. We found no substantial study where participants were asked in detail about reasons for self-harm, after responding with an initial affirmative to a question about attempted suicide. Respondent bias due to the illegality, sensitivity, stigma, and taboo against suicide and other self-destructive behaviours in Africa [98] is likely to vary according to how and by whom inquiries were made.

Even so, the median 12-month prevalence estimate of 16.9% (IQR: 11.5% – 25.5%), and median 6-month prevalence estimate of 18.2% (IQR: 12.7% – 21.6%) particularly had reasonably narrow confidence intervals. What is striking is that these figures are of the same order as those reported from Europe and North America, as is the finding that young women report more self-harm than young men. Similarly, methods of self-harm were similar with overdose of medication frequently reported in clinic-based studies, while self-cutting was the predominant method reported in the non-clinic based studies.

Generally, the studies reported multiple factors to be associated with self-harm at the personal level - sex, age, depression, hopelessness, psychiatric illness, alcohol and illicit drug use, at the family level - conflict with parents, at school-level - academic failure, bullying victimisation, truancy, and at the interpersonal level - breakup, sexual and physical abuse, romantic relationship problems, social support.

Various forms of abuse and violence victimisation occurring in the family, school, and interpersonal contexts were also reported. It was not possible to tell from all the studies we reviewed how often relationship problems in family, school, or social groups was marked by violence or abuse, but the circumstances of life in Ghana suggests the possibility of frequent exposure to such experiences. Relative to high-income countries, these circumstances are arguably likely to be more common in
| Author               | Setting     | Sample (Sex) | Reported method of self-harm | Study quality |
|----------------------|-------------|--------------|------------------------------|---------------|
| (year) Country       |             |              |                              |               |
| Cummins & Allwood    | General     | N = 81       | ▪ Overdose = 64/81 (79%)    | 3/5           |
| (1984) South Africa  | hospital    | (F = 54, M = 27) | M = 18/27 (66.7%)          |               |
| Schlebusch           | General     | N = 159      | ▪ Overdose, 151/159 (95%)  | 4/5           |
| (1985) South Africa  | hospital    | (F = 115, M = 44) | F = 112/115 (97.4%)         |               |
| Pillay               | General     | N = 55       | ▪ Overdose = 55/55 (100%)  | 3/5           |
| (1987) South Africa  | hospital    | (F = 42, M = 13) | M = 59/44 (88.6%)          |               |
| Pillay               | General     | N = 87       | ▪ Self-poisoning = 81/87 (93.1%) | 3/5           |
| (1988) South Africa  | hospital    | (F = 68, M = 19) | ▪ Overdose = 141/149 (97.2%) |               |
| Mhlongo & Peltzer    | General     | N = 100      | ▪ Paraffin = 36/100 (36%)  | 3/5           |
| (1999) South Africa  | hospital    | (F = 63, M = 37) | ▪ Methylel spirit = 12/100 (12%) |               |
| Madu & Matla         | School      | N = 435      | ▪ Self-poisoning = 40/435 (9.2%) | 4/5           |
| (2003) South Africa  | (F = 243, M = 192) | M = 19/192 (9.9%) | ▪ Overdose = 23/435 (5.3%)   |               |
| Sommer               | School      | N = 299      | ▪ Overdose = 21/299 (70.4%) | 2/5           |
| (2005) South Africa  | (F = 185, M = 114) | M = 19/185 (90.9%) | ▪ Hanging = 20/299 (6.8%)    |               |
| Yëo-Tenena et al.    | Hospital    | N = 42       | ▪ Chloroquine = 26/42 (61.9%) | 4/5           |
| (2010) Ivory Coast   | (F = 33, M = 9) | M = 19/33 (58.8%) | ▪ Psychotropics = 64/42 (19%) |               |
| Beekrum et al.       | Hospital    | N = 10       | ▪ All participants took overdose of prescription medication belonging to a family member: benzodiapeines, steroidal anti-inflammatories, and various blood pressure medications. | 5/5           |
| (2011) South Africa  | (F = 10) | M = 19/10 (90.9%) | ▪ Overdose = 53/53 (85.5%)   |               |
| Okoko et al.         | Hospital    | N = 62       | ▪ Hanging = 1 (1.6%)       | 4/5           |
| (2011) Congo Brazzaville | (F = 50, M = 12) | | ▪ Caustic soda = 6 (9.7%)    |               |
| Pretorius            | Children’s  | N = 12       | ▪ Cutting = 11 (91.6%)      | 3/5           |
Table 3 Predominant Form / Method of Self-harm by year of publication (Continued)

