Falls risk assessment outcomes and factors associated with falls for older Indigenous Australians

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Abstract

Objective: To describe the prevalence of falls and associated risk factors in older Indigenous Australians, and compare the accuracy of validated falls risk screening and assessment tools in this population in classifying fall status.

Method: Cross-sectional study of 289 Indigenous Australians aged ≥45 years from the Kimberley region of Western Australia who had a detailed assessment including self-reported falls in the past year (n=289), the adapted Elderly Falls Screening Tool (EFST; n=255), and the Falls Risk for Older People-Community (FROP-Com) screening tool (3 items, n=74) and FROP-Com falls assessment tool (n=74).

Results: 32% of participants had ≥1 fall in the preceding year, and 37.3% were classified high falls risk using the EFST (cut-off ≥2). In contrast, for the 74 participants assessed with the FROP-Com, only 14.9% were rated high risk, 35.8% moderate risk, and 49.3% low risk. The FROP-Com screen and assessment tools had the highest classification accuracy for identifying fallers in the preceding year (area under curve >0.85), with sensitivity/specificity highest for the FROP-Com assessment (cut-off ≥12), sensitivity=0.84 and specificity=0.73.

Conclusions: Falls are common in older Indigenous Australians. The FROP-Com falls risk assessment tool appears useful in this population, and this research suggests changes that may improve its utility further.

Key Words: Falls, Aboriginal, risk assessment, remote population, older people

Falls among older Australians are the leading cause of injury-related hospitalisations.[1] Recent research in the Kimberley region of Western Australia reported that 31% of Aboriginal Australians aged >45 years fell at least once in the previous year, and 12% reported injuries associated with falls.[2] Falls-related hospitalisations and associated head injuries data in the older Australian population show falls contributed to 81.4% of all injuries, and Indigenous Australians had 1.7 times the rate of head injuries compared to non-Indigenous persons.[3] Research on hip fracture risk profiles in older Indigenous Australians identified that high incidence of chronic illness such as diabetes mellitus and renal disease increased fracture risk. This is a combination of increased falls risk due to visual and muscular factors and, particularly in renal failure, weaker bones due to renal osteodystrophy and osteoporosis.[4] Investigation of factors associated with dementia among older Indigenous Australians identified presence of multiple known risk factors for falls reported in the general older population.[5] This study used the Kimberley Indigenous Cognitive Assessment (KICA) tool as part of a suite of assessments which enabled researchers to document previously unrecognised Indigenous health problems that have major implications for future Indigenous health care.[6] While these studies identified some falls risk factors in Indigenous Australians, no specific validated falls risk tool was used to evaluate the level of risk and specific contributory factors.

Falls risk factors are often categorised as intrinsic (e.g. impaired gait, poor vision) and extrinsic (e.g. poor lighting, uneven or slippery surfaces).[7] Four or more risk factors substantially increase the risk of falls,[8] with many studies reporting factors that contribute to falls risk in older populations.[9-10] Many falls risk factors are modifiable, with interventions such as exercise, medication review and home safety modification,[11] as well as multifactorial interventions, often based on a falls risk assessment, being effective in reducing falls.[11] However, there has been little research investigating risk factors for falls among older Indigenous Australians.

There are a number of validated falls risk screening and assessment tools available for use in community settings to assist

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Submitted: January 2016; Revision requested: March 2016; Accepted: May 2016
The authors have stated they have no conflict of interest.

Aust NZ J Public Health. 2016; 40:553-8; doi: 10.1111/1753-6405.12569

health practitioners to identify level of falls risk, contributory risk factors, and support tailoring of interventions to individual need.[12-15] Two existing falls risk screening tools, and a falls risk assessment tool were evaluated in this study with older Indigenous Australians.

The primary aim of this study was to determine the accuracy in classifying falls status for the two falls risk screening tools, and the falls risk assessment tool in older Indigenous Australians. Secondary aims included describing the prevalence of falls and associated risk factors.

