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## Assessing The Validity Of A Culturally Modified Drinking Motives Questionnaire For Use In Aboriginal Communities.

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# Assessing The Validity Of A Culturally Modified Drinking Motives Questionnaire For Use In Aboriginal Communities.

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## Abstract

**Introduction:** Alcohol related harms disproportionately affect Aboriginal people in Australia. Motives to drink have been identified as the most proximal factor to alcohol consumption. **Objectives:** The aim of this study is to assess the validity of a culturally modified Drinking Motives Questionnaire-Revised (DMQ-R) (Cooper, 1994) with Aboriginal participants. **Design:** The study was cross sectional, utilising data collected via face-to-face surveys with a sample of adult Aboriginal participants. **Participants:** A convenience sample of 135 Aboriginal men (n=41) and women (n=94) from the Pilbara Region of Western Australia, who had consumed alcohol in the preceding 12 months. **Outcome Measures:** The Culturally modified DMQ-R (CDMQ-R) developed in consultation with Aboriginal community researchers and a local Aboriginal Community Reference Group was the primary outcome measure for this study. **Results:** Confirmatory Factor Analysis indicated the four-factor model of drinking motives as measured by a culturally modified DMQ-R was valid for use with Aboriginal people of the Pilbara region. **Conclusions:** While most items loaded on the factor solution as hypothesised, there were some minor discrepancies which suggest further modification may be needed. In addition, the reduction of the original five-point scale to a three-point scale created statistical challenges. Future research might seek to further refine the DMQ-R for this population and determine an appropriate method for expanding the response scale incorporating advice from Aboriginal people.

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## Keywords

Alcohol, Aboriginal, motivation, factor analysis, behaviour

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Alcohol is a substantial contributor to the global burden of disease, and in 2016, was ranked as the seventh highest risk factor for premature death and disability worldwide (Griswold et al., 2018). In Australia, alcohol use is of concern, with an average of 10.6 litres of pure alcohol per person (>15 years of age) being consumed per year (World Health Organization, 2019). While far from the heaviest consumers of alcohol, the country ranks within the top 20 nations on per capita consumption (2019), and alcohol related costs to the country have been estimated at \$10.52 billion (AUD) per year including costs relating to healthcare (\$1.98B), crime (\$1.42B) and labour (\$3.54B) (Collins & Lapsley, 2008).

Many Australians drink at levels considered high risk according to the National Health and Medical Research Council (NHMRC) guidelines for lifetime (harm from alcohol related disease or injury) and single occasion risk (alcohol injury arising from that occasion) (NHMRC, 2009). The Australian Institute for Health and Welfare (AIHW) 2019 National Drug Strategy Household survey showed 16.8 percent of participants exceeded lifetime risk guidelines and 24 percent exceeded recommended amounts for single occasion risk (AIHW, 2020).

According to the Australian Bureau of Statistics (ABS), nearly 80 percent of Australians over 18 years of age consume alcohol (ABS, 2018a), and some groups are more vulnerable to harms than others. For example, people living in remote and regional areas experience higher levels of alcohol-related harm than urban populations. In these areas, people are 1.4 times as likely to exceed alcohol guidelines as their metropolitan counterparts (AIHW, 2020) and have a much higher rate of alcohol attributable death - 1.7 times those in city centres (Chikritzhs & Pascal, 2004). Aboriginal and Torres Strait Islander people also experience more alcohol-related harm than non-Aboriginal and Torres Strait Islander people. Drinking exceeding single occasion risk recommendations was at a rate of 33.1 percent among Aboriginal and Torres Strait Islander people in Western Australia (WA) - nearly 10 percent greater than the wider population (Australian Bureau of Statistics, 2016). Between 2013 and 2017, Aboriginal and

Torres Strait Islander people were five times more likely to die from alcohol related causes than non-Indigenous people (ABS, 2018b).

Motives underpinning alcohol consumption are important to understand, as they drive not only the decision to consume alcohol on any given occasion, but also the way in which people drink. The motivational pathway to alcohol use was first proposed by Cox and Klinger (1988) who identified that people make decisions to drink based on whether they expect the positive affective consequences of drinking to outweigh the positive consequences of not drinking. Subsequent research supported a four-factor model of alcohol use motives, indicating that motives can be characterised by their valence (positive/negative) and their source (internal/external) (Cooper, 1994). The combination of these two characteristics yields four motivating factors; drinking to enhance mood (positive internal motivator); drinking for positive social rewards (positive external motivators); drinking to cope with negative emotions (negative internal motivators); and, drinking to conform socially and avoid social rejection (negative external motivators) (Cooper, 1994). Cooper (1994) developed the Drinking Motives Questionnaire (DMQ) to assess these four factors.

