

**Faculty of Health Sciences
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**‘A Different Ball Game’: Engaging Men from Rural and Lower
Socioeconomic Areas in Behavioural Weight Management Interventions**

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**This thesis is presented for the Degree of
Doctor of Philosophy
of
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Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made. This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

Human Ethics The research presented and reported in this thesis was conducted in accordance with the National Health and Medical Research Council National Statement on Ethical Conduct in Human Research (2007) – updated March 2014. The proposed research study received human research ethics approval from the Curtin University Human Research Ethics Committee (EC00262), Approval Numbers HREC73204 (PhD chapter 3) and HRE2021-0217 (PhD chapter 4).

Signature:

Date: 01/01/2023

Acknowledgement of Country

The work reported on in this thesis was undertaken on Nyungar Boodjar.

I acknowledge the Whadjuk Nyungar people as the traditional owners of the land where Curtin University's Bentley campus sits, the base from which this project was coordinated from and where this thesis was written. I also acknowledge the Ballardong, Menang, and Wardandi Nyungar peoples as the traditional owners of the land on which much of the PhD work was undertaken. I would like to pay my respects to elders past and present.

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Publications Arising from Thesis

Chapter 2 of this PhD has been published in *Obesity Reviews* and chapter 3 has been submitted to *BMC Public Health*.

1. **McDonald MD**, Hunt K, Sivaramakrishnan H, Moullin J, Avenell A, Kerr D, Ntoumanis N and Queded E. A systematic review examining socioeconomic factors in trials of interventions for men that report weight as an outcome. *Obesity Reviews* (2022). <https://doi.org/10.1111/obr.13436> – PhD Chapter 2 and journal article published in '*Obesity Reviews*'
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Sections of the thesis introduction were used to contribute to two separate book chapters within the '*Handbook of Health Psychology*' which is due for publication in late 2024.

1. **McDonald MD**, McLaughlin M, and Moullin J. Implementation Strategies: From Lab to Field (2024). Liddlelow C & Mullan B (Intervention Section Eds). Morgan K & Sanderman R (Book Eds). *Handbook of Health Psychology*. Routledge.
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Statement of Contributors

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The purpose of this statement is to detail the nature and extent of the intellectual contribution by the PhD Candidate, Matthew McDonald, and all other co-authors of this publication. Matthew McDonald conceived the research idea, developed the review protocol, undertook the literature search and study selection process, extracted, and synthesized the data, conducted the risk of bias assessment, and managed all aspects of manuscript preparation and submission. Professor Kate Hunt, Professor Deborah Kerr, Professor Alison Avenell, and Professor Nikos Ntoumanis helped develop the initial research idea and the review protocol and assisted with the interpretation of findings and manuscript editing. Ms Hamsini Sivaramakrishnan assisted with study selection, data extraction and assisted with the interpretation of findings and manuscript editing. Mr Jack Birch assisted with risk of bias assessment and assisted with the interpretation of findings and manuscript editing. Dr Joanna Moullin assisted with the interpretation of findings and manuscript editing. Associate Professor Eleanor Qusted helped develop the initial research idea and the review protocol, assisted with study selection, and assisted with the interpretation of findings and manuscript editing. All authors reviewed and approved the final version of the manuscript.

I affirm the details stated in the Statement of Contribution are true and correct.

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Presentations Arising from Thesis

The primary author's ability to attend conferences was limited due to Covid-19. He plans to share his PhD research more widely at conferences in 2023.

1. **McDonald MD.** 'A Different Ball Game': Health Inequalities, Men's Weight Management, and the Aussie-FIT Program. Curtin School of Population Health Nutrition Seminar Series. November 2022 [*invited presentation*]
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Media Appearances Related to Thesis

During the recruitment period for Aussie-Fans in Training in rural towns, the primary author made appearances on local radio stations and in local newspaper articles.

1. Bunbury Mail Rural Aussie-FIT Article, February 2022
2. Albany Advertiser Rural Aussie-FIT Article, September 2021
3. Toodyay Herald Rural Aussie-FIT Article, June 2021
4. ABC MidWest and Wheatbelt Radio, MidWest and Wheatbelt Mornings, June 2021
5. Triple MMM Wheatbelt Radio, Saturday Morning Sports Show, May 2021
6. ABC Radio Great Southern, Morning Show, November 2020

Additional Publications During Candidature

The primary author contributed to eight peer-reviewed published research articles unrelated to his PhD during his candidature. These included four publications (one as first author) related to the ‘Game of Stones’ feasibility trial in Scotland, for which he was employed as a research assistant at the University of Stirling prior to commencing his PhD. One of those publications, for which he was second author, was the National Institute for Health Research (NIHR) final report (like a PhD, but more of a team effort) for the Game of Stones feasibility trial. His work on this feasibility trial led to significant UK funding for a full-scale trial of the intervention, for which he is a co-author on the published protocol (Macaulay *et al* 2022). Additional publications arose from collaborations with fellow PhD students in Australia (Sivaramakrishnan *et al* 2021) and the UK (Birch *et al* 2022), and via invitation from his supervisors to contribute to the process evaluation of the Aussie-Fans in Training metropolitan pilot trial (Kwasnicka *et al* 2021).

1. van der Pol M, **McDonald M**, Collacott H, Dombrowski SU, Harris FM, Kee F, Avenell A, Gray C, Skinner R, and Hoddinott P. Designing financial incentives for health behaviour change: a mixed-methods case study of weight loss in men with obesity. *Journal of Public Health* (2022). <https://doi.org/10.1007/s10389-022-01785-1>
2. Macaulay L, O’Dolan C, Avenell A, Carroll P, Cotton S, Dombrowski S, Elders A, Goulao B, Gray C, Harris FM, Hunt K, Kee F, MacLennan G, **McDonald MD**, McKinley M, Skinner R, Torrens C, Tod M, Turner K, van der Pol M, and Hoddinott P. Effectiveness and cost-effectiveness of text messages with or without endowment incentives for weight management in men with obesity (Game of Stones): study

protocol for a randomised controlled trial. *Trials* (2022).

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3. Birch JM, Jones RA, Mueller J, **McDonald MD**, Richards R, Kelly MP, Griffin SJ, and Ahern AL. A systematic review of inequalities in the uptake of, adherence to, and effectiveness of behavioral weight management interventions in adults. *Obesity Reviews* (2022). <https://doi.org/10.1111/obr.13438>
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Abbreviations

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5	Australian Bureau of Statistics.....	ABS
6	Aussie Fans in Training	Aussie-FIT
7	Australian Football League.....	AFL
8	Australian Institute for Health and Welfare.....	AIHW
9	Body Mass Index	BMI
10	Football Fans in Training.....	FFIT
11	Framework for Reporting Adaptations and Modifications.....	FRAME
12	Framework for Reporting Adaptations and Modifications to Evidence-based Implementation Strategies	FRAME-IS
13	Reach, Effectiveness, Adoption, Implementation, Maintenance.....	RE-AIM
14	Preferred Reporting Items for Systematic Review and Meta-Analysis.....	PRISMA
15	Place of residence, race/ethnicity/culture, occupation, gender/sex, religion, education, 16 socioeconomic status, social capital, and other factors.....	PROGRESS-PLUS
17	Randomised Controlled Trial.....	RCT
18	Risk of Bias.....	RoB
19	Self-Determination Theory	SDT
20	National Disability Insurance Scheme.....	NDIS
21	Socio-Economic Indexes for Areas – Index of Relative Socio-economic Disadvantage 22	SEIFA-IRSD
23	Western Australia.....	WA
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Thesis Abstract

Background: Despite a higher proportion of men living with overweight or obesity than women in Australia, men are underrepresented in behavioural weight management research and practice. To address this issue, gender-tailored interventions designed specifically for men has been developed. One such intervention is Aussie-Fans in Training (Aussie-FIT), which is an evidence-based behavioural weight management intervention that has been piloted in affiliation with Australian Football League (AFL) clubs and delivered in their professional sporting contexts. Aussie-FIT was highly attractive to urban-residing men and demonstrated promising intervention effects. Men resident in lower socioeconomic and rural areas are particularly unlikely to have access to or interest in participating in weight management, and the extent to which socioeconomic factors have been considered in the design and evaluation of such interventions for men is unknown. The extent to which the Aussie-FIT concept could help to engage men in lower socioeconomic rural contexts without professional sporting club affiliation or facilities has not been established.

Aim: The aim of this thesis was to investigate and address the underrepresentation of men from lower socioeconomic and rural areas in behavioural weight management via three interlinked studies.

Methods: A systematic review (chapter 2) of trials of weight management interventions for men evaluated the extent to which the included studies considered socioeconomic factors during intervention design, conduct, analysis, and reporting. Then, a qualitative study (chapter 3) was undertaken with stakeholders (seven focus groups, n=24) from three rural towns in Western Australia. Focus group data were analysed using the framework approach, and the findings informed the adaptation of Aussie-FIT for implementation in rural contexts. For the third study, men aged 35-65 years living with overweight or obesity were recruited to

1 participate in the adapted version of Aussie-FIT in three lower socioeconomic rural towns in
2 Western Australia (chapter 4). A mixed-methods approach was employed, and data collection
3 methods included metrics of program reach, questionnaire data, attendance registers, and
4 post-program participant focus groups (five focus groups, n=26). This study examined
5 recruitment, engagement, and retention rates, and explored the associated barriers and
6 facilitators experienced by rural-residing men that participated in Aussie-FIT.

7 **Results:** Findings from the systematic review indicate that socioeconomic characteristics
8 were inconsistently reported, few studies consulted men from lower socioeconomic groups
9 during trial design, and few explicitly targeted specific socioeconomic groups. Overall, there
10 was limited consideration of socioeconomic factors in trials of weight management
11 interventions for men. Themes generated during the qualitative analysis for the second study
12 (chapter 3) included Australian Football as a ‘common language’, the influence of the
13 ‘smaller fishpond’(population) in rural towns, and the importance of local partner
14 organisations for sustainability. These findings informed adaptations to the recruitment and
15 marketing strategies, delivery settings, football program theme, and partnerships for rural
16 implementation. Stakeholders recommended adopting an Australian Football program theme
17 without specific club affiliations and employing a multi-component recruitment strategy
18 utilising local trusted sources. In study 3, 83 of 124 men (67%) expressing interest enrolled in
19 rural Aussie-FIT and recruits attended 8.2 (of 12) sessions on average (chapter 4). Fifty-seven
20 (69%) completed the program, although retention varied by site (59-79%), partly due to
21 Covid-19. Program engagement was facilitated by an inclusive and supportive environment,
22 the football program theme and setting, and a within-group sense of community and
23 connectedness.

24 **Conclusions:** A greater consideration of socioeconomic factors is required in trials of weight
25 management interventions for men. For example, developing or adapting programs to

1 specifically meet the needs of men residing in lower socioeconomic rural communities. An
2 adaptation of Aussie-FIT, delivered in amateur local sporting contexts without AFL club
3 affiliations, successfully engaged men from low-to-middle socioeconomic areas in three rural
4 Australian towns. Chapters 3 and 4 provide a case example for how metropolitan focused
5 interventions can be adapted with local stakeholders for rural contexts and offers insight into
6 how popular local sporting codes can be utilised to attract men to health behaviour change
7 interventions in rural areas.

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Chapter 1: Thesis Introduction

1.1 Background

A high body mass index (BMI) is the second leading risk factor (behind tobacco) attributable to the burden of disease in Australia (Institute for Health Metrics and Evaluation, 2017). Two-thirds (63%) of adults in Australia are living with overweight or obesity, and Australia has the sixth highest obesity rate of countries in the Organisation for Economic Co-operation and Development (Australian Institute of Health and Welfare [AIHW], 2022a). In 2002 adult obesity prevalence in Western Australia (WA) was 21%, and it rose to 32% by 2017 (Merma & Radomiljac, 2018). Increasingly sedentary lifestyles and poor diets contribute to rising obesity prevalence, with population dietary intakes and physical activity levels in Australia inconsistent with the guidelines. For example, only a quarter of adults in Australia meet the physical activity guidelines, and the majority of adults in Australia do not consume the recommended number of vegetable and fruit serves (AIHW, 2022b). Priorities in the National Preventative Health Strategy 2021-2030 include increasing the consumption of healthy diets and physical activity levels, and halting the rise in obesity prevalence in Australia by 2030 (Australian Government, 2021).

Men have higher rates of overweight and obesity (75% vs 60%) (AIHW, 2022a) and are less likely to seek health information or consult with health professionals than women (Australian Government, 2019). Men living in rural Australia consume less fruit, more sugary drinks, and more alcohol than their urban residing counterparts (AIHW, 2019). Average life expectancy for men living in rural and low socioeconomic areas is lower than those resident in more affluent urban areas (AIHW, 2012). The expression of masculinities is influenced by where men live, cultural norms within their community, and the social context of their life (Evans et al., 2011). Traditional expressions of masculinity such as stoicism, resilience, and self-reliance may be particularly prevalent in rural and lower socioeconomic communities

1 (Dolan, 2011; Taylor Smith & Dumas, 2019). Interventions associated with making dietary
2 changes or losing weight are often viewed as female oriented and counter to social ideals of
3 masculinity (Archibald et al., 2015; Elliott et al., 2020).

4 Men are underrepresented in weight management research and practice (Pagoto et al.,
5 2012; Robertson et al., 2016). For example, two-thirds of over 36,000 participants in a recent
6 systematic review examining inequalities in behavioural weight management trials were
7 women (Birch et al., 2022). A referral bias exists for these types of programs, whereby
8 practitioners may be more likely to offer eligible women the opportunity to participate than
9 men (Ahern et al., 2016). However, even when similar numbers of men and women are
10 invited to participate in weight management programs, women are typically around twice as
11 likely to enrol (Ahern et al., 2016; Sharman et al., 2009). Men from lower socioeconomic and
12 rural may be particularly unlikely to participate in mixed-gender weight management
13 interventions (Ahern et al., 2016; Punt et al., 2020). Indeed, an individual's place of residence
14 can influence their health, health behaviours, and access to health interventions.

15 These types of inequalities are reflected in health policy, which typically highlight the
16 need for different types of interventions that support health in priority population groups such
17 as those from low socioeconomic areas and rural communities (AIHW, 2019; Australian
18 Government, 2021). This chapter discusses the relationship between socioeconomic status,
19 rurality, and health; equity issues in behavioural health interventions; adapting interventions
20 for new contexts; and gender-sensitised approaches to engaging men, with a particular focus
21 on the relevance to implementing a men's weight management intervention in rural WA
22 towns.

1.2 Socioeconomic Status, Rurality, and Health

Socioeconomic status is a relative concept that refers to the social and economic position of individuals within society, and is measurable at the individual, family, household, or community/area level (Australian Bureau of Statistics, 2011). Socioeconomic status can describe the social standing of individuals based on factors such as income, educational attainment and place of residence (Baker, 2014). The Australian Bureau of Statistics (ABS) describes ‘relative socioeconomic advantage and disadvantage in terms of people’s access to material and social resources, and their ability to participate in society’ (ABS, 2011). Adults living within the lowest socioeconomic areas in Australia were less likely to have been physically active during the 7 days prior to completing the ABS survey (78% vs 92%) and were less likely to be meeting the physical activity guidelines (24.0% vs 34%) than those residing in the highest socioeconomic areas (ABS, 2022a). Similarly, there is a socioeconomic gradient in obesity prevalence, with higher levels of obesity observed in lower socioeconomic areas (38%, quintile 1) compared to the highest socioeconomic areas (23%, quintile 5) (AIHW, 2022c). Lower socioeconomic status is predictive of poor diet, physical inactivity, and increased risk of morbidity and premature mortality (Drewnowski & Specter, 2004; Giskes et al., 2010; Stamatakis, 2006; Rea & Tabor, 2022; Steel et al., 2018). Rural communities in Australia are more likely to be categorised as having higher levels of socioeconomic disadvantage than neighbourhoods within major cities (ABS, 2022b).