| Author (year) | Setting | Sample (Sex) | Reported method of self-harm | Self-Injury |
|---------------|---------|--------------|------------------------------|------------|
| (2011) [29] South Africa | homes | (F = 10, M = 2) | | |
| Carving words into skin = 11 (9.1%) | ▪ Broken own bones = 9 (7.5%) |
| ▪ Punching self = 8 (66.6%) | ▪ Sharp objects through skin = 8 (66.6) |
| ▪ Burning with a lighter or match = 7 (58.3%) | ▪ Carving pictures or patterns into skin = 7 (58.3%) |
| ▪ Scratching = 4 (33.3%) | ▪ Rubbing glass into skin = 4 (33.3%) |
| ▪ Biting = 1 (8.3%) | ▪ Dripping acid onto skin = 1 (8.3%) |
| ▪ Dripping bleach or oven cleaner onto skin = 1 (8.3%) | ▪ Bleach or oven cleaner onto skin = 1 (8.3%) |
| ▪ Rubbing sandpaper = 2 (16.6%). | |
| Fine et al. (2012) [91] South Africa | Hospital | N = 50 (F = 31, M = 19) | Overdose = 17/50 (34%) | ▪ Cutting = 36/50 (73%) |
| ▪ Poisoning = 2/50 (4%) | ▪ Hanging = 10 (20%) |
| ▪ Drowning = 2/50 (4%) | ▪ Jumping from a height = 3/50 (6%) |
| Shilubane et al. (2012) [32] South Africa | Community | N = 14 (F = 8, M = 6) | Ingestion of: | ▪ Burning = 1/14 (7.1%) |
| ▪ Medications = 9/14 (64.3%) | ▪ Hanging = 1/14 (7.1%) |
| ▪ Paraffin = 1/14 (7.1%) | |
| ▪ Disinfectant = 1/14 (7.1) | |
| Van Rooyen (2013)* [50] Lippi (2014)* [52] South Africa | University | N = 603 (F = 483, M = 120) | ▪ Alcohol abuse = 46/201 (22.9%) | ▪ Cutting = 132/603 (21.9%) |
| ▪ Overdose = 25/201 (12.4%) | ▪ Severe scratching = 93/603 (15.4%) |
| ▪ Medication abuse = 12/201 (6%) | ▪ Carving words into skin = 70/603 (11.6%) |
| ▪ Cutting = 18/201 (9%) | ▪ Burning with lighter or match = 66/603 (10.9%) |
| ▪ Head banging = 24/201 (11.9%) | ▪ Sticking objects into skin = 52/603 (8.6%) |
| ▪ Interfering with wound healing = 36/603 (6.5%) | ▪ Punching self = 48/603 (8%) |
| ▪ Banging head = 30/603 (5%) | ▪ Carving pictures into skin = 44/603 (7.3%) |
| ▪ Prevented wounds from healing = 10/201 (5%) | ▪ Burning with cigarette = 42/603 (7%) |
| ▪ Playing with wound healing = 36/603 (6.5%) | ▪ Interfering with wound healing = 36/603 (6.5%) |
| ▪ Banging head = 30/603 (5%) | |
| van der Walt (2016) [60] South Africa | University | N = 201 (F = 110, M = 91) | ▪ Hitting self = 26/201 (12.9%) | ▪ Car accident = 2/4 (50%) |
| ▪ Medication abuse = 12/201 (6%) | ▪ Hanging = 2/4 (50%) |
| ▪ Overdose = 25/201 (12.4%) | ▪ Head banging = 24/201 (11.9%) |
| ▪ Sticking objects into skin = 52/603 (8.6%) | ▪ Cutting = 18/201 (9%) |
| ▪ Prevented wounds from healing = 10/201 (5%) | ▪ Scratching = 17/201 (8.5%) |
| ▪ Burning with a lighter or match = 66/603 (10.9%) | ▪ Exercised an injury on purpose = 12/201 (6%) |
| ▪ Scratching = 17/201 (8.5%) | ▪ Preventing wounds from healing = 10/201 (5%) |
| ▪ Banging head = 30/603 (5%) | ▪ Car accident = 2/4 (50%) |
| ▪ Prevented wounds from healing = 10/201 (5%) | ▪ Reckless driving = 21/201 (10.4%) |
| Meissner & Bantjes (2017) [27] South Africa | University | N = 4 (M = 4) | – | |
| ▪ Hanging = 2/4 (50%) | |
| ▪ Car accident = 2/4 (50%) | |
| Kritzinger (2018) [26] South Africa | Hospital | N = 10 (F = 10) | ▪ Overdose | – |
| ▪ Rat poison | |
| ▪ Furniture oil | |