Since its inception, the DMQ and its revised versions have been used across a range of contexts. A search of literature relating to the DMQ (Web of Science) shows that in the last five years alone, the DMQ has been used in 69 published, peer reviewed journal articles. These articles span 23 countries including those from North America, Central America, the United Kingdom, Europe, Asia, and Oceania. While many of these studies were conducted with University students, the DMQ has also recently been used with older adults (van Gils et al., 2020), High School Students (Voce & Anderson, 2019), inmates of correctional facilities (Salatino et al., 2019), psychiatric patients (Nehlin et al., 2018), armed services veterans (Mohr et al., 2018) and young people engaged in the child welfare system (Hudson et al., 2015). In just the last two years studies using the DMQ have translated the survey into Dutch (Austin et al.,

2020), Swedish (Nehlin & Oster, 2019), Portuguese (Mostardinha et al., 2019), Italian (Laghi et al., 2019) and Spanish (Mezquita et al., 2018).

These studies show the diverse cultural, socio-demographic, and linguistic contexts in which the DMQ has been successfully utilised. Few studies however have examined the suitability of the DMQ for use in Aboriginal and Torres Strait Islander communities, with those that have largely being in Canada (Mushquash, 2014) and the USA (Skewes & Blume, 2015). No published, peer reviewed studies could be found using the DMQ in an Australian Aboriginal and Torres Strait Islander context.

Given the disparate harms that people in regional and remote Australia and Aboriginal and Torres Strait Islander people receive from alcohol, there is a pressing need to further understand the determinants of alcohol use among this population. This is particularly true of the remote Pilbara region of north-west WA. Being both regional and with an Aboriginal and Torres Strait Islander population of 15.7 percent (in comparison with 2.8 percent across Australia) (ABS, 2016), this is an area where the negative impacts of alcohol consumption are of particular concern. In 2012, while the average consumption of alcohol by adults in Australia was 10.0 litres, the Pilbara region was consuming 12.3 litres per capita (Loxley et al., 2016). The local community in the Pilbara region has been vocal in expressing concern about alcohol use and its impacts on the community (Tucker et al., 2015). As grief and loss experienced by Aboriginal and Torres Strait Islander people throughout early colonisation continue to influence Aboriginal and Torres Strait Islander health outcomes today (Jackson Pulver et al., 2010) the DMQ-R additionally has the potential to support greater understanding of the impact of colonisation on drinking behaviours.

The aim of the current research is to assess the appropriateness and utility of the DMQ-R among Aboriginal communities in the Pilbara region of WA by adapting the wording and language of the DMQ-R to be culturally appropriate for this group and confirming the four-factor structure of the DMQ using Confirmatory Factor Analysis (CFA). As the DMQ-R has not

previously been culturally modified for use with Aboriginal and Torres Strait Islander participants, this study is preliminary in nature.

## **Methods and Materials**

### ***Participants***

A cross section of Aboriginal men and women (18 years or older) living in the Pilbara towns of Port Hedland, Roebourne, Newman and surrounding Aboriginal communities were invited to take part in a survey assessing knowledge and awareness of the harms of alcohol during pregnancy and its relationship with Fetal Alcohol Spectrum Disorder (FASD). This paper includes one element of the broader survey - the culturally modified Drinking Motives Questionnaire Revised (DMQ-R), which was administered to 226 participants. Of the 226 participants only 135 were current consumers of alcohol and completed the CDMQ-R. Surveys were undertaken in 12 locations, including five regional towns and seven remote Aboriginal communities. Table 1 contains data on the study characteristics of the samples from each location. Many participants were female (66.4%). The higher proportion of female participants reflects the lack of available male Aboriginal staff at the time of the survey, as culturally it is important that surveys with women are conducted by women, and surveys with men are conducted by men. Additionally, as the broader survey involved discussions around alcohol and pregnancy, and pregnancy is often considered Women's Business, this further created difficulties in engaging with men. The mean age of all participants was 39.5 years (range 18 - 68, SD=12.3). All participants spoke English; however, many also spoke local Aboriginal languages at home including Martu Wangka (n=28), Yindjibarndi (n=24) and Nyangumarta (n=24).