The Australian Institute for Health and Welfare define areas outside of Australia’s major cities as ‘rural and remote’ (AIHW, 2022d). In this thesis, the term ‘rural’ will be used to describe areas outside of major cities. Adults living in rural Australia are less likely to have completed year 12 of high school (54-57% vs 77%) and less likely to have completed a university degree (19-23% vs 41%) than those residing in major cities (AIHW, 2022e). Despite having lower average household incomes, rural residents typically pay higher prices

1 for goods and services (AIHW 2022e; ABS 2022b). Rural communities tend to have higher
2 rates of obesity, type 2 diabetes, and cardiovascular disease than urban areas (Alston et al.,
3 2020; O'Connor & Wellenius, 2012; AIHW, 2022e). Adult obesity prevalence is typically
4 lowest in higher socioeconomic areas within major cities and highest in lower socioeconomic
5 rural areas (Calder, 2019). For example, affluent suburbs in metropolitan Perth (e.g.,
6 Claremont, Cottesloe, and Nedlands) have amongst the lowest national obesity rates (13-
7 14%), whereas lower socioeconomic communities in rural WA (e.g., Beverley, Collie, and
8 Northam) have the highest obesity rates (34%) (Calder, 2019). These examples illustrate a
9 complex relationship between rural residency, socioeconomic status, and risk of ill-health.
10 Inequalities in health by place of residence, may be in part be due to a lack of access to
11 facilities, resources, and health services (AIHW, 2022e). To help address this issue in the
12 context of behavioural weight management interventions, the research presented in this thesis
13 provides evidence on how a metropolitan-based intervention can be adapted to reach men
14 resident in rural towns in WA with the support of local stakeholders.

15 **1.3 Equity Issues in Behavioural Health Interventions and Research**

16 The extent to which individuals' access and benefit from behavioural health
17 interventions is likely to vary depending on their place of residence (i.e., rural, and lower
18 socioeconomic areas) and other equity-related factors. Health inequalities can be defined as
19 the systematic, avoidable, and unfair differences in health outcomes between populations,
20 different social groups within the same population, or as a gradient across a population
21 ranked by social position (McCartney et al., 2019). An 'inverse prevention law' describes
22 how those most in need may be amongst the least likely to receive and benefit from
23 appropriate preventative health interventions (Lorenc et al., 2013). Interventions designed to
24 support individuals to make health behaviour changes typically require relatively higher
25 levels of personal resource, education, and agency for participants to maximise the potential

1 benefit from taking part (Adams et al., 2016). Inequalities can occur at any stage of an
2 intervention or research trial. That is, interventions could be more accessible or attractive to,
3 more easily adhered to, and/or more effective for individuals from higher socioeconomic
4 groups, such as those with higher education levels (Birch et al., 2020). Individuals from
5 priority population groups, such as those from lower socioeconomic and rural areas, often
6 face a disproportionately high burden of disease. If effective health behaviour interventions
7 are not accessed by these groups, or if they reach across social groups but are more readily
8 adhered to or effective in more ‘advantaged’ groups, they may serve to augment health
9 inequalities. Any such widening of health outcomes between population sub-groups is termed
10 ‘intervention generated inequalities’ (Lorenc et al., 2013). In the context of weight
11 management, intervention generated inequalities may occur due to the lower likelihood of
12 participation of men from lower socioeconomic and rural communities despite the high
13 obesity rates observed in this population (AIHW, 2022a).

14 Inequalities can occur across a range of characteristics. The PROGRESS-Plus
15 framework summarises factors in which sub-population groups may face inequalities: place
16 of residence, race/ethnicity/culture/language, occupation, gender/sex, religion, education,
17 socioeconomic status, social capital, and other additional factors (‘Plus’) (O’Neill et al.,
18 2014). A recent systematic review by Birch and colleagues (2022) summarised the extent to
19 which inequalities may be present in the uptake of, adherence to, and/or the effectiveness of
20 behavioural weight management trials by PROGRESS-Plus criteria (Birch et al., 2022). Most
21 of the studies included in the review found no differences between groups categorised as
22 ‘more’ or ‘less’ advantaged, however there was some evidence that ‘more advantaged’
23 groups may be more likely to be recruited, adhere to interventions, and be retained (Birch et
24 al., 2022). Whilst it is informative to consider inequalities at different stages of trials, meta-
25 analyses can provide more robust assessment of potential differential intervention effects. In

1 one such meta-analysis, Western et al (2021) found that digital interventions for increasing
2 physical activity were not effective in low socioeconomic groups but were effective in higher
3 socioeconomic groups receiving the same interventions (Western et al., 2021). Indeed, some
4 intervention types may be more prone to intervention generated inequalities. For example,
5 researchers have posited that there may be a ‘digital divide’ (in digital health interventions)
6 due to differing levels of e-health literacy across social groups (Szinay et al., 2022; Yoon,
7 Jang et al., 2020). For some interventions, additional efforts may be required to co-design
8 appropriate interventions, engage community stakeholders, adapt intervention content, or
9 adopt more suitable research methodologies, to engage specific sub-groups.

10 Research concerning how inequalities impact trial engagement or effectiveness is
11 often limited by inadequate reporting of participant characteristics relevant to health equity,
12 such as indices of socioeconomic status (Furler et al., 2012; Jull et al., 2017). Some
13 researchers have highlighted limitations created by underrepresentation of specific sub-
14 population groups, such as racial and ethnic minority groups in behavioural weight loss
15 interventions (Haughton et al., 2018; Rosenbaum et al., 2017). If population sub-groups are
16 under-recruited in randomised controlled trials (RCTs), the external validity and
17 generalisability of the study findings to those groups may be limited. Unrepresentative
18 research can sometimes be used to underpin health policy, potentially contributing to
19 systemic health inequalities. For example, women, the elderly and racial minorities were
20 underrepresented in randomised trials that informed cardiovascular guidelines in the United
21 States (Sardar et al., 2014). Recent guidelines to optimise the recruitment and retention of
22 participants from ethnic minority groups to randomised trials highlights four key
23 recommendations: i) ensure recruitment methods and eligibility criteria do not unintentionally
24 limit participation; ii) develop trial materials with inclusion in mind; iii) ensure cultural

1 competence of staff; and iv) build trusted partnerships with community organisations that
2 represent ethnic minority groups (Dawson et al., 2022).

3 In a recent systematic review of qualitative studies, being Indigenous driven, and
4 culturally safe and secure, were identified as crucial enablers in developing Indigenous
5 physical activity interventions, with colonisation and linked mistrust key barriers (Gidgup et
6 al., 2021). Systematic review recommendations for supporting Indigenous people's
7 participation in RCTs internationally include actively involving Indigenous research partners
8 and respectfully drawing on Indigenous knowledge and values (Glover et al., 2015). In the
9 Australian context, adherence to biomedical understandings of health and research
10 methodologies (e.g., RCTs), may be divisive amongst Aboriginal and Torres Strait Islander
11 communities (Lin et al., 2016). Addressing health inequalities for Aboriginal and Torres
12 Strait Islander people may include co-developing interventions with the community,
13 integrating culturally safe person-centred approaches (e.g., clinical yarning, which combines
14 cultural communication preferences with biomedical understandings of health) and
15 Indigenous research practices (e.g., decolonisation methodologies) (Gidgup et al., 2021; Lin
16 et al., 2016; Sherwood & Edwards, 2006). These considerations may be unique to Indigenous
17 populations, but the need for researchers to consider how health behaviour change programs
18 may or may not be acceptable to, engaging for, or able to reach specific sub-population
19 groups is evident.

20 Considering multiple characteristics defined by the PROGRESS-Plus framework that
21 may be linked to the production of health inequalities is referred to intersectionality.
22 Intersectionality is an approach to considering health inequalities that moves beyond
23 individual factors (e.g., socioeconomic status or gender), to instead focus on how multiple
24 factors may interconnect to produce unequal health outcomes (Kapilashrami & Hankivsky,
25 2018). In other words, multiple potential disadvantages and/or advantages may occur

1 simultaneously, with the culmination of these factors contributing to health outcomes. The
2 intersectionality of factors is also likely to be important to consider in relation to the uptake
3 of, adherence to, and the effectiveness of health behaviour change interventions. In addition,
4 sections of the population that would not normally be considered disadvantaged may be
5 underrepresented in certain contexts. For example, men are underrepresented in behavioural
6 weight management interventions (Pagoto et al., 2012; Robertson et al., 2016), and men from
7 lower socioeconomic and rural areas may be particularly unlikely to access or participate in
8 these types of interventions (Ahern et al., 2016; Punt et al., 2020). Intersectionality is also
9 reflected in the Australian Government's National Men's Health Strategy for 2020-2030,
10 which, for example, highlights that men that reside in rural and lower socioeconomic areas
11 are priority populations for preventative health (Australian Government, 2019). In this thesis
12 the PROGRESS-Plus factors 'gender/sex', 'place of residence', and 'socioeconomic status',
13 are considered in the context of weight management interventions.

14 **1.4 Adapting Interventions for Different Contexts**

15 Researchers have called for a higher priority to be given to health equity in both
16 intervention and implementation research trials (Brownson et al., 2021; Treweek et al., 2021).
17 A core concept of implementation science is adaptation of evidence-based interventions and
18 implementation strategies for different contexts. Context can be defined as characteristics and
19 conditions that alter, impede and/or support the delivery and effectiveness of interventions
20 (Evans et al., 2019). These characteristics or conditions, include socioeconomic,
21 geographical, and sociocultural contexts (Pfadenhauer et al., 2017). Recently published
22 guidelines for adapting interventions for different contexts highlights the involvement of a
23 diverse range of stakeholders as a core overarching principle central to all stages of
24 adaptation (Moore et al., 2021). Adapting effective interventions and strategies to support
25 their implementation in new contexts can be important for helping to address health

1 inequalities where the unmodified intervention may be unappealing, ineffective, unable to
2 reach, or otherwise inappropriate for particular sub-group populations (Bernal & Domenech
3 Rodríguez, 2012; Cabassa & Baumann, 2013). This PhD reports on stakeholder involvement
4 in the adaptation of a behavioural weight management intervention that has been piloted in
5 metropolitan areas for delivery in rural towns in WA.

6 Adaptation can be defined as the process of thoughtful and deliberate modification of
7 intervention design or delivery, to improve intervention fit or effectiveness within a given
8 context (Stirman et al., 2015; Wiltsey Stirman et al., 2017). To this end, adaptations can be
9 conceptualised as implementation strategies intended to enhance intervention reach and
10 support implementation in new contexts (Miller et al., 2020). Adaptations to effective
11 interventions have typically been viewed as undesirable ‘nuisances’, and likely to negatively
12 impact intervention effects research (Miller et al., 2020). But adaptations can have a positive
13 impact, particularly when made systematically and proactively, are aimed at improving
14 intervention fit (e.g., to align with target population values), have a stated goal or reason, and
15 retain the integrity of core intervention elements (Moore et al., 2013). Reporting of
16 adaptations is often inadequate or inconsistent, which has resulted in a lack of understanding
17 of the types of adaptations that may or may not work in a given context (Moore et al., 2021).
18 Thus, guidelines for reporting adaptations to interventions and implementation strategies
19 have been developed, including the specification of the extent, type, and rationale for
20 adaptations (Miller et al., 2021; Moore et al., 2021).

21 Assessment of similarities and differences between new and old contexts is an
22 important initial step in adapting interventions noted in the aforementioned guidelines
23 (Moore et al., 2021). In some cases, if differences between contexts are adjudged to be
24 significant, or in the absence of sufficient evidence, the adapted intervention may require
25 feasibility or pilot testing in the new context. In other circumstances, where effective

1 evidence-based interventions are being implemented in a setting or population that is
2 adjudged only moderately different from the contexts from which effectiveness data were
3 derived, it may be considered appropriate to “*borrow strength*’ from prior research without
4 undertaking another effectiveness RCT (Aarons et al., 2017). The goal of adapting
5 interventions for new contexts is often to extend the reach of the intervention for wider
6 population health impact. Reach is a core dimension of the RE-AIM (Reach, Effectiveness,
7 Adoption, Implementation, Maintenance) framework (Glasgow et al., 1999), which is
8 commonly used to assess the public health impact of interventions.

9 **1.5 Health Behaviour Change Interventions for Men**

10 ***1.5.1 Men’s Participation in Rural Weight Management Interventions***

11 Porter and colleagues (2019) undertook a systematic review examining the impact of
12 rural weight management interventions using the RE-AIM framework (Porter et al., 2019).
13 Rural interventions appeared to be effective at supporting clinically meaningful weight
14 reduction, but the authors reported that intervention reach was difficult to determine (Porter et
15 al., 2019). The review authors did not report gender representation of the included studies.
16 From scrutiny of the characteristic data of the studies included in the systematic review, we
17 observed vast underrepresentation of men in the reported trials. For example, in the five
18 mixed-gender RCTs included that report participant characteristics and were not aimed at
19 clinical populations, over three quarters of participants were women (1071 / 1383; 77%, 68-
20 91%). Further, inclusive of all studies within the systematic review (n=50 studies with a
21 variety of designs, e.g., RCT, quasi-experimental, cohort studies), none were directed
22 specifically at men.

23 In a large rural primary care weight management trial (published since Porter et als
24 systematic review) in the USA that reported enrolment data disaggregated by sex, only 7.8%

1 of men responded to direct mail invitations to participate compared to 17.7% of women (Punt
2 et al., 2020). Thus, men in rural areas appear to be significantly underrepresented in weight
3 management research due to the limited appeal of mixed-gender interventions in these
4 communities and a lack of interventions that are designed for or aim to specifically men in
5 rural areas. This PhD aims to help address this gap in the literature.

6 ***1.5.2 Gender Sensitisation***

7 Systematic review evidence suggests that to attract and engage men to weight
8 management programs, interventions should be designed in line with men's preferences
9 (Robertson et al., 2016). A qualitative evidence synthesis describes how features of weight
10 management programs that are attractive to men include retaining autonomy over dietary
11 intake and a physical activity component, and that humour and social support within group
12 interventions can facilitate attendance and adherence (Archibald et al., 2015). Gender
13 sensitisation refers to the design of programs that draw on existing knowledge around men's
14 preferences to ensure that interventions run congruent, rather than counter, to masculine
15 identities (Archibald et al., 2015). There is a growing body of literature supporting the value
16 of gender-sensitising interventions in terms of context, content, mode and/or style of delivery
17 (Caperchione et al., 2017; Gray et al., 2014; Maddison et al., 2019; Morgan et al., 2014;
18 Morgan, Collins, et al., 2011; Morgan, Lubans, et al., 2011; Quested et al., 2018; Wyke et al.,
19 2019; Wyke et al., 2015). The innovation of gender-sensitised interventions has been
20 described by researchers as a '*key development*' for engaging men that may otherwise be
21 considered hard-to-reach (Bottorff et al., 2015). Qualitative data from men who have taken
22 part in gender-sensitised weight management programs, describes the value that men place on
23 interventions being developed and targeted specifically for them (Hunt, Gray, et al., 2014;
24 Morgan, Warren, et al., 2011). Developing gender-sensitised interventions may be

1 particularly crucial in rural and lower socioeconomic contexts where adherence to traditional
2 expressions of masculinities are prevalent (Bonell et al., 2022).