Methods

Study design and participants

Participants were recruited in the second wave (W2) (2011-2013) of a cohort study of 363 Indigenous Australians originally recruited between 2004-2006 (Wave 1-W1).[2] This study (W2) included falls risk screening and assessment items not measured in W1.

Table 1: Participant characteristics for the full sample (n=289) and the sub-sample who completed a falls risk (FROP-Com) assessment.

Item	Full sample (n=289) n (%)	FROP-COM only (n=74) n (%)
Age		
45-49	45 (15.6)	8 (10.8)
50-59	111 (38.3)	24 (32.4)
60-69	61 (21.1)	13 (17.6)
70-79	47 (16.3)	19 (25.7)
80+	25 (8.7)	10 (13.5)
Gender		
Male	128 (44.3)	34 (45.9)
Female	161 (55.7)	40 (54.1)
Interpreter		
None	235 (81.3)	62 (83.7)
Professional	11 (3.8)	3 (4.1)
Community worker	13 (4.5)	1 (1.4)
Family	12 (4.2)	4 (5.4)
Other	18 (6.2)	4 (5.4)
Place of interview		
Home	156 (54.0)	43 (58.1)
Home of relative	23 (8.0)	2 (2.7)
Clinic	22 (7.6)	6 (8.2)
Residential care	17 (5.9)	4 (5.4)
Other	71 (24.5)	19 (25.6)
Cognition (KICA-Cog)		
Cognitively intact (≥36)	181 (74.5)	43 (63.2)
Cognitively impaired (≤35)	62 (25.5)	25 (36.8)
Self reported falls in past 12 months		
Any fall	89 (31.8)	22 (29.8)
≥2 falls	41 (14.2)	10 (13.5)
Male ≥2 falls	18 (14.1)	6 (17.6)
Female ≥2 falls	23 (14.3)	4 (10.0)

Members of six remote communities and a random sample from one town in the Kimberley region of Western Australia were invited to participate in the initial study.[2] Inclusion criteria were being of Aboriginal or Torres Strait Islander descent, living in one of the participating communities, and age ≥45 years. A total of 289 people were assessed in W2 (184 of the original cohort and 105 new recruits, Table 1).

Community agreement was obtained for the project in each area. Participants provided written informed consent. Ethics approval was received from the Human Research Ethics Committee of the University of Western Australia, and the Western Australia Aboriginal Health Ethics Committee.

Procedure and outcomes measures

Trained assessors including Aboriginal researchers and Aboriginal remote community workers collected data through face-to-face interviews. Demographic and health related factors, including the Kimberley Indigenous Cognitive Assessment (KICA-Cog),[6] medications used, and depression (Kimberley Indigenous Cognitive Assessment of Depression (KICA-dep) scale) were assessed.[16-17] In W2, falls related assessments were also utilised:

- Self-reported number of falls in the preceding year, with a fall defined as: "An event which results in a person coming to rest inadvertently on the ground or floor or other lower level other than as a consequence of the following: sustaining a violent blow, loss of consciousness, sudden onset of paralysis, or an epileptic seizure".[18](p 4)
- The Elderly Falls Screening Tool–(EFST, Table 2), adapted for this group.[19] Each question was scored 0 (no risk) or 1 (high risk), with scores ranging from 0 to 5, and total scores of ≥2 indicating high risk of falls.[19]
- The Falls Risk for Older People–Community version (FROP-Com, Table 4)[15] was used in a convenience sub-sample, (n=74, 25.6%), administered by a clinical specialist to identify presence of falls risk factors following the initial assessment using the KICA tool. Due to cultural, linguistic and educational reasons, the KICA-Cog (Cognitive Assessment)[6] was used in place of the FROP-Com AMTS (Abbreviated Mental Test Score) items for the majority of the participants, as it has been adapted and validated for use with Indigenous Australians.[15] Both KICA-Cog and AMTS scores were categorised into a four-point category score for use in the FROP-Com cognition section (0=KICA scores of >36 [good cognition]; 1=KICA scores of 33-35; 2=KICA scores of 26-32; and 3=KICA scores of <26 [marked cognitive impairment]).
- The Falls Risk for Older People–Community setting screening tool (The FROP-Com screen),[20] a subset of three items from the FROP-Com tool (Table 3).