F Female
M Male

* The studies by Lippi (2014) [52] and van Rooyen (2013) [50] were based on the same dataset, the 2009 University of Pretoria student survey in South Africa
| Author (Year)          | Associates / Risk Factors | Quality |
|-----------------------|----------------------------|---------|
| Cummins & Allwood     | Psychiatric disturbance    | 3/5     |
| (1984)                | Family dysfunction         |         |
|                       | (including divorce)       |         |
|                       | Family psychiatric illness |
|                      | School problems            |
|                       | Socialisation problems     |
| Pillay (1987)         | Medical/psychiatric illness|
| South Africa          | Problems with Parents      |
| Sefa-Dedeh & Canetto  | Problems with siblings     |
| Ghana (1992)          | Marital problems           |
| Kebede & Ketsela      | Hopelessness               |
| Ethiopia (1993)       | Heavy alcohol intake       |
|                      | Lower school grade         |
| Pillay & Wassenaar    | Depression                 |
| (1997)                | Lower family adaptability  |
|                      | High family cohesion       |
|                      | Low family satisfaction    |
|                      | Hopelessness               |
| Wassenaar et al.      | Family communication       |
| South Africa          | Breakdown                  |
|                      | Conflict with parents      |
|                      | Authoritarian patriarchy   |
| Mhlongo & Peltzer     | Problem with parents       |
| South Africa          | Academic failure           |
|                      | Romantic relationship      |
|                      | problems                   |
| Peltzer et al. (2000)| Suicidal ideation          |
| South Africa          | History of family suicide  |
|                      | Parental divorced          |
|                      | Large family size          |
| Madu & Matla (2004)  | Family conflict            |
| South Africa          | Poor schoolwork            |
|                      | Problems with peers        |
| Wild et al. (2004)    | Depression                 |
| South Africa          | Poor global self-worth     |
|                      | Poor body image            |
| Sommer (2005)        | Female sex                 |
| South Africa          | Previous psychiatric contact|
| Shiferaw et al. (2006)| Being sexually active      |
| Ethiopia              | Female sex                 |
|                      | Unwanted pregnancy         |
|                      | Boredom                    |
| Omigbodun et al. (2008)| Drinking alcohol          |
| Nigeria               | Having to go hungry        |
|                      | Perceived lack of family   |
|                      | support                    |
|                      | Suicide attempt in the     |
|                      | family                     |
|                     | Academic under-achievement |
|                      | Friend suicide attempt     |
|                      | Relationship problems      |
| Yeó-Tenena et al.     | Psychiatric problems       |
| (2010)               | (depression, substance     |
|                      | addiction)                 |
|                      | Previous suicide attempt   |
|                      | Emotional problems         |
|                      | Familial conflict          |
|                      | School failure             |
|                      | Unwanted pregnancy         |
|                      | Sexual abuse               |