Participants represented a sample of convenience, with people being approached in public spaces, at community events and through referrals and word of mouth. According to the 2016 National Census demography of Aboriginal and Torres Strait Islander people living in the Pilbara region (Mining and Pastoral Electoral Division) the median age is 25 years and there are

more men (51.4%) than women (48.6%) (ABS, 2016). The current study sample was substantially older and was conducted with more women than men, as seen in Table 1.

**Table 1**

*Demography of Survey Participants*

Type	Location	Sex (%)		Participants (n)	Age	
		Male	Female		Mean	SD
Towns	Port Hedland					
	Roebourne	25.3	74.7	95	39.4	1.2
	Newman					
Communities	Cheeditha					
	Parnpajinya					
	Warralong	42.5	57.5	40	38.6	2.2
	Yandeyarra					
	Kunawarrtji					
	Mingullatharndo					
	Punmu					

Due to the small number of participants in remote communities, a comparison of statistical differences between subsamples was not appropriate. To preserve the anonymity of participants in very small communities and towns, limited demographic information was collected and reported on collectively. While this makes it difficult to assess the level of selection bias in this study, the anonymity of participants was considered critical. This is an area that could be improved upon in future research by increasing the sample size and extending the geographical reach of the sample.

***Instruments***

**Alcohol Use.**

Alcohol use was a criterion for inclusion in the current study, however, was not required for participation in the broader study survey. Therefore, a single item was used to assess drinking status: *Have you consumed any alcohol in the last 12 months?*

### **Drinking Motives.**

The DMQ-R (Cooper, 1994) contains 20 items, with five questions for each of the four factors of coping, social, enhancement and conformity and typically takes five to 10 minutes to complete. Many of the items within the DMQ-R are very similar. This is due to the four constructs measured by the DMQ-R being latent constructs. That is, concepts that are not directly observable but rather are measured through multiple observations of distinct, but similar items. They include drinking to enhance mood (positive internal motivator); drinking for positive social rewards (positive external motivators); drinking to cope with negative emotions (negative internal motivators); and drinking to conform socially and avoid social rejection (negative external motivators).

Consultation with members from the local Aboriginal community was conducted to assess the appropriateness of the DMQ-R in its original form for use with an Aboriginal and Torres Strait Islander population. Initial consultation took the form of in-depth interviews with two local Aboriginal community researchers. Based on these interviews, several wording changes were made to the DMQ-R. English was the most appropriate language to conduct the survey in, given the large range of languages spoken as well as adequate basic English competency in the area. The modified items were then presented to a local Aboriginal Community Reference Group (CRG) consisting of Aboriginal representatives of the Port Hedland area of the Pilbara region. This group comprised men and women from varied language groups including the Kariyarra, Ngarluma and Noongar people. Consultation with the CRG led to the removal of three items and the addition of three new items. Two items within the *coping* scale (related explicitly to stress and pain) were removed and replaced. Another item was removed from the *conformity* scale and replaced with an item relating to shyness. All changes can be seen in Table 2.

**Table 2***Modification of the DMQ-R*

Factor	Original Item	Modified Item	Action
Social	Because it helps you to enjoy a party	Because it helps to enjoy a party/ celebration	Wording
	To be sociable		None
	Because it makes social gatherings more fun		Removed
	Because it improves parties and celebrations		Removed
	To celebrate a special occasion with friends	To join in with friends and family	Wording
Coping	To forget your worries	-	None
	Because it helps you when you feel depressed or nervous	Because it helps when you are sad	Wording
	To cheer you up when you are in a bad mood	-	None
	Because you feel more self-confident and sure of yourself	-	None
	To forget about your problems	-	None
		To block out the pain	New item
		Because it helps when you are stressed	New item
Enhancement	Because you like the feeling	-	None
	Because it's exciting	-	Removed
	To get high	To get drunk	Wording
	Because it gives you a pleasant feeling	Because it makes you feel good	Wording
	Because it's fun	-	None
Conformity	Because your friends' pressure you to drink	-	None
	So that others won't kid you about not drinking	So that people won't tease you for not drinking	Wording
	To fit in with a group you like	-	None
	To be liked	-	None
	So you won't feel left out	-	None
		To not be shy	New item

As seen in Table 2, three items were removed based on community consultation. The item *"Because it improves parties and celebrations"* was seen to be too similar to the item

*“Because it helps you to enjoy a party”* and therefore repetitive. The proposed solution was to merge the two items into *“Because it helps to enjoy a party/celebration”*. The item *“Because it makes social gatherings more fun”* was also considered repetitive to the CRG, being seen as indistinguishable from the items *“To be sociable”* and *“Because it helps to enjoy a party”*. The item *“Because it’s exciting”* did not resonate with members of the CRG, and they believed that the concept was better captured in the items *“Because it’s fun”* and *“Because it makes you feel good”*.