Statistical analysis

SPSS version 22 was used to analyse data. Demographic and assessment measures that were continuous were assessed for normal distribution, with parametric analyses used for normally distributed measures, and non-parametric analyses for non-normally distributed measures. Frequency measures

Table 2: Elderly Falls Screening Tool risk factors (sub-sample with completed FROP-Com score; n=74) cross-tabulated with self-reported falls in past 12 months.

EFST Item	Category	No Fall n (%)	1 or more Falls n (%)	Missing n (%)	*p* value
How many times have you fallen in the last year	Nil	–	–	–	–
	1 or more falls	–	–	–	–
Did you hurt yourself?	No	44 (60.3)	10 (13.7)	1 (1.4)	0.000
	Yes	0	19 (26)		
Near fall?	Never	23 (33.3)	10 (14.5)	4 (6.8)	0.059
	1-more than 10 times	17 (24.6)	19 (27.5)		
Walking speed (time to walk 5m)	<10 secs	31 (43.1)	16 (22.2)	0	0.334
	>10 secs	10 (13.9)	11 (15.3)		
	Unable to do	2 (2.8)	2 (2.8)		
Gait/walking style	Even gait	29 (40.8)	13 (18.3)	0	0.168
	Uneven gait	12 (16.9)	14 (19.7)		
	Unable to do	2 (2.8)	1 (1.4)		
Falls risk	≤1	25 (38.5)	6 (9.2)	9 (12.2)	0.001
	≥2	13 (20.0)	21 (32.3)		

were used to report the most common falls risk factors from the screening and assessment tools.

The association between individual falls risk factors on the FROP-Com, FROP-Com Screen and EFST and self-reported falls status (no falls in past year vs ≥1 fall in the past year) were assessed using chi squared analysis.

Sensitivity, specificity, positive and negative predictive values were calculated to evaluate the classification accuracy of the two screening tools (EFST and FROP-Com Screen) and overall falls risk classification for the FROP-Com assessment in correctly identifying participants who self-reported having one or more falls in the preceding year. A Receiver Operating Characteristic (ROC) Curve was also used for these analyses.

Statistical significance was set at 5% for all analyses.

Results

Participant profile and falls history

Participants' average age was 60.8 years (SD 11.1 years), and 55.7% were female (Table 1). Most assessments were conducted without need for an interpreter, and more than 50% were in participants' homes. Of the 289 participants, 32% reported ≥1 fall in the preceding year; of these 14.6% experienced ≥2 falls (Table 1). Falls increased with age (27.8% of those aged 45-60 fell; 61-75 years – 33.8%; and ≥76 years – 42.9%). There was no significant difference in the proportion of females with ≥2 falls (14.3%) and males (14.1%) for the full sample (Table 1).

Cognition was assessed with the KICA-Cog for 84% of participants. The average KICA score was 36.2 (SD 4.0). One hundred and eighty-one participants (74.5%) were classified as having normal cognition (KICA-Cog≥36, AMTS>8), 62 participants (25.5%) were classified as cognitively impaired KICA-Cog≤35, AMTS≤8 (Table 1).

Falls risk screening and assessment outcomes

EFST results were available for 255 participants (88.2%). Ninety-five participants (37.3% of those with a completed EFST) were classified at high falls risk, using the published cut-off score of ≥2.