3 Given the underrepresentation of men in mixed-gender behavioural health
4 interventions, self-directed eHealth interventions have been developed as one means to
5 engage men that removes the burden of in-person attendance (Dombrowski et al., 2020;
6 Morgan et al., 2013; Young et al., 2021). Another approach to tailor interventions for
7 engaging men is through the power of sport. The ‘Dads and Daughters Exercising and
8 Empowered’ (DADEE) program is one such program that uses sport and co-physical activity
9 to engage fathers and their daughters in a health behaviour change intervention that tackles
10 gender stereotypes around physical activity (Morgan et al., 2015). Trials of the DADEE
11 program demonstrated effectiveness in increasing fathers and daughters’ physical activity
12 (Morgan et al., 2022), and improving daughters social-emotional well-being (Young et al.,
13 2019). Professional sporting contexts can also help engage men health behaviour change
14 interventions. A recent systematic review highlighted the utility of using professional sport to
15 help engage men in behavioural health interventions (George et al., 2022). One such
16 program, which draws on the attraction of professional football (soccer), is Football Fans in
17 Training (FFIT).

18 ***1.5.3 Football Fans in Training***

19 FFIT is a behavioural weight management program that uses the attraction of
20 professional football (soccer) clubs and settings to engage male supporters. In the full-scale
21 RCT, 747 men living with overweight or obesity from across the socioeconomic spectrum
22 were recruited (Hunt, Gray, et al., 2014). Hunt and colleagues (2014) explain how the
23 *‘location and style of delivery of early FFIT sessions fostered team spirit’* and how men
24 appreciated undertaking the program *‘in circumstances that enhanced physical and symbolic*

1 *proximity to something they valued highly, the football club* (Hunt, Gray, et al., 2014). FFIT
2 is effective at supporting men to lose weight, with a large proportion of participants losing a
3 clinically meaningful amount of weight (Hunt, Wyke, et al., 2014). The intervention effects
4 did not appear to differ by socioeconomic status (i.e., education, income, place of residence)
5 (Wyke et al., 2015). A common weakness of weight management research is a lack of long-
6 term effectiveness outcomes; but notably, FFIT has demonstrated long-term (3.5 years)
7 maintenance of weight loss (Gray et al., 2018).

8 FFIT has been scaled-up in Scotland with ongoing routine program deliveries
9 managed by a voluntary sector organisation (the Scottish Professional Football League Trust)
10 (Hunt et al., 2020). Due to the geographical distribution of football clubs in the professional
11 league set-up in Scotland and sustained government funding, this program delivery model has
12 helped FFIT to be rolled out in association with clubs spanning the country (Hunt et al.,
13 2020). Data from routine 'scaled-up' FFIT deliveries in Scotland and England (n>3000)
14 suggests little or no 'voltage drop' in intervention effects in routine program deliveries when
15 compared to the RCT weight outcomes (Hunt et al., 2020; Hunt, Wyke, et al., 2014). FFIT
16 has also been adapted for different countries, sports, and populations (Hunt et al., 2020). In
17 several of these programs, based on the differences between new and old contexts, it was
18 deemed necessary to undertake pilot RCTs to assess the feasibility of the adapted intervention
19 and trial procedures to inform full-scale effectiveness trials in the new context. For example,
20 FFIT was adapted for and piloted in professional rugby settings in New Zealand to inform
21 parameters for a full trial (Maddison et al., 2019). In Scotland, the FFIT program was
22 minimally adapted for and tested in a non-randomised feasibility trial for women, with the
23 program delivery systems and sporting contexts remaining consistent (Bunn et al., 2018). In
24 Germany, due to minimal intervention adaptations, and similarities in the targeted population
25 (i.e., men 35-65yrs with BMI \geq 28) and sporting context (i.e., soccer) to those utilised in the

1 original effectiveness RCT, further effectiveness data was considered unnecessary (Pietsch et
2 al., 2020). In the latter two examples, the similarities between the delivery contexts allowed
3 for the minimally adapted interventions to be implemented based on '*borrowed strength*'
4 from the prior RCT outcomes.

5 ***1.5.4 Aussie Fans in Training***

6 Following sports teams is extremely popular in Australia, particularly amongst men.
7 As the vast majority of adults (80.4%) are sedentary and have low physical activity levels
8 (ABS, 2022a), researchers in Australia were inspired by FFIT to capitalise on the popularity
9 of Australian Football and adapted FFIT for the Australian context (Quested et al., 2018).
10 Aussie Fans in Training (Aussie-FIT) is a gender-sensitised behavioural weight management
11 program for men (aged 35-65 with a BMI $\geq 28\text{kg/m}^2$) which has been tested in a pilot RCT in
12 Western Australia (Quested et al., 2018). Like FFIT, Aussie-FIT:
13 involves weekly coach-led 90-minute sessions over 12 weeks
14 capitalises on connection with a favourite sports team as a hook to engage men
15 is delivered by trained coaches with education and physical activity components
16 embeds theoretical and evidence-based strategies to engage men in behavioural change
17 aims to facilitate the discussion of sensitive topics, fun, and positive humour

18 The content within the Aussie-FIT program is also informed by Self-Determination
19 Theory (SDT) (Ryan & Deci, 2000) and designed to empower men to use self-regulation
20 strategies to support them to make positive changes to their physical activity and eating
21 behaviours (Quested et al., 2018). SDT describes how conditions that support the satisfaction
22 of three basic psychological needs; to feel a sense of autonomy (free choice), relatedness
23 (meaningful connection with others) and competence (have skills or resources to master

1 skills, overcome challenges); fosters higher quality forms of motivation for engaging in
2 activities (Ryan & Deci, 2000). A meta-analysis of interventions grounded in SDT
3 demonstrated that when motivations for changing weight behaviours are of higher quality
4 (e.g., because the individual enjoys or values the behaviour), then attempts to modify their
5 behaviours are more likely to be achieved and sustained (Ng et al., 2012). The program also
6 embeds behaviour change techniques (e.g., self-monitoring, goal setting and feedback on
7 behaviours) and activities designed to facilitate psychological need satisfaction for autonomy,
8 competence, and relatedness in relation to physical activity and eating behaviours (Quested et
9 al., 2018). In line with FFIT and other ‘Fans in Training’ programs (Hunt et al., 2020), the
10 Aussie-FIT pilot showed promising intervention effects for participants mental and physical
11 health, and positive changes in health behaviours (e.g., diet and physical activity) (Kwasnicka
12 et al., 2020).

13 In the pilot study, Aussie-FIT was delivered in association with two professional
14 Australian Football League (AFL) clubs in metropolitan Perth within professional club
15 settings. The AFL clubs promoted Aussie-FIT via their social media pages, and the program
16 was highly attractive to urban-residing men, with 426 men expressing interest within four
17 days (Kwasnicka et al., 2021). Men that participated in the Aussie-FIT pilot trial (n=130) had
18 relatively high levels of education (Kwasnicka et al., 2021). In Aussie-FIT and other ‘Fans in
19 Training’ programs, the ‘behind the scenes’ professional sports club access, including a
20 stadium tour, are typically a key attraction to the program and emphasised in the marketing
21 materials. In WA, professional football settings are only accessible to those who live in
22 proximity to the AFL club facilities within the city of Perth. Without access to professional
23 club settings, adaptations to both the program content and implementation strategies will be
24 required to reach men in rural areas. The extent to which an adapted-version of Aussie-FIT

1 could engage men living with obesity in rural and lower socioeconomic areas, without access
2 to AFL club facilities, has not been established.

3 In November 2019 (prior to the submission of the PhD candidacy), 30 stakeholders
4 (e.g., sports club representatives, public health professionals, and community workers)
5 attended an Aussie-FIT pilot trial dissemination workshop and legacy event in Perth.
6 Attendees participated in discussion about how the program could be extended for delivery in
7 alternative settings. In a workshop group led by the primary author (MM), attendees
8 discussed challenges and opportunities to implementing Aussie-FIT within underserved
9 communities. Extending the reach of Aussie-FIT to men from rural and low socioeconomic
10 areas was raised as a priority. Challenges implementing Aussie-FIT in these contexts
11 included the funding required to deliver the program, locals' suspicion of outsiders (e.g.,
12 researchers), potentially harsh weather conditions, potential difficulty sustaining an AFL
13 affiliation with Aussie-FIT, travel distance to program venues, limited access to quality
14 sporting facilities, and the risk of not being supported by the local Australian Football
15 community. Opportunities included the social hub setting of some rural Australian Football
16 clubs, potential for in-kind support (e.g., program delivery venues), the potential to access
17 diverse population groups in rural areas, and the popularity of Australian Football amongst
18 Aboriginal and Torres Strait Islander communities. Stakeholders stressed that making the
19 right local connections in rural program delivery sites would be essential for the program to
20 be successful, including that locally based coaches embedded in the rural communities should
21 be employed to deliver the program.

22 **1.6 Summary**

23 Tackling poor diets, physical inactivity, obesity, and health inequalities are public
24 health priorities in Australia and internationally. There is a complex relationship between

1 place of residence (i.e., rural/urban, high/low socioeconomic areas), risk of ill-health, and
2 access to appropriate preventative health interventions. Men that live in lower socioeconomic
3 rural areas are less likely to participate in behavioural weight management interventions than
4 both rural-residing women and urban-residing men. Gender-sensitising (or gender-tailoring)
5 interventions is an important strategy for engaging men in preventative health interventions
6 and may be particularly important for engaging men in lower socioeconomic rural areas.
7 Adapting interventions for specific contexts (e.g., different settings or populations) is an
8 important strategy to help enhance the reach of interventions and tackle health inequalities.
9 Involving relevant stakeholders in the adaptation and implementation of programs is essential
10 to help ensure that the needs of the target group are met and for potential sustainability.

11 FFIT is an effective behavioural weight management intervention that uses
12 professional football (soccer) club settings to engage men in the UK and has inspired various
13 international adaptations. The Australian program (Aussie-FIT) has been piloted with
14 professional AFL clubs in urban Perth but is untested in rural areas. In Scotland FFIT
15 engages men from across the socioeconomic spectrum, including men resident in urban and
16 rural areas. However, there is a significant gap in understanding how best to engage and
17 support men from lower socioeconomic rural areas in evidence-based behavioural weight
18 management programs in the Australian context.

19 **1.7 Thesis Content and Aims**

20 The overall aim of PhD is to investigate and address the underrepresentation of men from
21 lower socioeconomic and rural areas in behavioural weight management via three interlinked
22 studies. The first study is a systematic review that examines socioeconomic factors in trials of
23 weight management interventions for men. The second study reports on the findings of focus
24 groups undertaken with rural stakeholders that informed the adaptation of Aussie-FIT for

1 implementation in rural contexts. The third study reports on mixed-methods data from the
2 implementation of the adapted version of Aussie-FIT in three lower socioeconomic rural
3 towns in Western Australia. These studies (chapters), their aims and information on when
4 they were undertaken are outlined in Table 1. Most of the research undertaken as part of this
5 PhD was completed before the State and International borders were opened in Western
6 Australia in March 2022, with little community transmission of Covid-19 up to this point.
7 The influence of community transmission of Covid-19 and vaccination requirements on the
8 rural Aussie-FIT deliveries in the third study site are discussed in Chapters 4 and 5. The
9 individual aims of these studies are:

- 10 1. to examine the extent to which socioeconomic factors have been considered in the
11 design, conduct, and reporting in trials of weight management interventions for men.
- 12 2. to explore with local community stakeholders the potential barriers and facilitators to
13 engaging rural men in Aussie-FIT and determine which specific adaptations may be
14 required to deliver Aussie-FIT in lower socioeconomic rural areas
- 15 3. to examine the extent to which an adapted version of Aussie-FIT delivered in lower
16 socioeconomic rural communities can recruit, engage, and retain men living with
17 overweight or obesity, and to explore the associated barriers and facilitators
18 experienced by men that participated in the program

19

20

21

1 **Table 1**
2 *Overview of Thesis Study Aims and Timing*

Chapter and Title	Chapter Aim	Timing
Chapter 2: A systematic review examining socioeconomic factors in trials of interventions for men that report weight as an outcome (study 1)	To examine the extent to which socioeconomic factors have been considered in the design, conduct, and reporting in trials of weight management interventions for men	This review was registered on PROSPERO in February 2020, included studies published up until July 2021 and was published in January 2022.
Chapter 3: ' <i>A different ball game</i> '. Adaptation of a men's health program for rural Australia (study 2)	To explore with local community stakeholders the potential barriers and facilitators to engaging rural men in Aussie-FIT and determine which specific adaptations may be required to deliver Aussie-FIT in lower socioeconomic rural areas	Focus groups were undertaken in 2020 and 2021 when when international and State (Western Australia) borders were closed.
Chapter 4: Can an Australian Football themed behavioural health program engage men in rural Australia? A mixed-methods study (study 3)	The overall aims of this mixed-methods study were to assess the feasibility of recruiting and retaining coaches to deliver rural Aussie-FIT, examine the extent to which the program can recruit, engage, and retain men living with overweight or obesity in rural areas, and to explore the associated barriers and facilitators experienced by men that participated in the program.	In sites 1 and 2, Aussie-FIT was delivered in 2021 when international and State (Western Australia) borders were closed, and Covid-19 cases were very limited with no community spread. In site 3, Aussie-FIT deliveries coincided with the opening of the State borders and relatively high levels of community transmission of Covid-19.

1
2
3
4 **Chapter 2: A Systematic Review Examining Socioeconomic Factors in Trials of**
5 **Interventions for Men that Report Weight as an Outcome**
6

7 **Note:** The following chapter has been published in ‘Obesity Reviews’.

8 McDonald, M. D., Hunt, K., Sivaramakrishnan, H., Moullin, J., Avenell, A., Kerr, D. A., . . .

9 Qusted, E. (2022). A systematic review examining socioeconomic factors in trials of
10 interventions for men that report weight as an outcome. *Obesity Reviews*, e13436.

11 <https://doi.org/10.1111/obr.13436>
12

13 **Contribution Summary for Chapter 2 (Study 1):** The primary author (MM) conceived the
14 research idea for this study, developed the review protocol, undertook the literature search
15 and study selection process, extracted and synthesised data, conducted the risk of bias
16 assessment, and managed all aspects of manuscript preparation and submission. KH, DK,
17 AA, and NN helped develop the initial research idea and protocol. HS assisted with study
18 selection and data extraction. JMB assisted with risk of bias assessment. EQ helped develop
19 the initial research idea and protocol and assisted with study selection. All authors reviewed
20 and provided comments on the manuscript, and approved the final version.

21
22 **Note:** In this chapter and throughout this thesis the PhD Candidate (MM) will be referred to
23 as the ‘primary author’.
24

1 **2.1 Introduction**

2 Obesity is a risk factor for morbidity and premature mortality (Di Angelantonio et al.,
3 2016; Flegal et al., 2013). Interventions that support individuals living with obesity to modify
4 their diet and physical activity behaviours can result in clinically significant weight reduction
5 and improved health outcomes (LeBlanc et al., 2018; Ma et al., 2017). The prevalence of
6 overweight and obesity between men and women is similar (AIHW, 2020; NHS Digital,
7 2020; Scottish Government 2018). However, men are underrepresented in weight
8 management research (Pagoto et al., 2012; Robertson et al., 2016). Trials reporting
9 recruitment data disaggregated by gender indicate that women are around twice as likely as
10 men to take up an offer to participate in mixed-gender weight management programmes
11 (Ahern et al., 2016; Punt et al., 2020). Qualitative research suggests that men perceive some
12 weight management programmes as being incompatible with their needs (Elliott et al., 2020),
13 and counter to social ideals of masculinity (Archibald et al., 2015). Hence, interventions
14 designed specifically to appeal to men are becoming more common. Men residing in lower
15 socioeconomic areas or with lower levels of educational attainment may be particularly
16 unlikely to participate in weight management programmes (Ahern et al., 2016; Rounds &
17 Harvey, 2019), but the extent to which socioeconomic factors are considered in the design
18 and evaluation of interventions for men is unknown.