Table 4 Associates, Risk and Protective Factors of Self-Harm (by year of publication)
| Author (year) | Associates / Risk Factors | Study quality |
|--------------|---------------------------|---------------|
| **Beekrum et al. (2011) [24]** South Africa | • Hopelessness and despair  
• Previous suicide or attempted suicide by a close family member  
• Confictual, disengaged or over-protective family relationships  
• Strained adolescent-parent communication  
• Conflicting social roles and values in the context of contemporary acculturation pressures  
• Academic failure  
• Breakup  
• Lack of social support  
• Physical and emotional abuse in the family | 5/5 |
| **Okoko et al. (2011) [90]** The Congo | • Previous suicide attempt  
• Psychosis  
• Alcohol abuse  
• Drugs abuse  
• Emotional breakdown  
• School problems  
• Breakup  
• Domestic violence victimisation  
• Sexual abuse  
• Neglect  
• Incest | 4/5 |
| **Pretorius (2011) [29]** South Africa | • Personal history of suicide attempts suicide;  
• Previous diagnosis of mood disorders (i.e., major depression, and bipolar disorder)  
• Experience of human trafficking before removal from parental care  
• Dysfunctional parenting (unavailability, conflict, or alcoholism) before removal from parental care  
• Family history of attempted suicide  
• Observation of the self-harm of another adolescent at the same children’s home  
• Abuse (i.e., physical, sexual, and emotional abuse) before removal from parental care. | 3/5 |
| **Campbell (2012) [45]** South Africa | • Female sex;  
• Coloured race;  
• Stressful relationships with parents and extended family  
• Financial hardship  
• Stressful romantic relationship  
• Negative life events | 3/5 |
| **Shilubane et al. (2012) [32]** South Africa | • Perceived accusations of negative behaviour  
• Feelings of physical rejection  
• Acute negative mood (e.g., depression, anger, hopelessness)  
• Being unaware of community-support resources  
• Personal history of attempted suicide  
• Confictual and strained family relationships  
• Lack of family support  
• Family member HIV positive status  
• Death of close family member  
• Family history of attempted suicide  
• Lack of trusted peer support  
• Peer suicide attempt | 4/5 |
| **Swahn et al. (2012) [30]** Uganda | • Sadness  
• Expectations of dying prior to age 30  
• Parental neglect due to alcohol use  
• Community involvement in child marriage prevention  
• Sexual violence victimisation | 4/5 |
| **Vawda (2012) [47]** South Africa | • Family member suicide  
• Both parents deceased  
• Use of dagga | 3/5 |
| **Gage (2013) [25]** Ethiopia | • Currently employed  
• Lost much sleep over worry  
• Depression  
• Receiving marriage request  
• Community involvement in child marriage prevention  
• Use of dagga | 4/5 |
| **Muula et al. (2013) [48]** Zambia | • Female sex  
• Aged ≤14 yrs.  
• Loneliness  
• Sleeplessness due to worry  
• Hopelessness  
• Suicidal ideation  
• Marijuana use  
• Drunkenness  
• Use of dagga | 5/5 |
| Author (year) | Associates / Risk Factors | Study quality |
|--------------|--------------------------|---------------|
| Shilubane et al. (2013) [49] South Africa | • Female sex  
• Hopelessness  
• Feeling unsafe  
• Substance use  
• Having unsafe sex  
• Older adolescence  
• Body dissatisfaction,  
• Lower grade | 5/5 |
| Chinawa et al. (2014) [51] Nigeria | • Depression  
• Alcohol and drug use | 2/5 |
| Penning & Collings (2014) [53] South Africa | • Female sex  
• Domestic injury  
• Domestic assault  
• Emotional abuse  
• Negative child sexual abuse appraisals | 5/5 |
| Randall et al. (2014) [54] Benin | • Male sex  
• Anxiety  
• Loneliness  
• Substance use  
• Being attacked | 5/5 |
| Lippi (2014) [52] South Africa | • Severe depression  
• Parenting style  
• Severe physical abuse  
• Severe emotional abuse  
• Sexual abuse or rape  
• Community violence  
• Domestic violence  
• Orphanhood by homicide | 3/5 |
| Cluver et al. (2015) [56] South Africa | • Older adolescence  
• Female sex  
• Orphanhood by AIDS,  
• Previous suicide attempt  
• Parental AIDS-illness  
• Food insecurity  
• Severe physical abuse  
• Severe emotional abuse  
• Sexual abuse or rape  
• Community violence  
• Domestic violence  
• Orphanhood by homicide | 4/5 |
| Ng et al. (2015) [57] Rwanda | • Child mental health symptoms (i.e., Depression above diagnostic threshold; conduct problems).  
• Parenting style  
• Family conflict  
• Death in family  
• Academic failure  
• Lack of social support  
• Bullying  
• Physical fight  
• Physically attacked  
• Physically bullied | 5/5 |
| Giri (2016) [58] Ethiopia | • Family history of suicide  
• Loneliness  
• Hopelessness  
• Mental illness  
• Financial loss  
• Parental tobacco use  
• Lifetime sexual partners  
• Number of days people smoked in presence weekly  
• Having many close friends  
• Food insecurity  
• Having many close friends  
• Bullying  
• Being attacked  
• Fighting  
• Assaulted with a weapon  
• Having been robbed | 5/5 |
| Shaikh et al. (2016) [59] Malawi | • Female sex  
• Early sexual debut  
• Serious injury  
• Loneliness  
• Anxiety  
• Suicide ideation  
• Suicide planning  
• Alcohol use  
• Parental understanding  
• Food insecurity  
• Having many close friends  
• Bullying  
• Being attacked  
• Fighting  
• Assaulted with a weapon  
• Having been robbed | 4/5 |
| Asante et al. (2017) [62] Ghana | • Anxiety  
• Loneliness  
• Parental understanding  
• Food insecurity  
• Having many close friends  
• Bullying  
• Being attacked  
• Fighting  
• Assaulted with a weapon  
• Having been robbed | 5/5 |
| Asante & Meyer-Weitz (2017) [31] Ghana | • Female sex  
• Aged 15 years or older  
• Smoking  
• Past alcohol use  
• Present alcohol use  
• Marijuana use  
• Survival sex  
• Parental support  
| | 4/5 |
| Peltzer & Pengpid (2017) [65] | • Health risk behaviours  