A subset of participants (n=74, 25.6%) completed the FROP-Com assessment. Comparison of demographic variables between participants who had completed the FROP-Com, and those who did not (n=215) identified no significant difference between groups for gender, but small, significant differences between the samples for age and falls risk (based on the EFST screen total score) ($p<0.05$). The FROP-Com sub-sample were older (mean 64.0 [SD=11.9] vs 60.2 [SD=10.8] years), and had slightly higher EFST falls risk (mean 1.6 [SD=1.4] vs 1.2 [SD=1.4]). The FROP-Com screen, as part of the FROP-Com, was also only assessed on these 74 participants.

Table 3: FROP COM Screen risk factors (sub-sample with completed FROP-Com score; n=74) cross-tabulated against self-reported falls in past 12 months.

FROP Com Screen Item	Outcome	No Fall n (%)	1 or more falls – n (%)	Missing n (%)	P value
Number of falls in past 12 months	No fall	-	-		
	1 or more	-	-		
Prior to this fall how much assistance was required for instrumental ADLs?*	None	36 (48.6)	11 (14.9)		
	Supervision-dependent	12 (16.2)	11 (14.9)	4 (5.4)	0.039
When walking and turning does the individual appear unsteady /risk of losing their balance?	No unsteadiness	31 (41.8)	7 (9.5)		
	Minimal to severe unsteadiness	21 (28.4)	14 (18.9)	1 (1.4)	0.042
Falls risk	0-3 Low risk	44 (59.5)	15 (20.2)	5 (6.8)	
	4-9 High risk	4 (5.4)	6 (8.1)		0.028

** Cooking, housework, laundry*

For the sub-sample with complete FROP-Com assessments, the risk factors with the highest proportion of the sample classified as high risk (i.e. scored 3 on the 0-3 point scale items, or 1 on the 0-1 scale items) were: number of prescription medications (53.4%), vision impairment (32.4%); inappropriate footwear (33.3%), nocturia (31.1%), incontinence (24.3%) and foot problems (20.8%). Although only five percent were rated as having severe balance impairment on walking and turning, 47% were rated as at least minimally unsteady on walking and turning. Forty-nine per cent of participants were assessed on the FROP-Com to have mild falls risk (scores≤11, n=33), 35.8% moderate falls risk (scores 12-18, n=24), and 14.9% were classified as high falls risk (scores≥19, n=10). Five FROP-Com risk factors differentiated fallers from non-fallers: i) higher number of medications associated with falls risk; ii) vision loss; iii) the home appears unsafe (multiple falls hazards); iv) assistance with instrumental activities of daily living prior to fall; and v) unsteady when walking and turning/risk of losing balance ($p<0.05$, Table 4).

Using the FROP-Com screen, only 10 (14.9%) of the sub-sample were classified at high falls risk (cut-off score ≥4) (Table 3), compared to 37.3% of the full sample classified as high risk on the EFST.

To enable comparison of the accuracy of classifying falls status (self-reported falls in the preceding year) between the tools, sensitivity, specificity, positive and negative predictive values and ROC analyses were performed using the sub-sample of n=74 with data for all three tools (Figure 1). Area Under the Curve (AUC) was significantly greater for the FROP-Com screen [0.886 (0.806-0.966) (95% Confidence Interval)], and the FROP-Com (classifying moderate or high falls risk together, scores ≥12; AUC=0.860), than for the EFST. Using the previously published cut off points to differentiate increased risk, the best combination of sensitivity and specificity was achieved by the FROP-Com (scores ≥12; sensitivity 0.842, specificity 0.733). At the cut off of 4 or above, the FROP-Com Screen had low sensitivity (0.158) but high specificity (0.956). This low sensitivity is likely due to the small number of participants classified above the recommended cut-off score (≥4) for this tool. When analyses were repeated for the FROP-Com screen using a cut-off of ≥3 to indicate high risk, 23 (33.3%) were classified at high risk, sensitivity was 0.632, and specificity was 0.911.