19 The term socioeconomic status describes the social standing of individuals based on
20 factors such as their place of residence, income, occupation, and educational attainment
21 (Baker, 2014). Living in lower socioeconomic areas is predictive of poorer quality diet,
22 including lower fruit and vegetable consumption and higher sugar-sweetened beverage intake
23 (Barton et al., 2015; Patel et al., 2020). Similarly, individuals residing in lower
24 socioeconomic areas are less likely to meet recommendations for physical activity (NHS
25 Digital 2017), which is likely due to differences in leisure-time physical activity (Beenackers

1 et al., 2012; O'Donoghue et al., 2018). The relationship between socioeconomic status and
2 health outcomes is more strongly mediated by poor diet and physical inactivity in men than
3 women (Whitley et al., 2013). Social context and socioeconomic status influence the way in
4 which masculinities are constructed (Evans et al., 2011). Adherence to particular
5 performances of masculinity linked to poorer health outcomes (Dolan, 2011; Taylor Smith &
6 Dumas, 2019), and reduced confidence to seek health information and trust in that
7 information (Richardson et al., 2012), are prevalent amongst men from lower socioeconomic
8 circumstances. Interventions and engagement strategies that are congruent with masculine
9 identities may be important to engage diverse populations of men (Grace et al., 2018; Hunt,
10 Gray, et al., 2014; Lefkowich et al., 2017; Oliffe et al., 2011).

11 The need for weight management interventions designed to appeal specifically to men
12 is well recognised (Bottorff et al., 2015; Robertson et al., 2016; Sharp, Spence, et al., 2020;
13 Young et al., 2012). The innovation of gender tailoring health interventions has been
14 described as a '*key development*' to engage men who may not otherwise participate (Bottorff
15 et al., 2015). Several interventions that have been gender tailored in content, context, mode
16 and/or style of delivery have proved successful in engaging men living with obesity and
17 supporting positive health behaviour change (Aguiar et al., 2017; Dombrowski et al., 2020a;
18 Hunt, Wyke, et al., 2014; Kwasnicka et al., 2020; Morgan et al., 2010; Morgan, Lubans, et
19 al., 2011; Sharp, Stolp, et al., 2020). Qualitative evidence from men's weight management
20 interventions highlights the value men place on programmes being developed and targeted
21 specifically for them (Hunt, Gray, et al., 2014; McDonald et al., 2020; Morgan, Warren, et
22 al., 2011). Systematic reviews indicate that men's weight management interventions can be
23 effective at supporting weight reduction (Robertson et al., 2017; Young et al., 2012).
24 However, the characteristics of men who participate in these programmes, and the extent to
25 which socioeconomic factors are considered in the design and evaluation of these

1 interventions is unknown. Interventions lacking an evidence base to suggest they are
2 appealing and effective across socioeconomic groups, may widen health inequities (White, et
3 al., 2009).

4 A systematic review examining government policy impact on socioeconomic inequities in
5 obesity and obesity-related health behaviours concluded that a *'broad complement of policies*
6 *spanning the agency-structure continuum'* is required to ameliorate inequities in obesity
7 (Olstad et al., 2016). Others have posited that behavioural weight management interventions
8 that rely on a high degree of individual agency may augment health inequalities (Adams et
9 al., 2016; White et al., 2009), with population level approaches potentially more equitable
10 (Boelsen-Robinson et al., 2015; McGill et al., 2015). Indeed, a recent systematic review
11 concluded that digital interventions targeting physical activity are not effective for
12 individuals with lower socioeconomic status (but are in those more affluent), and that
13 additional efforts or intervention tailoring are required for these types of interventions to be
14 equitable (Western et al., 2021). Possible explanations for this relationship include low
15 socioeconomic status being linked with having lower levels of ehealth literacy (Neter &
16 Brainin, 2012; Yoon et al., 2020), and potentially fewer opportunities to engage with or act
17 upon intervention content due to limited resources and differences in social and physical
18 environments (Pampel et al., 2010). Engaging members of disadvantaged communities in
19 intervention design and tailoring of interventions for population sub-groups can support
20 positive health outcomes (O'Mara-Eves et al., 2015). Public health policy highlights the need
21 for different types of interventions that support health in priority population groups that are
22 most at risk of ill-health, including those from lower socioeconomic circumstances
23 (Australian Government, 2019; Department of Health and Social Care, 2018).

24 In seminal research published in 2004, senior health policymakers (Petticrew et al., 2004)
25 and researchers (Whitehead et al., 2004) highlighted a lack of an equity dimension in research

1 evaluations. This has been underlined by systematic review evidence showing that RCTs
2 examining intervention effectiveness in reducing obesity-related inequities, particularly in
3 men, are lacking (Bambra et al., 2015). In 2014, recommendations for research from the
4 ‘ROMEIO’ series of systematic reviews on men’s obesity concluded that men from diverse
5 backgrounds should be consulted to optimise intervention engagement, and that qualitative
6 research findings should inform all aspects of intervention design, including intervention
7 settings and recruitment processes (Robertson et al., 2014). In 2017, an extension to the
8 CONSORT guidelines for better reporting of health equity in RCTs was published, with
9 useful recommendations around reporting of participants’ characteristics and limitations
10 related to groups that may experience social disadvantage (Welch et al., 2017). However, the
11 extent to which RCTs of weight management interventions for men align with these equity-
12 related recommendations is unclear. Therefore, the aim of this systematic review is to
13 examine RCTs of interventions for men with a behavioural component that report weight as
14 an outcome, to establish the degree to which socioeconomic factors have been considered,
15 including the extent to which:

- 16 1. consultations to inform intervention design are undertaken with men from specific
17 socioeconomic groups or with other relevant stakeholders
- 18 2. trials report participant socioeconomic characteristics
- 19 3. trials report the socioeconomic profile of their participants in relation to study
20 strengths or limitations statements
- 21 4. trials target specific socioeconomic groups or conduct sub-group analysis in relation
22 to socioeconomic characteristics

1 **2.2 Methods**

2 This systematic review is reported in line with the Preferred Reporting Items for
3 Systematic Reviews and Meta-Analysis (PRISMA) guidelines (Page et al., 2021). The review
4 protocol was registered with PROSPERO (CRD42020167282).

5 **2.2.1 Eligibility Criteria**

6 1. Participants: Men-only studies were included if they had a mean baseline
7 participant BMI of $\geq 30\text{kg/m}^2$ and/or a participant eligibility criterion BMI of $\geq 25\text{kg/m}^2$.
8 Studies that included men's partners or family members (e.g., children), where the primary
9 intervention outcome of interest was men's weight, were also included. Studies including any
10 males under 18 years were excluded, except in cases where males under 18 were participating
11 as family members (e.g., in a father-child intervention).

12 2. Interventions: Interventions targeting weight, diet and/or physical activity with a
13 behavioural component such as education, behaviour change techniques, psychological
14 theories, or counselling, were included. Interventions could include group-based or
15 individual, face-to-face, or e-health interventions. Surgical or drug interventions, with or
16 without a behavioural component, were excluded.

17 3. Comparators: Studies that included a control group (e.g., wait list, usual care,
18 minimal or no intervention) or that compared two or more active interventions against each
19 other were eligible.

20 4. Outcomes: Studies that reported men's weight or BMI as an outcome were eligible.
21 Weight outcomes in the context of this review refer to studies with interventions that may
22 support weight loss, maintenance of weight loss or weight gain prevention. Both objectively
23 measured and self-reported weight outcomes were eligible.

1 5. Study Designs: Peer-reviewed individual or cluster RCTs, with any length of
2 follow-up, published in English since the year 2000 were included.

3 ***2.2.2 Search Strategy and Information Sources***

4 A comprehensive search strategy (Appendix A) was developed for Medline, then
5 adapted for Embase, PsycINFO and the Cochrane Central Register of Controlled Trials.

6 Groups of terms incorporated into the search strategy related to the: a) outcome of interest
7 (weight); b) trial design (RCT); and c) population (men). In line with health equity
8 recommendations, equity-related search terms were not included (Welch et al., 2013).

9 Moreover, the aim of this review was not to assess studies that had a specific focus on equity,
10 rather to examine the extent to which socioeconomic factors were considered in all men's
11 weight management RCTs. The full electronic database search was conducted to include
12 studies from January 2000 to July 2021. This date range captures the period during which
13 seminal research (in 2004) highlighted a lack of an equity dimension in health research, and
14 since the innovation of gender-tailored weight management interventions for men (mid
15 2000's). Existing systematic reviews relating to men's weight management and physical
16 activity interventions were examined for potentially eligible articles (Robertson et al., 2017;
17 Sharp, Spence, et al., 2020; Young et al., 2012). Articles citing and referenced by eligible
18 studies were also examined to see if they were eligible for inclusion (Hinde & Spackman,
19 2015).

20 ***2.2.3 Study Selection***

21 Duplicate records were removed from the Endnote database. One reviewer (MM)
22 screened the titles and abstracts of all remaining records. The full texts of all records
23 identified as potentially relevant were examined against the inclusion and exclusion criteria.
24 Two reviewers (MM, HS) screened five full-text articles together, to ensure consistent

1 understanding of the inclusion and exclusion criteria. The same two authors (MM, HS) then
2 independently screened the remaining full texts. There was one discrepancy noted, which was
3 ultimately included through discussion with a third researcher (EQ).

4 ***2.2.4 Data Collection Process***

5 One reviewer (MM) extracted relevant data from eligible studies. Relevant
6 information was extracted from publications reporting RCT outcomes, as well as associated
7 study reports, protocols, intervention development papers and process evaluations. Additional
8 reviewers (HS, ZM) checked all the primary data reported against the original published
9 research articles.

10 ***2.2.5 Risk of Bias in Individual Studies***

11 One researcher (MM) assessed Risk of Bias (RoB) domains using the Cochrane RoB tool
12 (Sterne et al., 2019). Individual RoB domains were assigned as being ‘low risk’, ‘some
13 concerns’, or ‘high risk’ for each study. A second reviewer (JB) independently assessed RoB
14 domains for 50% of the included studies, to ensure consistent interpretation across studies (k
15 = 0.80). Any discrepancies were resolved through discussion, with a third researcher
16 consulted if required. The ‘other’ bias category was used to capture information on potential
17 conflicts of interest between the funder and researchers.

18 ***2.2.6 Data Items***

19 Baseline data (i.e., means and standard deviations of age and BMI), study descriptors
20 (i.e., sample sizes, inclusion criteria and recruitment strategies), participant socioeconomic
21 characteristics (i.e., education level, area level deprivation, income, and employment status),
22 and other associated factors (i.e., ethnicity and rurality) were extracted. The term ‘area level
23 deprivation’ refers to an index that categorises zipcode/postcode areas of residence by
24 deprivation, relative to the level of deprivation nationally (e.g., postcode areas classified as

1 being in quintile 1 are in the 20% most deprived areas and those in quintile 5 are in the 20%
2 least deprived areas nationally). These indexes typically account for multiple indicators of
3 deprivation, including income levels, employment, housing, health, education, and crime
4 (Payne & Abel, 2012). Information on consultations (i.e., with men from the target group or
5 other stakeholders) undertaken to inform intervention design, and statements made about the
6 socioeconomic profile of study samples being a study strength or limitation were also
7 extracted.

8 ***2.2.7 Data Synthesis***

9 The number and proportion of studies reporting specific participant socioeconomic
10 characteristics was calculated. From this, the total number of socioeconomic characteristics
11 reported in each study was determined. We calculated the number and proportion of studies
12 that reported consulting with men from the target group and other relevant stakeholders
13 during intervention design. Data on whether consultations targeted men from specific
14 socioeconomic groups were collated. The number and proportion of interventions tailored
15 specifically for men were also computed. Due to the heterogeneity of socioeconomic
16 characteristic measures across studies and countries, moderation analysis of socioeconomic
17 status on weight outcomes and retention was not undertaken.

18 The number and proportion of trials that reported the socioeconomic profiles of their
19 participants in relation to study strengths or limitations was calculated. Examining study
20 strength and limitation statements gives some indication as to whether study authors may
21 have considered the importance of the socioeconomic characteristics of their sample in
22 relation to the potential for their intervention to impact health inequalities. These statements
23 were categorised as being specific to the socioeconomic profile of the sample if they
24 mentioned socioeconomic groups, educational attainment, area level deprivation, income

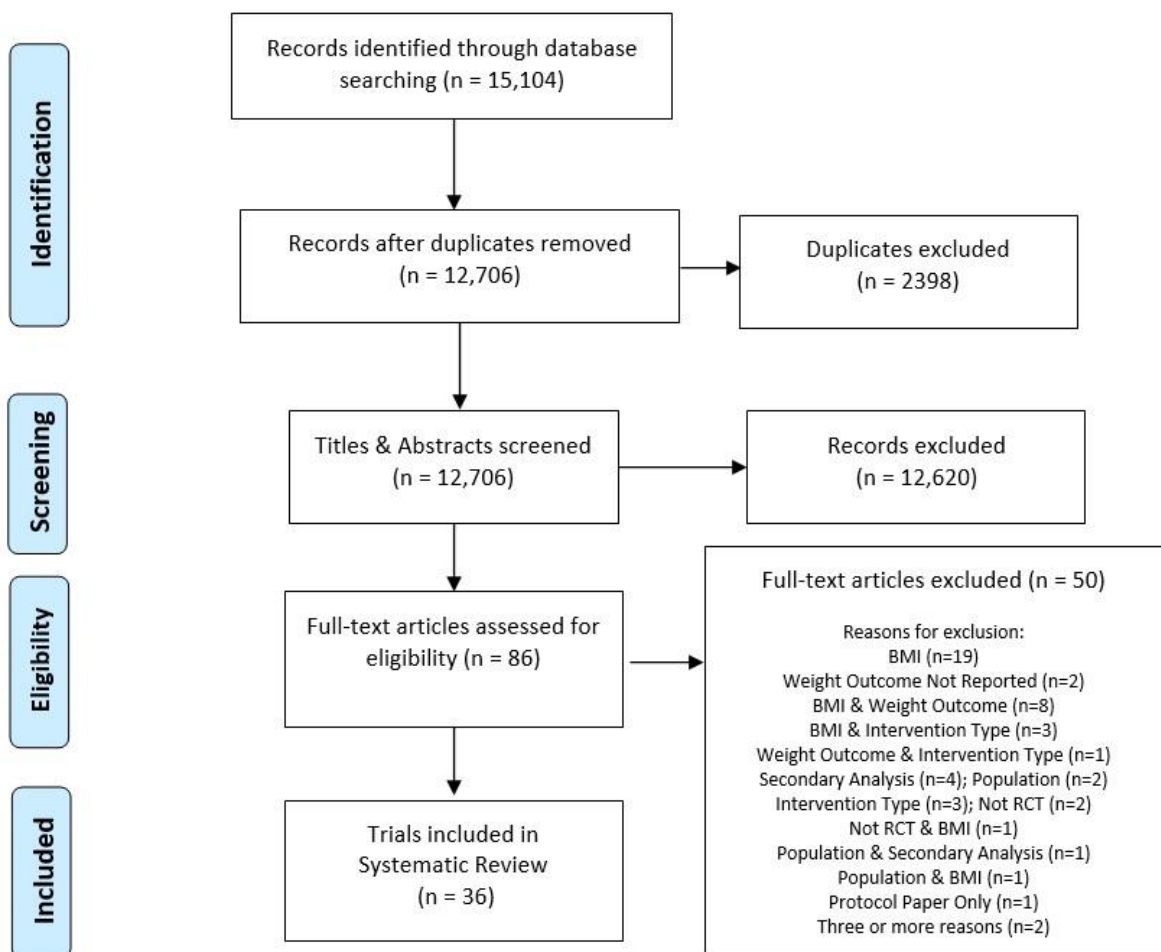
1 levels or similar terms. Statements clearly referring to strengths were documented as such.
2 Due to the potential for differential interpretation of whether some statements could be
3 deemed a limitation, a strength, or neither, we simply documented that the socioeconomic
4 profile was mentioned. Statements focusing on diversity related to ethnic groups were
5 classified separately if there was no mention of specific socioeconomic characteristics. Non-
6 specific statements about study diversity or generalisability were also classified separately.
7 All data were synthesised narratively.
8

1 2.3 Results

2 2.3.1 Study Selection

3 A summary of the study selection process is outlined in Figure 1. The search strategy
 4 identified 15,104 articles, with 12,706 remaining after duplicates were excluded. Eighty-six
 5 articles were eligible for full-text screening, of which 36 trials were ultimately included. No
 6 additional studies were deemed eligible from included studies citation and reference lists, or
 7 from existing systematic reviews. Common reasons for exclusion, after full-text review, were
 8 a failure to meet the BMI eligibility criteria and weight not being reported as an outcome.