Feedback from the CRG and community researchers consistently included community members dislike and difficulty in responding to questionnaires that included scaled response options. To accommodate this, the study team decided to reduce the original DMQ-R five-point Likert scale to a three-point response scale. Responses were “usually”, “sometimes”, and “hardly ever”.

While the reduction of the response scales and the removal of three items from the DMQ-R had the potential to impact the psychometric properties of the scales, the key priority of the study was working in genuine partnerships with Aboriginal communities to ensure culturally secure research (Coffin, 2007). In this context, asking for community input about questions and wording and continuing to use items which have been identified as problematic could result in the research and researchers appearing disingenuous. This then could have negative impacts on any future research conducted with the community and deepen a distrust of research that already exists.

### ***Procedure***

#### **Culturally Safe Approaches to Research.**

To ensure that all activities undertaken in the current study were culturally appropriate, a local CRG was consulted throughout the study, with feedback and advice being sought on the procedures and materials used. The CRG convened monthly to hear updates about the project and to provide guidance on next steps.

Where possible, local Aboriginal people were employed as community researchers and trained to deliver the surveys alongside lead researchers to ensure participants understood their rights and responsibilities in participating in the research. A video version of the participant information sheet was developed with two Aboriginal community researchers explaining the research with an emphasis on consent, confidentiality, and the right to withdraw participation at any time. Community researchers were also able to explain words or concepts in the survey that some participants were unfamiliar with, and in some instances explain the process in local language. After the participation in the project was appropriately described, participants were asked to sign a form indicating their informed consent to take part in the study.

Entry into two of the remote Aboriginal communities in which surveys took place is by permit only. In these instances, permits were approved by the Western Australian Department of Planning, Lands and Heritage. Before entering any remote Aboriginal community to conduct research, researchers consulted with the Chief Executive Officer (CEO) and/or Chairperson for each community as well as working closely with local Aboriginal Medical Services with whom the researcher's institute had formal partnership agreements. In all instances, female researchers conducted surveys with female participants, and male researchers with male participants.

#### **Patient and Public Involvement.**

The involvement of the CRG ensured that public input was sought at all stages of the modification of the DMQ-R and its implementation. The project's community researchers additionally provided input throughout as members of the local Aboriginal community. Additional public involvement is underway with a series of public meetings and presentations of results planned in each of the communities that participated in the project.

#### ***Overview of Analysis***

SPSS version 25 was used for descriptive data analysis and to calculate Cronbach's Alpha as an indicator of scale reliability. STATA 16 (StataCorp, 2019) was used to run a

Confirmatory Factor Analysis (CFA) to test the fit of the hypothesised four factor model of drinking motives. To run the CFA, a Generalised Structural Equation Model (GSEM) command was used. The modification from a five-point to a three-point scale meant that the items could no longer be treated as continuous, nor were they normally distributed. Given the preliminary nature of this research, the request to modify the response scale was not anticipated. This modification ensured the cultural validity of the measure. Research however has shown that Maximum Likelihood estimation models (in CFA) based on ordinal observed variables do not yield reliable results (Flora & Curran, 2004). To overcome this issue the covariance matrix based on Pearson correlations in a standard CFA was exchanged for one utilising polychoric correlations (Flora & Curran, 2004). This had the further unintended consequence of meaning that not all analysis of model validity could be performed such as Goodness of Fit and concurrent validity measures. Estimation of polychoric correlations and generation of the correlation matrix was performed using the *polychoric* user written Stata command (Kolenikov & Angeles, 2004). The final CFA was run on the polychoric correlation matrix (rather than the raw observed data) using an Iterative Principal Factor (IPF) extraction method and Varimax orthogonal rotation.