Discussion

Falls in Indigenous older people

This is the first study to use established falls risk screening tools and a falls risk assessment tool to investigate falls in Indigenous communities in Australia. It builds on preliminary investigations undertaken by our team that established that falls and associated injuries are at least as significant an issue in older Indigenous Australians as has been reported for older people generally in Australia and overseas.[2,21] This cohort of older Indigenous Australians was aged ≥45 years, compared to the commonly used aged cut-off of 60 or 65 years in most falls

Table 4: FROP-Com Identified Risk Factors (sub-sample with completed FROP-Com score; n=74) cross-tabulated with self-reported falls in past 12 months.

FROP Com Item	Outcome	No fall n (%)	1 or more falls n (%)	Missing n (%)	P
Falls in past 12 months?[c]					
Injury related to falls[c]	No	46 (68.7)	3 (4.5)	7 (9.5)	0.000
	Yes	0	18 (26.9)		
Number of prescription medications[c]	None apply	10 (13.5)	4 (5.4)	1 (1.4)	0.887
	1 or more apply	41 (55.4)	18 (24.3)		
No. of pre identified medications[a,c]	None apply	45 (60.8)	14 (18.9)	0	0.025
	1 or more apply	7 (9.5)	8 (10.8)		
Named medical condition affecting balance & mobility[c]	No chronic condition	7 (9.5)	1 (1.4)	0	0.259
	1 or more chronic condition	45 (60.8)	21 (28.4)		
Sensory loss/vision	No	39 (52.7)	11 (14.9)	0	0.036
	Yes	13 (17.6)	11 (14.9)		
Somatosensory	No	46 (64.8)	19 (26.8)	3 (4.1)	0.833
	Yes	4 (5.6)	2 (2.8)		
Foot problems	No	40 (55.6)	17 (23.6)	2 (2.7)	0.793
	Yes	10 (13.9)	5 (6.9)		
Inappropriate foot wear	No	35 (48.6)	13 (18.1)	2 (2.7)	0.366
	Yes	15 (20.8)	9 (12.5)		
Cognitive status[c, d]	Impaired[c]	16 (23.5)	9 (13.2)	6 (8.1)	0.624
	Not cognitively impaired	30 (44.1)	13 (19.1)		
Continence	No	10 (13.5)	8 (10.8)	0	0.116
	Yes	42 (56.8)	14 (18.9)		
3 or more trips to the toilet at night	No	15 (20.3)	8 (10.8)	0	0.523
	Yes	37 (50)	14 (18.9)		
Nutritional intake declined in last month[c]	No	47 (63.5)	17 (23)	0	0.132
	Small to moderate amount	5 (6.8)	5 (6.8)		
Weight loss in last 3-12 months[c]	No weight loss	44 (59.5)	17 (23)	0	0.448
	Small to severe weight loss	8 (10.8)	5 (6.8)		
Number of alcoholic drinks consumed in last month[c]	No alcohol	37 (54.4)	15 (22.1)	6 (8.1)	0.764
	1 plus alcoholic drinks	12 (17.6)	4 (5.9)		
Does home appear safe?[c]	No	7 (15.2)	9 (19.6)	28 (37.8)	0.001
	Yes	27 (58.7)	3 (6.5)		
Observed behaviours in activities of daily living[c]	Consistently aware of current abilities	46 (63)	18 (24.7)	1 (1.4)	0.318
	Under or over estimates abilities	5 (6.8)	4 (5.5)		
Prior to fall assistance was required with personal care activities?[c]	None	42 (57.5)	15 (20.5)	1 (1.4)	0.179
	Supervision/dependant	9 (12.3)	7 (9.6)		
Has this changed since last fall?	No	30 (60)	18 (36)	24 (32.4)	0.077
	Yes	0	2 (4.0)		
Prior to this fall how much assistance was required for instrumental ADLs?[b,c]	None	36 (51.4)	11 (15.7)	4 (5.4)	0.039
	Supervision/dependant	12 (17.1)	11 (15.7)		
Has this changed since most recent fall?	No	30 (61.2)	17 (34.7)	25 (33.8)	0.070
	Yes	0	2 (4.1)		
Does the individual unsteady /risk of losing their balance?[c]	No	31 (42.5)	7 (9.6)	1 (1.4)	0.042
	Yes	21 (28.8)	14 (19.2)		
Walk safely around home?[c]	Independent+/- gait aid gait aid	50 (68.5)	18 (24.7)	1 (1.4)	0.110
	Supervision/Unsafe	2 (2.7)	3 (4.1)		
Walk safely in community?[c]	Independent+/- gait aid gait aid	50 (68.5)	18 (24.7)	1 (1.4)	0.110
	Supervision/Unsafe	2 (2.7)	3 (4.1)		
How physically active is the individual?[c]	Not very to inactive	9 (12.3)	5 (6.8)	1 (1.4)	0.523
	Very to moderate	43 (58.9)	16 (21.9)		
Change since most recent fall?	No	32 (65.3)	16 (32.7)	25 (33.8)	0.166
	Yes	0	1(2.0)		
Falls Risk	Mild falls risk	31 (46.3)	2 (3.0)	7 (9.5)	0.000
	Moderate falls risk	12 (17.9)	12 (17.9)		
	High falls risk	2 (3.0)	8 (11.9)		