9 **Figure 1. PRISMA Flow Diagram**



1 **2.3.2 Study Characteristics**

2 Table 2 reports selected characteristics of the included RCTs. Most trials were
3 conducted in the USA (n=9), Australia (n=8), Scotland (n=5) or other European countries
4 (n=7). The number of study participants ranged from 18 to 1113. Most studies (n=21) had
5 less than 100 participants, twelve had between 100 and 200, and four had over 200. Ten
6 studies completed longer term follow-up measures with participants (12-24m: n=6; >24m:
7 n=4) (Borg et al., 2002; Dombrowski et al., 2020a; Esposito et al., 2004; Hunt et al., 2014;
8 Mohamad et al., 2019; Morgan, Lubans, et al., 2011; Patrick et al., 2011; Puhkala et al., 2015;
9 Wyke et al., 2019; Young et al., 2017). Twenty studies were pilot or feasibility studies
10 (Aguiar et al., 2016; Alick et al., 2018; Azar et al., 2015; Demark-Wahnefried et al., 2017;
11 Dombrowski et al., 2020a; Garcia et al., 2019; Gray et al., 2013; Griffin et al., 2019; Irvine et
12 al., 2017; Kwasnicka et al., 2020; Maddison et al., 2019; Mohamad et al., 2019; Mollentze et
13 al., 2019; Morgan, Collins, et al., 2011; Morgan et al., 2010; Morgan, Lubans, et al., 2011;
14 O'Connor et al., 2020; Petrella et al., 2017; Shin et al., 2017; Ventura Marra et al., 2019).
15 Weight loss was the main intervention outcome in most studies (n=28), with maintenance of
16 weight lost the focus in two trials (Borg et al., 2002; Young et al., 2017). Four studies were
17 published between the years 2000 and 2009. One study reported post-intervention results in
18 2009 (Morgan et al., 2009), with longer-term outcomes reported in 2011 (Morgan, Lubans, et
19 al., 2011). Twelve studies were published between 2010 and 2015, with a further 19
20 published more recently (2016-2021).

21 Four studies involved fathers and their primary school-aged children (Griffin et al.,
22 2019; Morgan et al., 2014; Morgan et al., 2010; O'Connor et al., 2020). Two of these studies
23 were of the Healthy Dads Healthy Kids intervention in Australia (Morgan et al., 2014;
24 Morgan et al., 2010), and two were of cultural adaptations of the same programme in the UK
25 (Griffin et al., 2019) and USA (O'Connor et al., 2020). One study examined the effects of a

1 group-based intervention with and without spousal support in African American men (Alick
2 et al., 2018). All other studies involved only men. Two studies examined interventions for
3 men who had experienced prostate cancer (Demark-Wahnefried et al., 2017; Mohamad et al.,
4 2019), two for men with moderate or severe sleep apnoea (de Melo et al., 2021; Johansson et
5 al., 2009), one for men with erectile dysfunction (Esposito et al., 2004), and one for men
6 consuming high levels of alcohol (Irvine et al., 2017). Three worksite-related studies
7 specifically recruited long distance truck or bus drivers (Puhkala et al., 2015), those working
8 at company headquarters (Kim et al., 2015), and men working in private companies and local
9 government agencies (Ozaki et al., 2019), respectively. Thirteen studies included remote
10 individual level interventions utilising technology, and 12 studies were face-to-face group-
11 based interventions. The remote individual level interventions included five studies linked to
12 the Self-Help, Exercise and Diet using Information Technology (SHED-IT) intervention in
13 Australia (Aguiar et al., 2016; Morgan et al., 2013; Morgan, Collins, et al., 2011; Morgan,
14 Lubans, et al., 2011; Young et al., 2017). The face-to-face group based RCTs included the
15 pilot (Gray et al., 2013), full-scale trial (Hunt, Wyke, et al., 2014), and international
16 adaptations (Kwasnicka et al., 2020; Maddison et al., 2020; Petrella et al., 2017; Wyke et al.,
17 2019) of the Football Fans in Training (FFIT) intervention. Three trials were of interventions
18 utilising very low-calorie diets (Johansson et al., 2009; Kaukua, Pekkarinen, Sane, &
19 Mustajoki, 2002; Mollentze et al., 2019).

Study Characteristics

Primary Source	Country	N	Study Arms	Controls	Primary Outcome of Intervention	Intervention Duration (months)	Intervention Type	Measures (months post-baseline)	Weight Change (kg)
Aguiar et al 2016*	Australia	101	2	Wait-list	Weight	6	Remote, Individual	3 & 6	-5.5
Alick et al 2017*	USA	40	2	Active Intervention	Weight	2.8	F2F, Group	1.4 & 2.8	-1.3
Azar et al 2015*	USA	64	2	Wait-list	Weight	2.8	Remote, Group	3	-3.2
Borg et al 2002	Finland	90	3	Minimal Intervention	Weight (WLM)	6	F2F, Group	6 & 29	+0.2, -1.3
Crane et al 2015	USA	107	2	Wait-list	Weight	6	Combination	3 & 6	-4.7
Demark-Wahnefried et al 2017*	USA	40	2	Wait-list (post-surgery intervention)	Weight	Varied up to prostate surgery	F2F, Individual	Varied post intervention	-2.5
De Melo et al 2021	Brazil	45	2	Low Protein Diet	Sleep Apnoea & Metabolic Parameters	1	F2F, Individual	1	-0.3
Dombrowski et al 2020*	Scotland	105	3	Wait-list	Weight	12	Remote, Individual	12	-2.1, -0.4
Esposito et al 2004	Italy	110	2	Minimal Intervention	Erectile/ Endothelial Function	24	Combination	24	-13.0
Garcia et al 2019*	USA	50	2	Wait-list (12wks)	Weight	2.8	F2F, Individual	2.8	-5.5
Gray et al 2013*	Scotland	103	2	Wait-list	Weight	2.8	F2F, Group	2.8	-4.8
Griffin et al 2019*	England	43	2	Minimal Intervention	Weight	2.8	F2F, Group	3 & 6	-0.9
Hunt et al 2014	Scotland	747	2	Wait-list	Weight	2.8	F2F, Group	2.8 & 12	-4.8
Irvine et al 2017*	Scotland	69	2	Minimal Intervention	Alcohol Consumption & Weight	2	Remote, Individual	5	+1.1
Johansson et al 2009	Sweden	62	2	Wait-list	Sleep Apnoea	2.1	F2F, Group, with VLCD	0.2, 0.7, 1.2, 1.6 & 2.1	-19.8
Kaukua et al 2002	Finland	38	2	Wait-list	Weight loss on HRQoL	3.9	F2F, Group, with VLCD	2.5, 3.9 & 7.4	-17.1
Kim et al 2015	South Korea	205	2	Minimal Intervention	Weight	6	Remote, Individual	1, 3 & 6	-0.1
Kwasnicka et al 2020*	Australia	130	2	Wait-list	Weight	2.8	F2F, Group	3	-3.3
Maddison et al 2019*	New Zealand	96	2	Wait-list	Weight	2.8	F2F, Group	2.8	-2.5
Mohamad et al 2019*	Scotland	62	2	Wait-list (12wks), then minimal intervention	Weight	2.8	Remote, Individual	2.8 (Obj), 6 & 12 (SR)	-2.4

Mollentze et al 2019*	South Africa	18	2	Standard Intervention	Weight	6	Combination, with VLCD	3 & 6	-8.1
Morgan et al 2013	Australia	159	3	Wait-list	Weight	3	Remote, Individual	3 & 6	-3.2, -4.2
Morgan et al 2014	Australia	93	2	Wait-list	Weight	1.6	F2F, Group	3.2	-3.4
Morgan et al 2011a*	Australia	110	2	Wait-list	Weight	3	Combination	3.2	-4.3
Morgan et al 2011b*	Australia	53	2	Wait-list	Weight	3	F2F, Group	3 & 6	-7.6
Morgan et al 2011c*	Australia	65	2	Minimal Intervention	Weight	3	Remote, Individual	3 & 12	-2.2
O'Connor et al 2020*	USA	36	2	Wait-list	Weight	2.3	F2F, Group	4	-1.7
Ozaki et al 2019	Japan	71	3	Wait-list	Weight	2.8	Remote, Individual	2.8	-2.2, -4.3
Patrick et al 2011	USA	441	2	Wait-list	Weight	12	Remote, Individual	6 & 12	-0.7
Petrella et al 2017*	Canada	80	2	Wait-list	Weight	2.8	F2F, Group	2.8	-3.6
Puhkala et al 2015	Finland	113	2	Wait-list	Weight	12	Combination	12 & 24	-4.0
Rounds et al 2020	USA	102	2	Intervention without incentives	Weight	2.8	Remote, Individual	2.8 & 5.5	-2.2
Shin et al 2017*	South Korea	105	3	Minimal Intervention	Weight	2.8	Remote, Individual	0.9, 1.8 & 2.8	-0.7, -2.7
Ventura Marra et al 2019*	USA	59	2	Minimal Intervention	Weight	2.8	Remote, Individual	1.4 & 2.8	-3.3
Wyke et al 2019	England, Netherlands, Norway & Portugal	1113	2	Wait-list	Sedentary Time & Physical Activity	2.8	F2F, Group	2.8 & 12	-2.4
Young et al 2017	Australia	92	2	No Intervention	Weight (WLM)	6	Remote, Individual	6, 12 & 36	-1.6

Note.

Primary Outcome of Intervention: For pilot and feasibility studies, the intended primary outcome of the intervention or potential future full RCT is listed (i.e., not feasibility related outcomes)

Intervention Type: Whether the intervention is predominantly delivered face-to-face or remotely, and mostly individually or group based. Some studies are listed as 'combination' where the predominant intervention type is mixed and difficult to classify. If interventions involve a very low-calorie diet, this is also listed.

Weight Change (kg): Intervention group(s) vs comparison group weight change reported at final follow-up. Different analysis methods used across studies and in some cases, we have calculated weight change between groups or converted lbs into kg for reporting in this paper.

***Pilot/Feasibility Studies:** Starred studies (n=20) are either self-described as pilot/feasibility studies and/or report on feasibility related outcomes.

Abbreviations: kg, Kilograms; VLCD, Very Low-Calorie Diet; F2F, Face to Face; HRQoL, Health Related Quality of Life; WLM, Weight Loss Maintenance; Obj, Objective; SR, Self-Report; Wks, Weeks

1 **2.3.3 Risk of Bias**

2 The full list of studies and designated RoB for each domain can be found in the
3 supporting information (Appendix B). Most studies had a low risk of bias for the
4 randomisation process (n=28, 77.8%), missing outcome data (n=29; 80.6%) and
5 measurement of outcome (n=33; 91.7%). Most studies (n=32, 88.9%) had ‘some concerns’
6 for deviations from intended interventions due to a lack of blinding in the intervention types
7 considered in this review. For selection of reported result, most studies (n=24; 66.7%) had
8 ‘some concerns’ due to a lack of information on whether the analysis methods were pre-
9 planned. Four studies had a high risk of other bias due to potential conflicts of interest around
10 how the study was funded or interventions provided, which included the three studies of a
11 very low-calorie diet intervention.

12 **2.3.4 Study Socioeconomic Characteristics**

13 Table 3 provides an overview of information related to intervention design, study
14 socioeconomic characteristics, and statements related to the socioeconomic profile of studies.
15 Measures of socioeconomic characteristics were heterogeneous across studies and countries.
16 Seven (19.4%) studies reported no socioeconomic characteristics, 14 (38.9%) studies
17 reported one, and 15 (41.7%) reported two or more socioeconomic characteristic at baseline.
18 Twenty-four (66.7%) studies reported education level and 14 (38.9%) studies reported
19 working status or occupation. Twelve (33.3%) studies reported area level deprivation, all of
20 which were from Australia or the UK. For two of the trials of worksite specific interventions,
21 other than the targeted occupations, neither study reported other socioeconomic factors (Kim
22 et al., 2015; Puhkala et al., 2015). Four recent studies aimed to engage the following specific
23 groups: men from more deprived areas (Dombrowski et al., 2020a), men from low-income
24 Hispanic families (O'Connor et al., 2020), men from socioeconomically disadvantaged and

1 ethnically diverse localities (Griffin et al., 2019), and men in the workplace with 2 years or
2 less of college education (Rounds & Harvey, 2019), respectively. Fifteen (41.7%) studies
3 reported participant ethnicity. Three of these trials were intended for and had an inclusion
4 criterion relating to specific ethnic groups (Alick et al., 2018; Garcia et al., 2019; O'Connor et
5 al., 2020). One pilot study reported on the urban-rural classification of their sample, with all
6 participants (n=54) residing in areas classified as 'rural' (Ventura Marra et al., 2019).

7 Detailed information on the socioeconomic characteristics of study samples and
8 related statements about study strengths or limitations are provided in Appendix C. Twenty
9 (55.6%) studies did not specifically mention the socioeconomic profile of their study sample.
10 Of these 20 studies, three provided a broad statement about a lack of generalisability (Crane
11 et al., 2015; Esposito et al., 2004; Shin et al., 2017), one provided a broad statement about
12 sample diversity being a study strength (Patrick et al., 2011), one made a statement about the
13 lack of generalisability to other ethnic groups (Garcia et al., 2019), another reported the reach
14 across ethnic groups as a strength (Maddison et al., 2019), and the remaining fourteen made
15 no statement about sample diversity or reach. Three studies that had designed their
16 intervention or recruitment strategies to reach specific socioeconomic groups reported the
17 socioeconomic profile of their sample as a strength (Dombrowski et al., 2020a; Griffin et al.,
18 2019; O'Connor et al., 2020).

19 The FFIT intervention and recruitment strategies were not designed to specifically
20 engage lower socioeconomic groups. However, the study papers did report reaching men
21 from across the socioeconomic spectrum in both the pilot and full-scale trials (Gray et al.,
22 2013; Hunt, Wyke, et al., 2014). In the full trial (n=747 participants), this was reported as a
23 study strength as it facilitated sub-group analysis examining potential differential intervention
24 effects across socioeconomic groups (Wyke et al., 2015). In the pre-specified analysis,
25 intervention effects on weight outcomes at 12 months did not vary significantly by participant

1 education, employment status or area level deprivation (Wyke et al., 2015). No other studies
2 included in this review conducted sub-group analysis in relation to socioeconomic
3 characteristics.