Cronbach's Alpha (Alpha) is a measure of internal consistency of a scale that can help to identify the scales reliability and measurement error (Tavakol & Dennick, 2011). Alpha was calculated for each of the hypothesised factors. Using the 'Cronbach's Alpha if item deleted' option within SPSS indicates possible improvements to the scale on removing specific items.

### **Ethical Approvals.**

This research was approved by the Western Australian Aboriginal Health Ethics Committee (WAAHEC; Ref. 739) and the University of Western Australia Human Research Ethics Committee (HREC) with reciprocal approval from the Curtin University HREC (HRE2019-0082). All participants provided informed consent for their participation in the study.

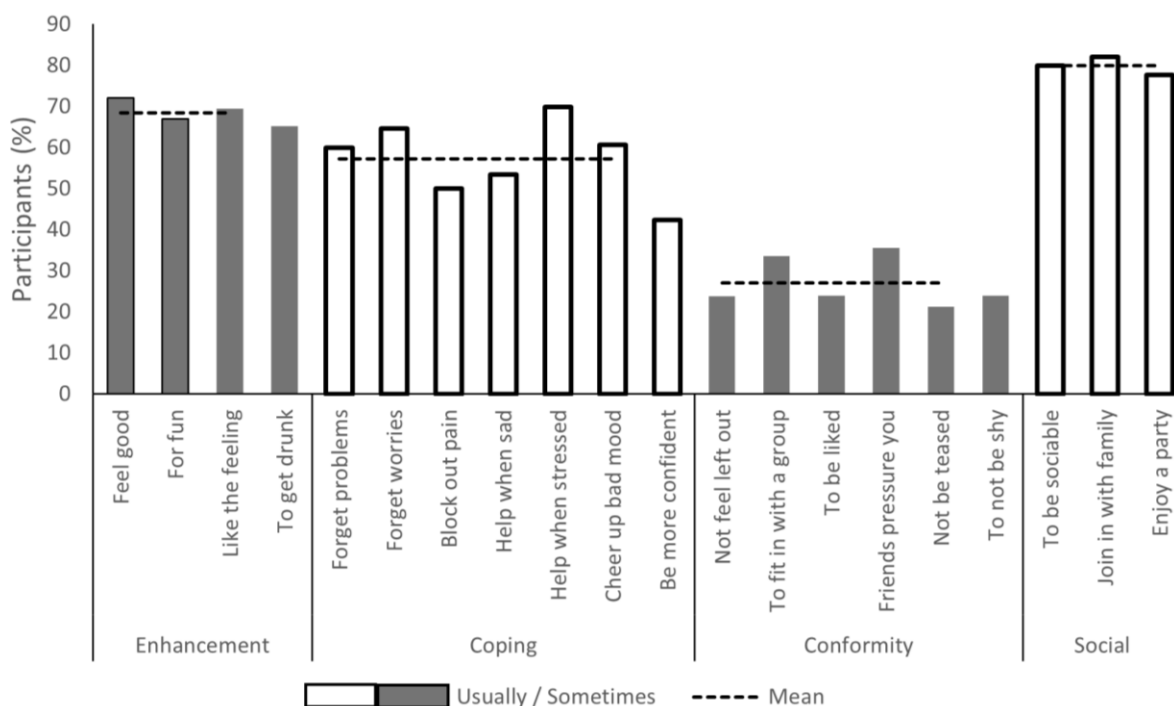
## Results

### Descriptive Analysis

Figure 1 shows the proportion of participants who responded *usually* or *sometimes* to each of the CDMQ-R items. The proportion of participants was averaged within each factor to give an indication of the relative importance of each motivator on drinking. For many participants ( $\bar{x} = 79.87\%$ ) drinking was socially motivated (Figure 1). Enhancement was the second most common motive ( $\bar{x} = 68.45\%$ ) followed by coping ( $\bar{x} = 57.23\%$ ). Conformity was rarely cited as a motive for drinking ( $\bar{x} = 27.00\%$ ).