• Hunger  
| | 4/5 |
| Author (year) | Country         | Personal a & Risk Factors | Family b | School c  | Interpersonal d | Abuse and violence e | Study quality |
|--------------|-----------------|---------------------------|----------|-----------|-----------------|----------------------|---------------|
| Amare et al. (2018) [67] | Ethiopia      | • Living alone            | –        | • Truancy | • Poor social support | –                  | 5/5           |
| |                        | • Loneliness            |          |          |                 |                      |               |
| |                        | • Hopelessness          |          |          |                 |                      |               |
| |                        | • Sleep disturbance worries |        |          |                 |                      |               |
| |                        | • Being physically hurt |          |          |                 |                      |               |
| Khuzwayo et al. (2018) [68] | South Africa | • Aged 16 years and above | –        | –         | –               | • Threatened in school with a weapon | 3/5 |
| |                        | • Female sex            |          |          |                 | • Bullied in school |               |
| |                        | • Cannabis use          |          |          |                 | • Dating violence victimisation |               |
| |                        | • Anger                 |          |          | • Conflict with parents |                      |               |
| |                        | • Low mood              |          |          | • Breakup       |                      |               |
| |                        | • Suicidal ideation     |          |          | • Impulsivity   |                      |               |
| |                        | • Previous suicide attempt |       |          | • Unemployment  |                      |               |
| |                        | • Impulsivity           |          |          | • Conflict with parents |                      |               |
| |                        | • Unemployment          |          |          | • Truancy       |                      |               |
| van der Wal & George (2018) [70] | South Africa | • Emotional reactivity    | –        | –         | –               | • Social support    | 3/5           |
| |                        | • Tension-reduction coping |      |          |               |                      |               |
| Baiden et al. (2019) [71] | Ghana               | • Anxiety                | –        | –         | –               | • Having a close friend | 5/5 |
| |                        | • Illicit substance use |          |          | • Breakup       |                      |               |
| |                        | • Physical activity     |          |          | • Loss of significant other |                      |               |
| Carvalho et al. (2019) [97] | Cross-national study | • Cannabis use           | –        | –         | –               | • Bullying victimisation | 5/5 |
| |                        | (Benin, Ghana, Mozambique, Namibia, & Tanzania) |          |          |               |                      |               |
| Darré et al. (2019) [73] | Togo                | • Female sex             |          |          | • Family history of suicide | • Living as a couple | 3/5 |
| |                        | • Being aged > 18       |          |          | • Financial problems |                      |               |
| |                        | • Sentinel problems     |          |          | • Family problems |                      |               |
| |                        | • Health problems       |          |          | • Absence of parents |                      |               |
| |                        | • Loneliness            |          |          |                 |                      |               |
| |                        | • Unwanted pregnancy    |          |          |                 |                      |               |
| |                        | • Distaste of life      |          |          |                 |                      |               |
| |                        | • Abstinence            |          |          |                 |                      |               |
| Koyanagi, Oh et al. (2019) [74] | Cross-national study | –         |          |          | –               | • Bullying victimisation | 5/5 |
| |                        | (Benin, Ghana, Malawi, Mauritania, Mozambique, Namibia, Seychelles, Swaziland, & Tanzania) |          |          | • Children and adolescent food insecurity |                      |               |
| Koyanagi, Stubbs, et al. (2019) [75] | Cross-national | –         |          |          | –               |                      | 5/5           |
| |                        | (Benin, Ghana, Mauritania, Mozambique, & Tanzania) |          |          | • Family history of suicide |                      |               |
| |                        | • Financial problems    |          |          | • Living as a couple |                      |               |
| |                        | • Family problems       |          |          | • Death of a loved one |                      |               |
| |                        | • Absence of parents    |          |          |                 |                      |               |
sub-Saharan Africa due to poverty, unemployment, death of parents (to AIDS), physical and sexual abuses including (forced) child marriage – displacement by wars and conflicts, substance use and abuse (due to less than ideally regulated access to prescription medication), family conflict, among others [99, 100]. Under the circumstances, it is surprising that rates are not higher in African studies.