4 Twenty-two studies reported that their interventions were tailored specifically for men
5 based on the literature, and six reported stakeholder (not including target group men)
6 consultations during pre-trial intervention design. Nine (25%) of the studies (Dombrowski et
7 al., 2020; Garcia et al., 2019; Gray et al., 2013; Griffin et al., 2019; Hunt et al., 2014; Irvine
8 et al., 2017; Maddison et al., 2019; Mohamad et al., 2019; O'Connor et al., 2020) included in
9 this review reported consulting with men from the target during intervention design.
10 Consultation methods undertaken to inform the intervention design process varied across
11 studies, including focus groups, workshops, survey data, and various patient and public
12 involvement activities. Of the nine studies that consulted men, four specifically reported
13 engaging with lower socioeconomic groups (Dombrowski et al., 2020a; Garcia et al., 2018;
14 Jolly et al., 2020; O'Connor et al., 2020). In the cultural adaptation of the Healthy Dads
15 Healthy Kids intervention for men and children from low-income Hispanic communities in
16 the USA, family members participated in focus groups, online surveys and interviews with
17 findings reviewed by stakeholder experts to inform the adaptation (O'Connor et al., 2020).
18 Garcia and colleagues undertook semi-structured qualitative interviews with men in the US,
19 including those 'less-acculturated' (e.g., Spanish-speaking, foreign-born, low educational
20 attainment), to inform the gender and cultural tailoring of a face-to-face individual
21 intervention (Garcia et al., 2019). In the Healthy Dads Healthy Kids feasibility study in the
22 UK, individual and focus group interviews with fathers and other family members from a
23 range of ethnic, religious, and socioeconomic groups informed the cultural adaptation of the
24 programmes, with patient and public involvement also integrated throughout (Jolly et al.,
25 2020). In the 'Game of Stones' feasibility trial of a remotely delivered individual intervention

1 in Scotland, a focus group with men from lower socioeconomic areas informed the
2 recruitment strategies; with a large survey, and patient and public involvement activities
3 undertaken to inform the intervention design and study processes (Dombrowski et al., 2020b;
4 McDonald et al., 2020). Eleven (30.6%) trials did not report intervention tailoring for men or
5 undertake stakeholder or target group consultations.

6

7

Table 3*Intervention Design, Socioeconomic Characteristics and Strength & Limitation Statements*

Studies		Intervention Design				Socioeconomic Characteristics Reported					Strength and Limitation Statements	
Primary Intervention Type	Total	Tailored for Men	Men Consulted	Stakeholders Consulted	No Tailoring for Men or Consultations	Education Level	Area Level Deprivation	Working Status/ Occupation	Income	None Reported	Socioeconomic Profile Mentioned	No mention of Socioeconomic Profile
	N	N	N	N	N	N	N	N	N	N	N	N
Face to Face Group	12	10	5	4	2	9	5	6	4	1	8	4
Face to Face Individual	3	1	1	0	2	2	0	1	0	1	0	3
Remote Group	1	0	0	0	1	1	0	0	0	0	1	0
Remote Individual	13	8	3	2	2	10	6	4	1	2	6	7
Very Low-Calorie diet	3	0	0	0	3	1	0	1	0	2	0	3
Combination	4	3	0	0	1	1	1	2	0	1	1	3
Total	36	22, 61.1%	9, 25.0%	6, 16.7%	11, 30.6%	24, 66.7%	12, 33.3%	14, 38.9%	5, 13.9%	7, 19.4%	16, 44.4%	20, 55.6%

Notes.

Primary Intervention Type: Whether the intervention is predominantly delivered face-to-face or remotely, and mostly individually or group based. Some studies are listed as 'combination' where the predominant intervention type is mixed and difficult to classify. If interventions involve a very low-calorie diet, this is also listed.

1 **2.4. Discussion**

2 ***2.4.1 Summary of Evidence***

3 This systematic review highlights that in RCTs of interventions with a behavioural
4 component for men that report weight as an outcome, socioeconomic factors were
5 inconsistently reported, few were specifically designed for men from lower socioeconomic
6 groups, and sub-group analysis by socioeconomic status was rarely undertaken or planned.
7 Thus, there is currently limited evidence on the reach and effectiveness of interventions
8 across the socioeconomic spectrum, or for interventions designed specifically for men from
9 lower socioeconomic circumstances. However, some recent feasibility studies did aim to
10 engage specific socioeconomic and ethnic groups.

11 Counter to recommendations for involving men from diverse backgrounds during
12 intervention design (Robertson et al., 2014), only nine (25%) of the trials included in this
13 review reported consulting with men from the target group, of which four specifically
14 reported engaging with lower socioeconomic groups (Dombrowski et al., 2020a; Garcia et al.,
15 2018; Jolly et al., 2020; O'Connor et al., 2020). Of note, eight of the nine studies that
16 reported consulting with men from the target group have been published since the ROMEO
17 review recommendations in 2014 (Robertson et al., 2014). Four of the most recent RCTs
18 (published since 2019) included in this review were aimed at specific socioeconomic groups
19 (Dombrowski et al., 2020a; Griffin et al., 2019; O'Connor et al., 2020; Rounds et al., 2020),
20 suggesting that there may be a recent shift towards a greater focus on equity and diversity,
21 and the importance of adaptation and targeting to specific groups. One of these studies, the
22 'Gutbusters' trial in the USA, initially targeted men in the workplace with two years or less
23 college education, but due to poor enrolment rates the recruitment methods and the inclusion
24 criteria were altered, resulting in a highly educated sample of men (Rounds et al., 2020);

1 Rounds & Harvey, 2019). Indeed, lower socioeconomic groups are typically difficult to
2 engage in research due to a variety of barriers, including a lack of trust in research, a lack of
3 perceived benefit from participating, gatekeepers preventing access to the target group,
4 gender roles, cultural factors, and stigma related to participating (Bonevski et al., 2014).
5 Recruitment of men from diverse backgrounds is particularly challenging in the context of
6 weight management (Ahern et al., 2016).

7 Rigorous feasibility studies and piloting, with pre-specified progression criteria, are
8 required before undertaking definitive RCTs (Eldridge et al., 2016; Robertson et al., 2014),
9 and this stage may be of particular importance to ensure that prospective trials are likely to
10 reach, engage, and be acceptable to men from lower socioeconomic groups. The ‘Game of
11 Stones’ feasibility trial targeted recruitment activities in postcode areas with higher levels of
12 deprivation, meeting a-priori enrolment and feasibility targets (Dombrowski et al., 2020a).
13 Furthermore, in a feasibility trial of the culturally adapted version of the Healthy Dads
14 Healthy Kids intervention for low-income Hispanic families, pre-specified feasibility criteria
15 were largely met, with some modifications to the recruitment strategies suggested (O’Connor
16 et al., 2020). However, in a recent feasibility RCT of the UK adaptation of the same
17 programme, which targeted socioeconomically disadvantaged and ethnically diverse
18 localities, a-priori trial feasibility progression criteria relating to recruitment, attendance, and
19 follow-up were not met (Griffin et al., 2019; Jolly et al., 2020). These examples highlight the
20 importance of robust assessment of feasibility for interventions targeted at specific
21 socioeconomic or ethnic groups, to best inform decisions around resource allocation for
22 definitive RCTs that have the potential to have a positive effect on health inequalities.

23 Eleven studies did not report undertaking consultations to inform intervention design
24 or being tailored specifically for men. A qualitative evidence synthesis highlights that
25 programme features that help attract and retain men in weight management interventions

1 include having autonomy over dietary intake, some focus on physical activity, social support,
2 and the use of humour (Archibald et al., 2015). In addition, men may be motivated to attend
3 programmes that are in culturally and physically accessible, that are delivered in non-
4 threatening settings that align with their masculine identities (Archibald et al., 2015). For
5 example, in the gender tailored Australian Football themed Aussie-Fans in Training
6 programme, 426 men registered their interest in participating within 3 days of advertising
7 (Kwasnicka et al., 2020). Despite the clear programme appeal, the authors reported limited
8 sample diversity in terms of socioeconomic status and ethnicity (Kwasnicka et al., 2021;
9 Kwasnicka et al., 2020). In the FFIT RCT in Scotland, without specific targeting of
10 recruitment efforts beyond the location of professional football clubs known to attract people
11 from a wide range of socio-economic backgrounds in their fan base, the programme recruited
12 men from across the socioeconomic spectrum (Hunt, Gray, et al., 2014). Gender-tailoring and
13 aligning interventions with men's interests can engage men who would not otherwise
14 participate; however, depending on the context, specific targeting (e.g., in lower
15 socioeconomic areas or regional towns) and tailoring (e.g., for specific ethnic groups) may be
16 required to reach more diverse populations more representative of the burden of obesity-
17 related disease.

18 There are concerns that interventions that rely on a high degree of individual agency
19 may exacerbate inequalities. Inequalities can occur at any stage of trials (i.e., during
20 recruitment, adherence, or outcomes) of weight management programmes (Birch et al.,
21 2020). For example, in a large RCT of brief opportunistic primary care interventions,
22 participants from lower socioeconomic backgrounds that were assigned to the behavioural
23 weight management programme referral group, on average, lost less weight than their
24 counterparts from higher socioeconomic backgrounds (Graham et al., 2019). This was
25 attributed to those from lower socioeconomic backgrounds attending fewer programme

1 sessions (i.e., inequalities related to intervention adherence) (Graham et al., 2019).
2 Differential effectiveness was only examined in one of the studies included in this review, the
3 FFIT trial (Wyke et al., 2015). In pre-specified sub-group analysis, no significant predictors
4 of the interventions effect on weight (the primary outcome) were observed, including for
5 education level, area disadvantage and employment status (Wyke et al., 2015). The delivery
6 of FFIT via professional football clubs (a traditionally working-class game), and alignment to
7 culturally valued masculine identities, may have supported the positive intervention outcomes
8 reported across socioeconomic groups, despite the high levels of agency required from men
9 participating.

10 RCTs can be classified as ‘health equity relevant’ if they either exclusively focus on a
11 single disadvantaged population sub-group or they assess potential differential effects across
12 the socioeconomic spectrum (Jull et al., 2017). No full-scale studies included in this review
13 targeted specific lower socioeconomic or other disadvantaged groups. Studies are typically
14 designed based on having the power to detect differences in outcomes between intervention
15 and control groups, they often will not be sufficiently powered to assess differential
16 effectiveness. Furthermore, any such sub-group analysis should only be undertaken if they
17 are pre-specified (Petticrew et al., 2012). In the current review, study sample size was not an
18 inclusion criterion, and most studies were pilot or feasibility studies (n=20). Only four studies
19 included had a sample size of over 200. Thus, in most of the studies included in this review,
20 sub-group analysis would not be appropriate.

21 A recent UK study has developed a core outcome set looking to standardise reporting
22 of behavioural weight management interventions for adults to help better understand which
23 interventions work best for which segments of the population (Mackenzie et al., 2020). Area
24 level deprivation category was considered a ‘core’ outcome for behavioural weight
25 management interventions (Mackenzie et al., 2020), highlighting the importance of

1 measuring, and reporting a measure of socioeconomic status. In the current review, twelve
2 studies reported area level deprivation, all of which were based in either Australia or the UK.
3 However, educational attainment and other potentially relevant socioeconomic characteristics
4 were neither considered ‘core’ nor ‘optional’ outcomes (Mackenzie et al., 2020). A key
5 dimension of the RE-AIM framework, which is commonly used to assess the public health
6 impact of interventions, is intervention reach (Glasgow et al., 2019). If effective programmes
7 do not adequately reach lower socioeconomic groups, they may not have a positive effect on
8 health equity. Ideally, studies should consider socioeconomic factors from the outset, when
9 designing interventions. But, where evidence for intervention effectiveness exists, alternative
10 study designs may be considered to more closely examine factors related to intervention
11 reach. For example, in the Healthy Dads Healthy Kids intervention that has been tested in
12 two RCTs in Australia (Morgan et al., 2014; Morgan et al., 2010), the intervention was
13 subsequently trialled in a non-randomised dissemination study targeting lower socioeconomic
14 regional communities (Morgan et al., 2019). This study demonstrated that the Healthy Dads
15 Healthy Kids intervention could be delivered by trained local facilitators in lower
16 socioeconomic regional communities, and prior positive trial weight outcomes were largely
17 replicated in this context, including up to 12 months (Morgan et al., 2019).

18 Whilst a policy priority in many countries (Australian Government, 2019; Department of
19 Health and Social Care, 2018), socioeconomic factors may not always be a top priority for
20 researchers who design and evaluate (weight management) interventions. A recent qualitative
21 study found that although trial Chief Investigators deemed matters relating to equity to be
22 important, the majority were primarily motivated by a commitment to delivering successful
23 trials efficiently (Rai et al., 2021). Undertaking trials in less research-active sites, with higher
24 disease prevalence, and lower socioeconomic status could be seen as a risk to trial success
25 (Rai et al., 2021). In the current review, this may be reflected by the majority (n=20) of trials

1 making no specific mention of the socioeconomic profile of their study sample in relation to
2 strengths or limitations. Moreover, this could also point to the need for a shift in the way that
3 researchers report on the socioeconomic profiles of study samples, and how this information
4 is contextualised in relation to intervention reach, trial outcomes, and the potential for
5 interventions to positively (or negatively) impact health inequalities. Drawing on the
6 CONSORT-Equity extension guidelines (Welch et al., 2017) and the studies collated in this
7 review, we propose that researchers reporting on the socioeconomic profiles of study
8 samples:

- 9 i) collect characteristic data on and report a minimum of two measures of
10 socioeconomic status that enable, as far as possible, comparison to the wider
11 literature and national population data
- 12 ii) contextualise this data in relation to who the intervention has reached, the trial
13 outcomes, and the potential for impact on health inequalities
- 14 iii) highlight how this information can inform future research and/or policy

15 ***2.4.2 Strengths and Limitations***

16 No previous reviews have a specific focus on socioeconomic factors in men's weight
17 management RCTs. This review included RCTs only, was pre-registered on PROSPERO, and
18 PRISMA reporting guidelines were adhered to throughout. Usefully, this review includes
19 studies with smaller sample sizes assessing pilot and feasibility outcomes, providing insight
20 into whether studies are designed with equity in mind, targeted to specific socioeconomic
21 groups or have demonstrated feasibility of reaching particular socioeconomic groups for
22 future larger trials.

23 Due to the heterogeneity of socioeconomic measures across studies and countries, moderation
24 analysis of socioeconomic status on weight outcomes and retention rates was not undertaken.

1 In addition, heterogeneity of measures makes it difficult to make conclusions about the
2 socioeconomic profiles of study samples. Hence, in this review, we did not deviate from how
3 authors reported their studies or look to categorise the degree to which studies may have
4 reached socioeconomic groups. Inequalities can also occur across a range of characteristics
5 that may not be related to socioeconomic status (e.g., race/ethnicity, religion, sexual
6 orientation, social capital). In this review, we were unable to focus on all of these
7 characteristics, but studies were considered where factors overlapped with a measure of
8 socioeconomic status (e.g., a study targeting low-income men from a specific ethnic group
9 (O'Connor et al., 2020). Most included studies were from high-income countries, with little
10 representation from lower-income countries. This may be partly attributed to the fact that
11 only studies published in English were included. The risk of obesity associated disease is
12 increased in Asian populations at a lower BMI compared to other ethnic groups (Ding et al.,
13 2020; World Health Organisation Expert Commission, 2004), with lower BMI cut-offs for
14 overweight and obesity across Asian-Pacific countries (Misra et al., 2009; Ogawa &
15 Miyazaki, 2015; Pan & Yeh, 2008). The inclusion criterion for this review rendered several
16 studies targeted at addressing overweight and obesity in men from Asian countries ineligible
17 due to having a lower BMI criterion (Dong et al., 2016; Iriyama & Murayama, 2014; Kang et
18 al., 2010; Maruyama et al., 2010; Muto & Yamauchi, 2001; Nanri et al., 2012; Tan et al.,
19 2016; Tanaka et al., 2010).