**Figure 1**

*Responses to CDMQ-R Items – Motives for Usually or Sometimes Drinking*



### Confirmatory Factor Analysis

The model tested using the GSEM (generalised structural equation modelling) command in STATA was constrained to four factors. The rotated solution of the 20 items corresponded

well with the theoretical DMQ-R factors as can be seen in Table 3. Two items did not load onto the hypothesised factors at all. The item “*To feel more confident or sure of yourself*” loaded onto the *conformity* scale rather than the *coping* scale. The item “*To get drunk*” loaded onto the *coping* scale rather than the *enhancement* scale. Several items loaded onto more than one factor. These included two items in the *enhancement* factor: “*Because it makes you feel good*”, and “*To get drunk*”. Except for the “*To get drunk*” item these loaded more strongly on the *enhancement* factor than the *coping* factor. Within the *coping* factor, one item also loaded onto the *conformity* factor, however this was a lower loading.

Non-normality of the ordinal data necessitated the use of the alternative polychoric estimation of the model, meaning that traditional Goodness of Fit indices such as the Root Mean Square Error of Approximation (RMSEA) were not appropriate to use in this instance.

**Table 3***Rotated Factor Solutions CDMQ-R*

		Rotated Factor Loadings*			
	Item	Social	Coping	Enhancement	Conformity
Social	To be sociable	<b>0.41</b>	0.12	0.39	0.31
	To join in with friends and family	<b>0.90</b>	0.10	0.12	0.25
	Because it helps to enjoy a party/ celebration	<b>0.72</b>	0.18	0.28	0.35
	To not be shy	0.16	0.22	0.80	0.13
Coping	To forget about your problems	0.03	<b>0.92</b>	0.28	0.10
	To forget your worries	0.16	<b>0.89</b>	0.09	0.29
	To block out the pain	0.00	<b>0.80</b>	0.22	0.30
	Because it helps when you are sad	0.12	<b>0.75</b>	0.24	0.22
	Because it helps when you are stressed	0.22	<b>0.77</b>	0.17	0.25
	To cheer up when you are in a bad mood	0.01	<b>0.62</b>	0.07	0.54
	To feel more confident or sure of yourself	0.22	0.25	0.08	0.57
Enhance	Because it makes you feel good	0.01	0.50	<b>0.64</b>	0.07
	Because it's fun	0.22	0.13	<b>0.88</b>	0.05
	Because you like the feeling	0.11	0.34	<b>0.66</b>	0.20
	To get drunk	0.24	0.44	0.40	0.01
Conformity	So you won't feel left out	0.04	0.20	0.24	<b>0.80</b>
	To fit in with a group you like	0.04	0.10	0.21	<b>0.90</b>
	To be liked	0.10	0.13	0.21	<b>0.86</b>
	Because your friends pressure you to drink	0.09	0.27	0.20	<b>0.66</b>
	So that people won't tease you for not drinking	0.07	0.25	-0.11	<b>0.78</b>

**Scale Reliability Analysis**

Of the four items in the *social* scale, one item “*To not be shy*” was removed as it loaded more strongly on the *conformity* scale. The remaining three items showed a high degree of reliability ( $\alpha=0.77$ ) (see Table 4). Of the seven items in the *coping* scale, one item “*To feel more confident or sure of yourself*” was removed as it loaded more strongly on the *conformity* scale. The remaining six items showed a very high degree of reliability ( $\alpha=0.92$ ). One item “*To get*

*drunk*” was removed from the *enhancement* scale due to poor loading. The remaining three items showed a high degree of reliability ( $\alpha=0.77$ ). The *conformity* scale had an Alpha score of 0.88 indicating a high degree of reliability.

### ***Concurrent Validity***

The decision to not measure concurrent validity in this study was based on consultations with Aboriginal staff members and participant feedback from previous survey collections in these communities. The outcome of both suggested a need to keep the surveys as short as possible while maintaining the least feasible perceived repetition. While concurrent validity would add further evidence for the use of this scale, the potential loss of participants and increased participant fatigue made the concurrent use of the original scale in the survey ill-advised.

### ***Final CDMQ-R***

Based on the results of the CFA and Alpha testing, the final items for each of the four drinking motives for the CDMQ-R are presented in Table 4.

**Table 4***Final CDMQ-R Scales and Chronbach's Alpha*

Factor	Item	Alpha
Social	To be sociable	0.77
	To join in with friends and family	
	Because it helps to enjoy a party/celebration	
Coping	To forget about your problems	0.92
	To forget your worries	
	To block out the pain	
	Because it helps when you are sad	
	Because it helps when you are stressed	
	To cheer up when you are in a bad mood	
Enhancement	Because it makes you feel good	0.77
	Because it's fun	
	Because you like the feeling	
Conformity	So you won't feel left out	0.88
	To fit in with a group you like	
	To be liked	
	Because your friends pressure you to drink	
	So that people won't tease you for not drinking	

**Discussion**

Drinking motives have been shown as important in understanding drinking behaviour in a very wide range of contexts including some limited applications among North American Indigenous communities (Mushquash et al., 2008; Skewes & Blume, 2015). This study however is the first to evaluate the factor structure of a culturally modified DMQ-R in an Aboriginal population in Australia.