Findings from the qualitative studies in this review suggest some reasons for the high levels of self-harm among young people: entrenched cultural and family rules of comportment and norms of obedience and respect and the sense of powerlessness experienced by both boys and girls as linked to self-harm [22–24, 27, 32]. The higher prevalence estimates in females have been attributed to socially and religiously sanctioned oppression and exploitative normative gender role discrimination against women and girls [101]. Compared to young males, young females tend to be victims of more domestic chore burdens, caretaking responsibilities, sexual abuse and exploitation, exclusion from education, unemployment, and exclusion from decision making [11, 101]. Thus, as found in regional reviews of studies involving adult samples [11, 12] and psychological autopsy studies of suicide in Africa [102, 103], self-harm and suicide among women has been interpreted as protestation against socially sanctioned abuse and oppressive control, while men’s self-harm and suicide represent a quest for lost masculinity.

**Strengths and limitations of this review**
Our comprehensive search strategy identified a substantial literature in a previously under-reviewed geographical area. Of the 74 studies, 12 (16.2%) were peer-reviewed articles exclusively indexed in the African regional academic databases searched. These 12 papers represent a valuable addition to previous reports covering parts of sub-Saharan Africa [10].

Our categorisation of the factors associated with self-harm into personal, family, school, interpersonal level factors was motivated by the wide variation and the

| Author and Year | Country | Personal a | Family b | School c | Interpersonal d | Abuse and violence e | Study Quality |
|-----------------|---------|------------|----------|----------|-----------------|---------------------|--------------|
| Nguyen et al. (2019) [76] | Cross-national (Nigeria, Uganda, & Zambia) | – | • Orphanhood prior to age 18 | – | – | • Coerced/forced sexual initiation | 5/5 |
| Shayo & Lwalwa (2019) [78] | Tanzania | • Loneliness | • Anxiety | • Younger age | • Food insecurity | Parental care | – | 5/5 |
| Thornton et al. (2019) [79] | Cross-national (South Africa & Guyana) | – | – | – | • Social stress | – | 2/5 |
| Vancampfort et al. (2019) [82] | Cross-national (Benin, Ghana, Mauritania, Mozambique, Namibia, Seychelles, & Tanzania) | • Sedentary leisure-time | – | – | – | – | 5/5 |

aPersonal level factors: These include personal characteristics and histories, and factors related to personal (mental) health conditions

bFamily level factors: These cover factors and circumstances within the family, and relationships and interactions with family members
cSchool-level factors: These relate to academic performance and relationships and circumstances within the school context
dInterpersonal level factors: These are circumstances related to the individual’s relationships with peers and neighbours, and other social relationships and interactions outside the family and school contexts
eAbuse and violence: Based on previous evidence, we created this category to include all abuse and violence items – that is psychological, physical, emotional, and sexual abuse victimisation items