20 **2.5 Conclusions**

21 In trials of interventions with a behavioural component for men that report weight as an
22 outcome, socioeconomic factors are inconsistently reported, men from lower socioeconomic
23 circumstances are rarely targeted or consulted during intervention design, and there is scant
24 evidence that interventions reach or are effective in lower socioeconomic groups. Recent
25 feasibility trials of interventions with a focus on specific socioeconomic and ethnic groups

1 suggests a potential nascent towards a greater consideration of factors related to equity. To
2 best inform public health policy related to health inequalities, in trials of weight management
3 interventions for men, a greater consideration of socioeconomic factors is required during
4 intervention design, conduct, analysis, and reporting.

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1 **3.1 Introduction**

2 Prevalence of obesity, cardiovascular disease, type 2 diabetes, and high blood
3 pressure is higher in rural communities than urban areas (Alston et al., 2020; O'Connor &
4 Wellenius, 2012; AIHW, 2019). Global rises in mean body mass index between 1985 and
5 2017 are more pronounced in rural than urban-residing men (2.1 vs 1.6kg/m²) and women
6 (2.1 vs 1.4kg/m²) (NCD Risk Factor Collaboration, 2019). In Australia, obesity rates are
7 highest in low socioeconomic rural communities, with obesity up to three times more
8 prevalent (circa. 40% vs 13%) than affluent urban areas (Calder, 2019). Increases in physical
9 inactivity are more pronounced in rural areas (Moreno-Llamas et al., 2021), which is likely
10 driven by technological advances increasing rural sedentary work time, particularly for men
11 (Guo et al., 2018; Pickett et al., 2015). In Australia and internationally, many rural
12 communities face disadvantage due to a multitude of factors, including lack of access to
13 facilities, resources, and services (AIHW, 2019). Despite a growing international evidence-
14 base for rural weight management program effectiveness (Porter et al., 2019), rural men (i.e.,
15 men living in rural areas) are significantly less likely to take up an offer to participate in
16 mixed-gender programs than women (Punt et al., 2020). The Australian Government's Men's
17 Health Strategy highlights the need for interventions that support health in priority population
18 groups, including men in rural and low socioeconomic areas (Australian Government, 2019).
19 However, men's weight management programs seldom target rural or low socioeconomic
20 areas (McDonald et al., 2022; see Chapter 2).

21 One strategy that has proved valuable for engaging men internationally is to design
22 health programs specifically for delivery within sports settings in affiliation with professional
23 clubs to appeal to their fanbases (Hunt, Wyke, et al., 2014; Kwasnicka et al., 2020; Maddison
24 et al., 2020; Petrella et al., 2017; Wyke et al., 2019). Aussie-FIT has been delivered in
25 affiliation with two AFL clubs in metropolitan Perth within professional club settings

1 (Quested et al., 2018). The AFL clubs promoted the program via their social media pages,
2 and the program was highly attractive to urban-residing men (Kwasnicka et al., 2020). The
3 AFL club setting and the shared interest of participants in the AFL club was considered an
4 important component that helped to attract men to the program and fostered within-group
5 camaraderie (Kwasnicka et al., 2021). In line with prior ‘Fans in Training’ programs (Hunt et
6 al., 2020), Aussie-FIT participants improved their mental and physical health, and reported
7 positive health behaviour changes (e.g., diet and physical activity) (Kwasnicka et al., 2020).
8 However, Aussie-FIT is untested in rural areas and the program has not previously engaged a
9 socioeconomically diverse sample of men (Kwasnicka et al., 2021). Interventions that lack an
10 evidence base to suggest they reach and are effective across demographic groups, may
11 inadvertently exacerbate health inequalities (Petticrew et al., 2012; White et al., 2009).
12 Australian Football is the most popular spectator sport in Australia (Wood, 2008), but
13 professional AFL clubs are only located in major cities. Therefore, the original format of
14 Aussie-FIT, which relies on program delivery in the AFL context, is unable to help address
15 rural health inequities. To align with policy recommendations related to health inequalities
16 (Australian Government, 2017; Australian Government, 2019; Department of Health, 2019),
17 Aussie-FIT requires adaptation for implementation in rural contexts. This study aimed to
18 inform the required Aussie-FIT adaptations for implementation in rural contexts.

19 Adaptation can be defined as the process of thoughtful and deliberate modification of
20 intervention design or delivery, to improve intervention fit or effectiveness within a given
21 context (Stirman et al., 2015; Wiltsey Stirman et al., 2017). Stirman *et al* (2019) classify
22 adaptations to evidence-based interventions into two broad categories: i) core intervention
23 modifications; and ii) contextual modifications (Stirman et al., 2019). Context can be defined
24 as a set of characteristics and conditions that alter, impede and/or support the delivery and
25 effectiveness of interventions (Evans et al., 2019), and includes socioeconomic, geographical,

1 and sociocultural contexts (Pfadenhauer et al., 2017). The degree of adaptation largely
2 depends on differences or similarities between the new context and those from which
3 evidence of effectiveness are derived (Escoffery et al., 2018). In ‘Fans in Training’ programs,
4 the ‘*behind the scenes*’ access and allure of professional sports club settings, including a
5 stadium tour in session one, are typically emphasised in the program marketing materials
6 (Hunt et al., 2020; Kwasnicka et al., 2020). Without affiliation or access to urban professional
7 club settings, adaptations to both the program content (e.g., the stadium tour) and
8 implementation strategies (e.g., recruitment and marketing strategies) are required to reach
9 men in rural communities.

10 Recent guidance for adapting interventions highlights the importance of including a
11 diverse range of stakeholders, including individuals and organisations that could facilitate
12 intervention delivery or decisions about future intervention scaling (Moore et al., 2021). The
13 aim of this study is to report on how findings from rural stakeholder focus groups informed
14 the adaptation of Aussie-FIT for implementation in rural areas. In doing so, we draw on
15 concepts from implementation science and evidence on gender-tailored and sports setting-
16 based interventions for men. The objectives of this study are to:

- 17 i) explore the services available to support rural men to manage their weight or
18 increase their physical activity
- 19 ii) examine barriers and facilitators to rural implementation and engagement of men
20 across socioeconomic groups
- 21 iii) determine which specific adaptations are needed to implement Aussie-FIT in rural
22 areas

1 **3.2 Methods**

2 ***3.2.1 Summary of Aussie-FIT***

3 Aussie-FIT is a group-based gender-tailored behavioural weight management
4 program for men (aged 35-65 with a BMI $\geq 28\text{kg/m}^2$) that has been tested in a pilot
5 randomised controlled trial (RCT) in AFL settings in metropolitan Perth (Kwasnicka et al.,
6 2020; Kwasnicka et al., 2021). The program consists of weekly AFL coach-led 90-minute
7 sessions over 12 weeks that involves interactive education and physical activity components
8 delivered in professional AFL contexts. Club coaches undertake 15-hours of training with the
9 research team. Funding is required to support the coaches training time, to cover 3 hours for
10 each session delivered (1½ hours delivery, 1 ½ hours preparation), and for program resources
11 (i.e., physical activity self-monitoring device and program booklet). The total direct costs
12 (i.e., program set-up, promotion, and delivery costs) associated with the Aussie-FIT program
13 in the metropolitan pilot was AUD\$270 per participant (Kwasnicka et al., 2020).

14 Aussie-FIT capitalises on participants connection with their favourite AFL team,
15 embeds behaviour change techniques (e.g., self-monitoring, goal setting and feedback on
16 behaviours), and aims to foster a fun environment with positive humour (Quested et al.,
17 2018). The program content is informed by Self-Determination Theory and designed to
18 empower men to use self-regulation strategies to support them to make positive changes to
19 their physical activity and eating behaviours (Quested et al., 2018). Further details can be
20 accessed in the Aussie-FIT pilot RCT protocol (Quested et al., 2018), and a figure describing
21 the key process evaluation functions is available in the process evaluation paper Kwasnicka
22 et al., 2021).

1 **3.2.2 Rural Aussie-FIT Project**

2 This study reports on the formative stages of a larger project that aims to help address
3 the underrepresentation of men in rural and lower socioeconomic areas in community health
4 programs. In this study, we engage local stakeholders in focus group discussions to inform
5 the adaptation of Aussie-FIT for rural contexts. Building on this work, we continued to
6 collaborate with the stakeholders that participated in this study and wider local networks to
7 help support the implementation of the adapted Aussie-FIT program in rural towns. We plan
8 to report on the implementation of Aussie-FIT in rural towns in a future publication using
9 mixed-methods data, which will include implementation barriers and facilitators, and
10 program reach, engagement, and retention.

11 **3.2.3 Setting**

12 This study was undertaken in two ‘inner regional’ and one ‘outer regional’ towns in
13 WA, as classified by the Australian Bureau of Statistics (ABS, 2016). The term ‘rural and
14 remote’ encompasses all areas outside of Australia’s major cities, which includes ‘inner
15 regional, ‘outer regional’, ‘remote’ and ‘very remote’ areas (AIHW, 2022). These sites were
16 selected as they include areas with some of the highest obesity rates in WA, higher levels of
17 socioeconomic deprivation, and differing population sizes.

18 **3.2.4 Participants**

19 Participants in the focus groups were staff or volunteers (aged >18) working in rural
20 areas in health promotion, men’s health, local football, sport development, community work,
21 or similar roles.

1 **3.2.5 Recruitment**

2 Staff from local partnership organisations (e.g., Department of Local Government,
3 Sport, and Cultural Industries; Cancer Council WA; WA Country Health; WA Football
4 Commission) supported researchers to identify and connect with potential contributors in the
5 three planned rural Aussie-FIT delivery sites. Researchers also emailed various organisations
6 (e.g., men’s sheds, local football clubs) to ask if they could share information about the
7 Aussie-FIT focus groups to their members and networks.

8 **3.2.6 Stakeholder Focus Groups**

9 Focus groups were used instead of individual interviews to meet the objectives of this
10 study by capturing interactional discussions where participants could further develop or
11 clarify their contributions, or introduce new viewpoints, with consideration of other
12 participants’ perspectives. The focus groups were undertaken face-to-face at rural venues
13 with a view to helping to build relationships between the researchers and the local
14 stakeholders participating. Another pragmatic consideration was that the study researchers
15 travelled to the rural locations in order to speak to participants face-to-face. Given the
16 distance travelled, undertaking focus groups was considered the optimal way to allow the
17 voices of the largest range of stakeholders to be heard (including those from diverse
18 backgrounds) within the time available. Participants were given an information sheet,
19 provided informed consent, and completed a short demographics form. Researchers
20 introduced the Aussie-FIT program and pilot results using a 15–20 minutes PowerPoint
21 presentation. Researchers then used a topic guide (Appendix D) to lead a discussion on local
22 contextual considerations for the implementation of Aussie-FIT in rural settings. We
23 developed the topic guide with a view to exploring local contextual factors, and to identify
24 specific potential adaptations for rural settings (e.g., recruitment strategies, Australian

1 football club theme, local sporting delivery settings). These topics were identified from
 2 previous research (Quested et al 2018) and warranted further exploration in the present study
 3 due to differences between the metropolitan areas in which Aussie-FIT has previously been
 4 delivered and rural Australian contexts.

5 Twenty-four stakeholders participated across seven audio-recorded focus groups
 6 (mean length 57 minutes, range 39-71 minutes). Five focus groups were co-facilitated by two
 7 researchers (the primary author & EQ), and two by the primary author alone. Participant
 8 characteristics are shown in Table 4. The sample was diverse with regard to occupation, work
 9 experience, age and gender, and representation of Aboriginal and Torres Strait Islander
 10 Peoples. Some of the individual focus groups were less diverse. For example, health
 11 promotion staff were the sole contributors to one group in site 1 and another in site 2, both of
 12 which lacked input from individuals in the sporting sector. Several participants had personal
 13 experience or interest in Australian football (e.g., former, or current player).

Table 4

Characteristics of Focus Group Participants

Participant	Focus Group	Site*	Gender	Age	Ethnicity	Occupation Sector	Years' Experience*
1	1	1	Female	30-39	White Australian	Health Promotion	6
2	1	1	Male	30-39	Indian	Health Program	2.5
3	1	1	Female	30-39	White Australian	Health Promotion	1
4	2	1	Female	50-59	NR	Health Promotion	6
5	2	1	Male	18-29	White Australian	Allied Health	9
6	2	1	Male	18-29	White Australian	Men's Health	1
7	2	1	Male	60-69	White Australian	Sport Sector	4
8	3	2	Male	50-59	White Australian	Sport Sector	30
9	3	2	Female	50-59	White Australian	Health Promotion	1
10	3	2	Female	40-49	White Australian	Sport Sector	4
11	3	2	Male	40-49	Aboriginal and/or Torres Strait Islander	Health Promotion	10
12	4	2	Female	40-49	White Australian	Health Promotion	3
13	4	2	Female	30-39	White British	Health Promotion	8
14	4	2	Female	30-39	White Australian	Student [Health Promotion]	n/a
15	4	2	Male	60-69	White Australian	Health Promotion	8
16	4	2	Male	20-29	Aboriginal and/or Torres Strait Islander	Health Promotion	1
17 [#]	5 & 7	3	Female	18-29	White Australian	Health Promotion	3.5

18	5	3	Female	50-59	White Australian	Sport Sector	9
19	5	3	Male	NR	White Australian	Sport Sector	NR
20	6	3	Male	30-39	White British	Sport Sector	9
21	6	3	Female	18-29	White Australian	Sport Sector	4.5
22	7	3	Male	18-29	White Australian	Allied Health	7
23	7	3	Male	18-29	White Australian	Australian Football	4
24	7	3	Male	50-59	Aboriginal and/or Torres Strait Islander	Community Work	6

Notes.

NR: Not reported.

*Sites 1 and 3 are classified as 'inner regional' and site 2 as 'outer regional' areas

*Years of experience in their current role or similar roles

#This individual participated in two focus groups

1

2 **3.2.5 Analysis**

3 Anonymised verbatim focus group transcripts were read, reread, and entered into
4 NVivo software to facilitate analysis guided by the framework approach (Ritchie & Spencer,
5 2002). This approach consisted of 5 steps: i) familiarisation; ii) thematic framework
6 identification; iii) indexing; iv) charting; and v) mapping and interpretation (Ritchie &
7 Spencer, 2002). The initial thematic framework construction was undertaken by the primary
8 author following data familiarisation. The framework was informed by emergent themes
9 raised by participants as well as drawing upon a-priori issues deemed important by
10 researchers (e.g., potential recruitment strategies in rural locations). Another researcher (EQ)
11 provided critical comment on the thematic framework based on detailed reading of three
12 transcripts (one from each site). The primary author coded the interviews, charted context-
13 specific factors by site and mapped key themes. The primary author and EQ met frequently to
14 discuss the ongoing interpretation of the data. Differences in opinion were resolved through
15 further discussion between the primary author and EQ. Driven by the goal of informing
16 specific adaptations to the Aussie-FIT program for rural contexts, and to demonstrate exactly
17 how these adaptations were derived, the analyses were intended to be at a more descriptive
18 level. Themes are presented in a format that first reports findings related to the current

1 context and local provisions to set the scene, before reporting on more specific themes that
2 could inform future initiatives and Aussie-FIT adaptations.