a: Sedative, Antidepressant, Anti-epileptics, Central-acting analgesic, Digoxin, Diuretics, Type 1a anti-arrhythmic, Vestibular suppressant

b: Cooking, housework, laundry

c: 4 point scale items, collapsed to dichotomous items in this table (0=nil risk; 1-3=mild/moderate or severe risk)

d: AMTS≤8 or KICA ≤36

risk assessment studies of non-Indigenous populations. With more than one-quarter of the 45-60 year age group reporting falls, there is clearly a need for falls prevention strategies including this younger age group for Australian Indigenous populations. Using retrospective recall of falls over the past year, 32% reported one or more falls. Fourteen percent of the full sample fell two or more times in the preceding year (multiple fallers), which is an indicator of increased risk of falls and injuries. Prospective representative studies of Australians aged over 65 years have reported substantially lower proportion of their samples having multiple falls (7.7% to 10%).[22,23] Retrospective falls recall (as used in our study) has been shown to underestimate falls incidence by about 20% compared to prospective falls data collection methods,[24] so the proportion of fallers and recurrent fallers may be even higher.

Falls risk screening and assessment outcomes

This study found that the FROP-Com assessment tool best classified fall risk among older Indigenous Australians. The study also found that the number of prescribed medications, vision impairment, inappropriate footwear, nocturia, incontinence, foot problems, and balance impairment were the most prevalent falls risk factors rated as high risk on this tool.

There was a large disparity in the proportion of the sample classified at high falls risk by the two falls risk screening tools, with 37.3% of the full sample, and 52.3% of the sub-sample (n=74) classified at high risk using the published cut-off of ≥2 for the EFST, while only 14.9% of the sample were classified at high risk using the published cut-off of ≥4 for the FROP-Com screen. The proportion classified at high risk using the FROP-Com screen was substantially lower than that reported for a high risk population in the validation study for this tool (older people presenting to emergency departments after a fall) (46.4%).[15] In the Russell et al. validation paper,[15] they discussed the issue of selecting a cut-off "in the context of the setting requirements" (p 44), and recommended consideration of the lower cut-off of ≥3. In view of this and the study outcome, there may be value in using the lower cut-off (≥3 indicating high risk) in general community samples, including Indigenous Australian samples, rather than the cut-off score derived from high risk samples presenting to