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Table 4: Associates, Risk and Protective Factors of Self-Harm (by year of publication) (Continued)
**Table 5** Reported Reasons for Self-harm (by year of publication)

| Author & Year | Term | Setting | Design | Sample | Intrapersonal Reasons | Interpersonal Reasons | Study Quality |
|---------------|------|---------|--------|--------|-----------------------|-----------------------|---------------|
| Sefa-Dedeh & Canetto (1992) Ghana | Attempted suicide | General Hospital | Qualitative clinical case study of clinical records. (Two cases: Only Case A included in review). | To: ▪ Die ▪ Validate self | To: ▪ Get revenge against parents ▪ Make parents feel guilty; ▪ Obtain empathy and understanding from family. ▪ Regain control over social relationships and resources. | 4/5 |
| Wassenaar et al. (1998) South Africa | Attempted suicide | General Hospital | Qualitative clinical case study of clinical records. (Three cases: Only Case 2 included in review). | To die | To resolve conflict with parents. | 4/5 |
| Mhlongo & Peltzer (1999) South Africa | Parasuicide | Patients' records and interviews with patients presenting with self-harm. (n = 100) | To die (27 [27%]) | To demonstrate, usually, against family conflicts and abuse (58 [58%]) | 3/5 |
| Beekrum et al. (2011) South Africa | Non-fatal suicidal behaviour | General hospital | Qualitative case study. (n = 10) | To: ▪ Stop feelings of hopelessness and despair. ▪ Get rid of negative thoughts. | To: ▪ Let others (e.g., boyfriend, or parent) change their behaviour or attitudes. ▪ Communicate distress related to conflict with parents, parental conflict, high parental expectations, and peer-cultural conflict. ▪ Get parents/family to understand their problems. | 5/5 |
| Pretorius (2011) South Africa | Deliberate self-harm | Children's homes | Mixed methods approach. (n = 12) | To: ▪ Stop bad feelings (8 [66.6%]) ▪ Feel relaxed (7 [58.3%]) ▪ Feel something, even if it was pain (7 [58.3%]) ▪ Punish self (5 [41.6%]) ▪ Relieve feeling numb/empty (5 [41.6%]) | To: ▪ Get control of a situation (5 [41.6%]) ▪ Receive more attention from guardians/caregivers/friends (2 [16.6%]) ▪ Get guardians/caregivers to understand you (2 [16.6%]) ▪ Get help (1 [8.3%]) | 3/5 |
| van Rooyen (2013) South Africa | Deliberate self-harm | University | Cross-sectional survey of students. (n = 603) | To: ▪ Stop bad feeling ▪ Relieve feeling numb or empty ▪ Punish yourself ▪ Feel relaxed ▪ Get control of a situation ▪ Feel part of a group ▪ Be like someone you respect ▪ Avoid having to do something unpleasant you don’t want to do | To: ▪ Let others know how desperate you were ▪ Try to get a reaction from someone, even if it’s a negative reaction ▪ Receive more attention from your parents or friends ▪ Get your parents to understand or notice you ▪ Get other people to act differently or change ▪ Avoid school, work, or other activities ▪ Avoid being with people | 3/5 |
| Meissner & Bantjes (2017) South Africa | Attempted suicide | University | One-to-one semi-structured qualitative interviews with students with histories of attempted suicide. (n = 4) | To: ▪ Escape feeling trapped ▪ Avoid suicide ▪ Distract from painful memories ▪ Die | To: ▪ Make emotional pain visible to others ▪ Disconnect from others | 5/5 |
| Kritzinger (2018) South Africa | Non-Fatal Suicidal Behaviour | General hospital | Qualitative case study approach: One-to-one semi-structured interviews with clinical sample of adolescents. (n = 10) | To: ▪ Escape unbearable thoughts ▪ End sense of meaninglessness ▪ Die | To: ▪ Escape a painful/unbearable situation ▪ Make parents change their mind/behaviour. | 5/5 |

a Intrapersonal reasons (i.e., reasons intended to change one's state or circumstances); reasons or motives relate to desired changes in one's personal or internal state, including changes in sensations, emotional states or thoughts.

b Interpersonal reasons (i.e., reasons intended to change the state or circumstances of significant others); include desired changes within one's social environment, such as communicating distress to someone, or to influence the behaviour of others or to punish others.

c Frequency distribution of reasons not reported.
general lack of meaningful classification of these factors across the studies and is not without limitations. For example, in terms of the factors associated with self-harm, there is likely to be significant inherent interdependence between, for example, personal level factors and family level factors – family factors could be influencing the onset of the personal level factors and vice-versa – or between personal, school and interpersonal levels. The categorisation into intrapersonal and interpersonal factors too is therefore likely to be subject to considerable interdependence.