The possible motives for drinking among Aboriginal and Torres Strait Islander people in Australia are broad. From the impacts of colonisation on Aboriginal and Torres Strait Islander people - including the legacies of government policies of forced removal from families - to social

and conformity pressures of small-scale communities with complex kinship and social structures. The importance of understanding the motives underpinning drinking behaviours in Aboriginal and Torres Strait Islander communities cannot be overstated. Despite this, there is a lack of peer reviewed literature looking at motives for alcohol use in Aboriginal communities. The current research has begun to rectify this paucity by modifying and validating a version of the DMQ-R.

The results of the CFA supported the four-factor structure of the DMQ-R with the final items aligning with the theoretical constructs supporting the use of this modified tool with Aboriginal participants.

The modification process indicated that some of the original items would not resonate with Aboriginal people in the Pilbara region. The rewording and removal of three of the original DMQ-R items along with the addition of three new items saw the scale retain 20 items, with more emphasis on the coping motives scale and less on the social factors. The additional removal of items due to scale reliability and CFA output suggest that further modification of the scale might be required in future. While the focus of this study was to develop a modification of the DMQ-R that was first and foremost culturally valid, the removal of items and reduction of the response scale has the potential to significantly impact the psychometric properties of the measure. The inclusion of new items increased the face validity of the overall measurement, however it also created disparity in the number of items in each sub-scale. It is possible that the reduction of some scales, and the increase of others might reflect a bias in the sample rather than being characteristic of the population. Future research should further examine the impact of these changes, in this context.

While the response scale modifications made a traditional maximum likelihood-based CFA impossible, the polychoric method of estimation yielded positive results. The CFA results provide validation of the use of the CDMQ-R with an Aboriginal population. A key limitation of the polychoric method is that it does not allow for an assessment of goodness of fit indices.

A combination of feedback from consultation with community members and Aboriginal staff in developing the CDMQ-R, in addition to the CDMQ-R being administered as part of a larger survey resulted in a decision to not undertake an assessment of concurrent validity. Future assessment of the CDMQ-R should include a measure of concurrent validity.

The final scale suggested by the CFA and reliability analysis contained 17 items, reminiscent of the short form DMQ-R (DMQR-SF) developed by Kuntsche and Kuntsche (2009). The DMQR-SF contains three items per factor for a total of 12 items.

The study suggests that with a reduced response scale and language adaptation the DMQ-R is a suitable for use in Aboriginal populations. Future research should examine the relationship between drinking motives and reported drinking behaviour to assess the CDMQ-R's ability to predict drinking in an Aboriginal and Torres Strait Islander context. Modelling of this relationship could be undertaken using Structural Equation Modelling (SEM) and a validated measure of alcohol use such as the Alcohol Use Disorder Identification Test (AUDIT) (Saunders et al., 1993).

While both men and women were encouraged to take part in the survey, there was a much greater uptake by women. It is likely that there were two primary factors relating to this. The first is because broader survey was about FASD and alcohol use during pregnancy. This is sometimes seen as 'Women's Business' in some of the communities where the research took place. Some men may have felt embarrassed to talk to the researchers if they thought the discussions were focused on women's issues. To reduce this effect in future surveys, the CDMQ-R and alcohol use surveys will be conducted separate to broader surveys about alcohol and pregnancy.

Secondly, cultural protocols dictate that it is appropriate to have men talking with men, and women talking with women. The project team had difficulty recruiting and retaining male community researchers, hampering the data collection activities with men. More work is needed around the recruitment and retention of male staff in the Pilbara.

The average age of participants was also substantially older than the average age of the broader Aboriginal population in the Pilbara region. Future surveys might consider using quota sampling to ensure a more representative sample of the population.

It is important to develop valid tools to understand drinking motivation in diverse populations within the Pilbara. This understanding will enable more effective design and implementation of health promotional and public health strategies to reduce alcohol related harms.

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