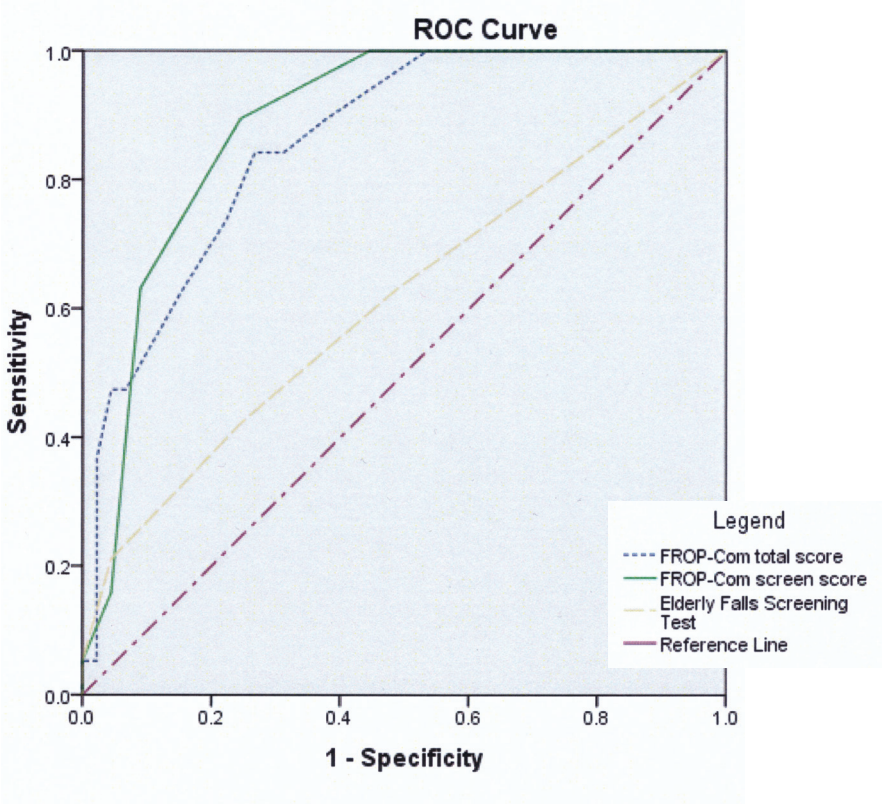
Emergency Departments after a fall that was used to validate the FROP-Com screen.

Although the FROP-Com performed well in terms of identifying falls status (sensitivity, specificity and AUC), the primary role of *assessment tools* such as this is to identify falls risk factors requiring attention in individuals (in contrast to *screening tools*, which have a main purpose of accurately classifying risk, but not to identify contributory risk factors). The mix of risk factors most commonly rated as high risk using the FROP-Com among this Indigenous sample provide some guidance as to falls prevention interventions that might have benefit from interventions shown to be effective in older people generally.[11] Medication review, vision review and optimisation, home safety review and modifications (although limited by moderate missing data), and exercise to improve balance, strength and mobility appear to be the most relevant risk factors to target in an intervention program for older Indigenous Australians. These risk factors are also known to be important falls risk factors in systematic reviews that have reported on primarily non-Indigenous populations.[9] However, comparison of prevalence of these risk factors between our sample and other studies is constrained to those using similar methods of obtaining data on falls risk (e.g. using the FROP-Com tool). Unfortunately, the FROP-Com has not been used in a representative sample of non-Indigenous older people for direct comparison of frequency of falls risk factors. To date, there have been no randomised trials investigating falls prevention interventions in older Indigenous Australians addressing prevalent falls risk factors, and this is an important area for future research.

For future research, the FROP-Com screen (using a lower cut-off score of ≥3) is recommended to quantify falls risk, and the full FROP-Com be used for those identified at increased risk, to identify modifiable risk factors and to inform decision making about interventions. Special consideration will need to be given to determine the most culturally appropriate and acceptable falls prevention interventions for this population, as this may differ from the implementation of interventions shown to be effective in non-Indigenous populations in Australia and elsewhere.