Future directions
Future studies should explore the prevalence estimates of self-harm among young people in non-clinical contexts such as the community and schools [6–8]. Participants in such prevalence studies should include other minority and vulnerable groups of young people including the homeless, and other out-of-school children and youth; lesbian, gay, bisexual, and transgender (LGBT) youth; orphans, and other children and youth in especially difficult circumstances including those with disability and in juvenile detention, who are often unrepresented or under-represented in population based studies on issues affecting young people [27, 33]. Recently, evidence of school-based studies from sub-Saharan Africa – and across the African continent, generally – indicates that the population of young people reporting LGBT and other sexual minority orientation is growing [104]. However, studies on their (mental) health needs are limited [99, 100].

Recent systematic reviews and primary studies from high-income countries indicate that street-connected children and adolescents represent a good case example of a high-risk group whose self-harm has received inadequate attention in the recent research literature [105]. In carrying out future studies, researchers should clearly define self-harm and more importantly, present to participants the operational definition used in the study, in order to facilitate recall and accurate responses.

More examination is needed of risk-factors for self-harm, not least in attempting to identify the temporal sequence of reported associations to help clarify interdependence between such factors. Future research (including qualitative studies) should also consider exploring factors such as social support, parenting styles, and school climate, which serve to protect young people in sub-Saharan Africa from engaging in self-harm. Such research can inform programmes aimed at strengthening protective and promotive factors within families and schools, and at local community levels can have significant positive effects on improving the developmental outcomes of vulnerable young people [106].

Too much research into risk and protective factors in self-harm has used concepts and measures developed in high income countries. We need to know more about specific features of life in sub-Saharan countries.

Conclusion
Together, the studies in this review suggest that self-harm is a public (mental) health challenge in young people across countries within sub-Saharan Africa. Given what we know about the link between self-harm and poor mental health, impaired social function and increased suicide risk, more research into the epidemiology, causes and treatment of self-harm in this setting is justified. Too few studies from too few countries have examined the methods of self-harm, risks, protective factors, and the reasons associated with self-harm from a culturally and socially sensitive perspective. The findings of the reviewed studies were overly influenced by the use of pre-existing Western derived models and measures.

Supplementary information
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Authors’ contributions
EQ, MW and AH conceived this study; EQ performed the literature search, extracted the data and conducted narrative analysis; AH and MW contributed to the eligibility screening consensus discussion to ensure accuracy of data extraction; EQ drafted the manuscript. All the authors contributed to the interpretation of results and revision of the manuscript and approved the final version.

Abbreviations
IQR: interquartile range; MMAT: mixed method appraisal tool; PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses; PRISMA-P: Preferred Reporting Items for Systematic Reviews and Meta-Analysis protocols; SA-ETD: South African national Electronic Theses and Dissertations; WHO: World Health Organization; UNICEF: United Nations International Children’s Emergency Fund; UNDP: United Nations Development Programme

Additional file 1. PRISMA flow chart.
Additional file 2. PRISMA checklist.
Additional file 3. Search strategies.
Additional file 4. Authors contacted.
Additional file 5. Sources of included studies.
Additional file 6. Methods and designs used by studies.
Additional file 7. Methodological quality ratings of studies.
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Availability of data and materials
An unpublished protocol guiding this review was completed in June 2016 by following PRISMA-P statement [107]. A copy of the protocol is available from the first author on reasonable request. All data generated or analysed during this study are included in this published article and its supplementary information files.

Ethics approval and consent to participate
This systematic review received ethical approval from the School of Psychology Ethics Committee University of Leeds, UK (Ref. No. 16–0373). Consent to participate is not applicable.

Consent for publication
Not applicable.

Competing interests
EQ authored two of the cross-sectional studies included in this review. We declare no other competing interests.

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