Some challenges were reported in utilising some of the FROP-Com items in this sample and setting, resulting in some minor

Figure 1: Sensitivity, specificity and Area Under Curve results for the three tools (EFST, FROP-Com screen, and FROP-Com) in correctly classifying falls status (self-reported falls in the past 12 months) (n=74).



	EFST	FROP-Com screen	FROP-Com
Sensitivity[#]	0.632	0.158	0.842
Specificity[#]	0.511	0.956	0.733
Positive Predictive Value[a]	0.333	0.667	0.576
Negative Predictive Value[a]	0.774	0.742	0.927
Area Under Curve (95%CI)	0.614 (0.455-0.733)	0.886 (0.806-0.966)	0.860 (0.769-0.951)

[#] calculated at previously published cut-off scores for FROP-Com (>12), FROP-Com screen (≥4), and EFST (≥2).

modifications being recommended for the FROP-Com if being used for evaluating falls risk factors in Indigenous Australians. The items and recommended modifications include: 1) Cognition – Modify the FROP-Com cognition section to have equivalent scoring for the culturally appropriate cognitive section of the Kimberley Indigenous Cognitive Assessment (KICA-Cog)[6] instead of the Abbreviated Mental Test Score (this was done for the analyses in this paper). 2) Environment – It was often difficult to access as generally the assessment was conducted outside the home as it was considered intrusive at times to go into the home. In these instances, the house interior was not able to be viewed. Alternative approaches may include use of images of unsafe environments to seek self-report of safety within the home, if a review of the actual home environment is not considered acceptable to some Indigenous older people. In addition, remote community settings often have additional hazards away from the home associated with a high prevalence of unpaved paths and roads, so most surfaces are uneven.

Several other FROP-Com items were at times difficult to assess using the existing FROP-Com wording (e.g. feet and footwear were considered difficult to rate in the standard manner for this setting, as most people in this cohort wore thongs and in many cases walked barefoot), or obtain relevant information (e.g. weight loss). Any modifications to the FROP-Com or the FROP-Com screening tool need to consider these culturally relevant issues, but also ensure that the tools remain concise and practical (in

terms of time and resource requirements) for acceptance in clinical practice. Some minor modifications may improve the utility of the FROP-Com in this sample, but this requires further investigation.

Study strengths and limitations

Strengths of this study included the engagement and support of the Kimberley Indigenous communities, and comparison of the different screening and assessment tools within the one sample. The study had several limitations that need to be considered in the context of interpreting the study results. The relatively small sample size who had the FROP-Com and FROP-Com screen completed, compared to the full sample who had the EFST may limit the generalisability of the FROP-Com and FROP-Com screen. The FROP-Com subsample had similar history of falls in the past 12 months and gender, and were slightly but significantly older, with small but significantly greater EFST falls risk. Use of self-reported falls data is known to underestimate falls rate by about 20%,[24] often with minor falls or less injurious falls not being recalled. Even minor, non-injurious falls can have moderate impact on older people, including loss of confidence and activity curtailment.[25] As a next step, it will be important to evaluate the FROP-Com and FROP-Com screen in a large prospective study using gold standard methods of monthly collection of falls data. A further limitation was that there was an item relating to falls history as a risk factor in each of the tools used to compare accuracy in classification of falls status. This may inflate the accuracy of the tools in classifying falls risk. However the FROP-Com, which was the tool with highest classification accuracy, would have been least influenced by this as the falls history question is one of 26 items used in the classification of falls risk.

In summary, this study identified a similar prevalence of falls and multiple falls in Indigenous Australians aged ≥45 years to those reported among non-Indigenous Australians aged ≥65 years. The FROP-Com screen and FROP-Com assessment tool appear suitable, with minor modification, for determining falls risk, and contributory risk factors, in older Indigenous Australians.

Acknowledgement

We gratefully acknowledge the assistance of the many community members living in Derby, Ardyaloon, Warmun, Wirrimanu, Looma, Junjuwa and Mowanjum who participated in this project.

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