3 Focus group findings were then used to inform adaptations to the Aussie-FIT program
4 content and implementation strategies for rural Australian contexts. Adaptions to the program
5 content for delivery in rural contexts were mapped against the original Aussie-FIT content
6 delivered in urban professional AFL settings and reported using relevant questions from the
7 Framework for Reporting Adaptations and Modifications (FRAME) (Stirman et al., 2019).
8 Implementation strategy adaptations for rural contexts were similarly mapped against the
9 original program and reported using relevant questions from the Framework for Reporting
10 Adaptations and Modifications to Evidence-based Implementation Strategies (FRAME-IS)
11 (Miller et al., 2021). Using a structured framework provides a more systematic process to
12 reporting adaptations, helps to track and reflect on how and why modifications have been
13 made, and can allow for mechanisms of change conclusions to be drawn from the assessment.

14 **3.3 Results**

15 This section presents the findings of the stakeholder focus group analysis, followed by
16 a description of the specific adaptations made to the Aussie-FIT program for implementation
17 in rural communities. Driven by the study objectives, five overarching themes were generated
18 from the analysis. These were the ‘limited appeal of existing services to men’, ‘a common
19 language’, ‘a smaller fishpond’, ‘engaging rural men and diversity’ and ‘rural partnerships and
20 sustainability’. The first theme most directly responds to the first study objective, to explore
21 existing services in these rural communities. The second theme reports how Australian
22 Football was considered a ‘common language’ in rural WA communities, with the sport
23 described as extremely popular with strong rivalries between local clubs. The third describes
24 the influence of the ‘smaller fishpond’ (population) within rural communities, including the

1 importance of locally trusted community champions, and the potential benefits and
 2 drawbacks ('double-edged sword') linked to the power of word of mouth within close-knit
 3 communities. A variety of specific stakeholder recommendations around maximising the
 4 engagement of rural men including those from diverse backgrounds is then presented in the
 5 fourth theme. Finally, the importance of working closely with established organisations that
 6 are trusted, was considered vital for program sustainment. These findings directly informed
 7 the adaptations to Aussie-FIT for implementation in rural areas including to program
 8 recruitment and marketing strategies, the Australian Football program theme and linked
 9 program content, and planned partnerships with locally based organisations (see table 5).

10 **3.3.1 Focus Group Findings**

11 **Limited Appeal in Rural Services for Men.** Access to existing physical activity and
 12 weight management services varied by site. Stakeholders in site 1 reported a '*lack of choice*'
 13 and suggested that this was likely to be the case in similarly small towns across rural
 14 Australia. The one gym in site 1 was expensive, posing a significant barrier to accessing the
 15 facility for many community members '*watching their money*'.

16 '*rural, regional, remote is a different ball game as well. Just options are so much*
 17 *less out here compared to the city...*' (Site 1, Focus Group 1, Male)

18 When opportunities to participate in mixed-gender programs were presented, few men
 19 were reported to engage. One stakeholder involved in delivering some of the few local fitness
 20 classes, alluded to a '*stigma*' associated with the opportunities available, suggesting they
 21 were viewed as more of a '*feminine type*' of program, or '*not tough enough*' and at odds with
 22 many men's masculine identities.

23 '*...running the fitness classes and stuff at work. There are no men. Like in the*
 24 *classes, there's none. And I think a lot of that is because there is some stigma*

1 *around like group exercise. I think men, it's like not necessarily a sign of like*
 2 *weakness. It's maybe like a more of like a feminine type thing (Site 1, Focus*
 3 Group 1, Male)

4 Stakeholders in the two larger rural sites, described more options for physical activity.
 5 However, in site 2, program options that appealed specifically to men appeared to be limited.

6 *...those programs attract a lot of females. More so than the male demographic.*
 7 *You know, the Zumba and they've got you know, all these sorts of things. But it's*
 8 *getting that... the male activity in there, which is lacking (Site 2, Focus Group 1,*
 9 Female)

10 A soccer-based men's weight loss initiative was running in site 3. This
 11 was viewed as appealing to some men, but not others, with an Australian Football
 12 theme considered likely to attract a largely different demographic of local men.
 13 One stakeholder discussed how an Australian Football 'hook' would appeal to
 14 him, but that he (and others with similar sporting interests) would be averse to
 15 participating in a soccer-based program.

16 *... most of them were soccer players, because at end of the day, if you're not....*
 17 *I was a footballer, so a footballer, doesn't go and play soccer. You just go, 'nope,*
 18 *they're different!'. And that's how it is. (Site 3, Focus Group 3, Male)*

19 **A Common Language**

20 ***Popularity of Australian Football.*** Stakeholders depicted Australian Football as being
 21 a connection point for social interaction amongst peers for (many) men in Western Australia,
 22 particularly in '*footy-mad*' rural towns.

1 *I can understand the appeal, AFL being the common language of WA [Western*
2 *Australian] males. Yeah, it's interesting when I get some of my male colleagues*
3 *together it's you know, how dogs normally greet each other? Well, they talk*
4 *football. You know, just to work out where they fit in it. I always sit back and*
5 *go 'yeah okay, that's fascinating'. (Site 2, Focus Group 1, Male)*

6 After the Aussie-FIT pilot study presentation, stakeholders reflected on the program's
7 popularity when delivered in association with professional AFL clubs in metropolitan Perth,
8 the pride the men showed in participating, and the obvious '*adulation*' for their club. One
9 stakeholder referred to the AFL club links and guest appearances from current or former
10 players, as being a valuable form of '*currency*' that would be attractive to footy-oriented
11 prospective participants. However, the need for a different approach in rural towns without
12 access to professional football settings was recognised.

13 *I can see why you had such a popular uptake in Perth. Based, you know, you've*
14 *got the two AFL sides, bang. You know, and access to the change rooms. Okay,*
15 *it's all there, packaged nicely. Here it's going to be a little bit harder and you're*
16 *going to have to look at other alternatives. (Site 2, Focus Group 1, Male)*

17 ***Local Club Affiliations and Footy Exposures.*** One approach mooted was for Aussie-
18 FIT to be affiliated with local amateur clubs, including using their team colours and football
19 venue for program delivery. However, some stressed that close affiliations with any specific
20 local clubs could lead to the program hitting '*a few snags*'. For example, eligible men with
21 links to other local clubs could be hesitant to take part: '*you would only alienate them*'. Indeed,
22 this stakeholder emphasised how little love is lost between some rival clubs:

1 ... *there's that much animosity between the clubs, is a bit like over in Europe*
 2 *with the soccer teams, it's alive and kicking with our footy as well.* (Site 3,
 3 Focus Group 3, Male)

4 Thus, if programs were delivered in association with specific local clubs some
 5 stakeholders considered that, in the interest of equity and maximising intervention reach, the
 6 program should be delivered '*with each club*'. Whereas others highlighted that close
 7 affiliation with any local club could also create barriers to participation for men with limited
 8 football experience. Men perceiving others as more skilled, experienced, or active within
 9 local football communities, could be '*uncomfortable*' or '*embarrassed*' about joining the
 10 program as an inexperienced outsider. Thus, stakeholders universally agreed that program
 11 marketing materials should highlight that all eligible men are welcome regardless of
 12 footballing experience or skill, and as one stakeholder put it; '*... you don't have to be skilled*
 13 *in X, Y and Z [to participate]*'.

14 **A Smaller Fishpond**

15 ***Trust, Recognition and Credibility: The Importance of Local Champions.***

16 Stakeholders agreed that, in rural contexts, getting the right community champions involved
 17 would go a long way to ensuring program success. One stakeholder proposed that one well-
 18 known local contact would '*give you 30 people*' through their community connections alone.
 19 Prospective Aussie-FIT coaches, given their direct involvement in program delivery, were
 20 seen as ideally placed to play a critical role in championing the program, given their local
 21 knowledge and connections.

22 *They'd all have guys who they could tap on the shoulder and say 'hey, come and*
 23 *join in'. Yeah, I think that would definitely be a good way to say lock in your*
 24 *core staff or people who are going to run the program locally. And then again*

1 *it's their good reputation in the community that would then potentially attract*
 2 *people. To know that it's not going to be just some gimmick program or*
 3 *something that's not going to have value. (Site 3, Focus Group 1, Female)*

4 Having trusted and potentially well-known community champions to support program
 5 implementation in rural towns was considered important in garnering local trust and attracting
 6 men.

7 *...there's probably certainly people, [site 2] being a small community, that are*
 8 *very prominent in their community. You know, both for football and the*
 9 *professional lives that they have. So, but yeah, I mean maybe you could leverage*
 10 *their celebrity status. It's completely the wrong word to use, but the recognition*
 11 *they have in the community and the trust that people... and credibility that they*
 12 *hold as well. (Site 2, Focus Group 2, Female)*

13 Another suggestion was that prospective participants registering their interest
 14 may themselves be an ideal and trusted source of participants in rural communities;
 15 *'bring a friend or two is probably going to have to be a realistic approach'.*

16 ***A Double-Edged Sword.*** Stakeholders indicated that any discomfort around attending
 17 a local-club affiliated program could be amplified within close-knit rural communities, where
 18 men may know other participants that are more active in the local football community.

19 *...people who would then feel uncomfortable about like coming to the program*
 20 *if it's closely aligned with the local team. If they've never really experienced*
 21 *football, but they've always wanted to. And then they think oh but I, I'm not at*
 22 *that level, I'll be embarrassed, I'll you know, the other guys they're all so*
 23 *experienced and I don't feel comfortable. I just wonder is that a risk too, that*

1 *people may not want to because they think 'oh I work with him and he's [Club*
2 *Name] you know, I don't want to look silly'...* (Site 1, Focus Group 1, Female)

3 To maximise the prospect of engaging men from diverse backgrounds within the
4 '*smaller [rural] fishpond*', stakeholders recommended adopting a multi-faceted recruitment
5 strategy including Facebook promotion, local media sources, and word-of-mouth recruitment
6 through local clubs, organisations, and community champions. Indeed, the power of word of
7 mouth was frequently alluded to as being a particularly important consideration in rural
8 communities. Whilst having the potential to be a key avenue for raising interest in new health
9 initiatives, this was presented as a double-edged sword, with word likely to quickly spread
10 should anyone get '*shitty*'.

11 ...*with smaller towns and maybe you don't get this in your metro setting. Is... and*
12 *it can work wonders and it can be really positive. And you know, word of mouth*
13 *can be positive. But also if something goes awry or if someone gets shitty about*
14 *something, that goes through [site 1]'s Chinese whispers channels, like nobody's*
15 *business. So I think it would be a matter of getting like that champion, community*
16 *champion to stay.* (Site 1, Focus Group 2, Female)

17 Stakeholders speculated that in urban areas, men would likely be able to limit
18 knowledge of their participation to themselves or to close family or friends should
19 they wish to. This degree of privacy was seen as unlikely to be an option in rural
20 communities, where '*people talk*'. Stakeholders believed that local men will be aware
21 of how their participation is viewed more widely in the community, including any
22 potential threat to their identity as a local man. Given the football program theme, with
23 careful consideration of how the program is marketed, Aussie-FIT was considered
24 well placed to minimise this threat.

1 ...All country towns, like people talk. And it's like 'oh you know, such and such
 2 is doing the ol weight loss class'. You know what I mean? So I think guys won't
 3 potentially engage because of a fear of that. Whereas like 'oh you know that like,
 4 that footy program. Like you know, the old fellas footy program'. Just you know,
 5 something like that is, will make it more likely that they, they buy in. Hence why
 6 I think Aussie-FIT will make it. But how you market that will obviously, that'll
 7 be the hardest thing... (Site 1, Focus Group 1, Male)

8 **Engaging Rural Men and Diversity**

9 **Program Marketing and Cost.** Whilst the football program hook was deemed
 10 fundamental to Aussie-FIT's potential success in rural towns, the football theme was described
 11 as '*a means to an end*'. That is, stakeholders believed that the positive physical health outcomes
 12 of participating should be emphasised; '*you need to market the end*'. Particularly in the context
 13 of the Covid-19 pandemic, potential mental health benefits linked to participating in the
 14 program and meeting like-minded men were also regarded as important to include within
 15 promotional materials.

16 ...they formed those social groups at the end and people that maybe had been
 17 feeling a bit lonely. Particularly after this lovely year we've just had, I think that
 18 could be a real drawcard as well, around coming in, meeting new people. As
 19 opposed to perhaps going just purely for the fitness or the health angle. (Site 2,
 20 Focus Group 2, Female)

21 The cost of participating in physical activity programs was regarded as a major barrier
 22 to engagement, so ensuring that marketing materials clearly highlight that there is no
 23 participation cost was considered important.

1 ...you've already ticked a big box by saying it's free. That's the biggest drawcard
2 or a barrier that gets put up is cost. (Site 2, Focus Group 1, Female)

3 **Location of Rural Football Settings.** The number of football venues that could host
4 Aussie-FIT varied by site. In site 1 there was only one venue option shared by two local football
5 clubs, with this likely to be the case in similar smaller rural towns. Stakeholders described a
6 lack of public transport across all sites, with those in site 2 specifically recommending the
7 central football precinct to optimise accessibility. In site 3, two main venue possibilities were
8 discussed. The first was the '*premier football facility*' where '*people want to play*', which was
9 a favoured site should there be availability at this in-demand facility. The second option, with
10 greater availability, was considered well placed for accessibility and promotion to men from
11 diverse socioeconomic backgrounds.

12 ...location-wise that's where (venue option 2) would be a good one, because
13 that's the area where there is, a lower socioeconomic area, state housing, some
14 Aboriginal involvement there. So that'd be a good thing (Site 3, Focus Group 3,
15 Male)

16 **Aboriginal Engagement.** Sports sector specialists in site 3 discussed how even when
17 programs are free to participate in, men from the Aboriginal community would often still not
18 participate. In the context of Australian Football, stakeholders indicated that there is often little
19 involvement of Aboriginal men at local clubs beyond their playing years due to '*entrenched*'
20 barriers, '*little hoops you have to jump through*' and a sense of not being welcome.

21 ...even making things free seems as though that the lowest socioeconomic still
22 don't actually get involved all the time. It's that like there's a barrier. And we've
23 seen that with Aboriginal participation....[...]

1 ...Aboriginal guys in particular, the barrier is always is that the sport is what
2 actually keeps them involved because they actually feel welcome. And part of it,
3 when they can actually go there and play, they don't necessarily always feel that
4 they're welcome once they're finished. (Site 3, Focus Group 3, Male)

5 Aboriginal health specialists also reflected on challenges to engaging Aboriginal men
6 in health initiatives due to issues with trust and deep-rooted barriers to participation.
7 Suggestions for mitigating these barriers were focused on helping to support men to feel more
8 ‘culturally comfortable’, including by seeking ‘early buy in [from the Aboriginal community]’,
9 employing an ‘Aboriginal staff member’ or providing bespoke deliveries (‘run it Aboriginal
10 specific’). Some optimism was expressed that a male-specific Australian football-themed
11 program could potentially have greater appeal than existing weight management services for
12 some Aboriginal men:

13 ...not quite comfortable with [mixed-gender program] that would potentially
14 prefer to be in a predominantly non-Aboriginal setting with other men, than an
15 Aboriginal setting with a bunch of women. (Site 1, Focus Group 2, Female)

16 **Seasonality, Work and Weather.** The optimal time of year to engage local men varied
17 across rural sites. In site 1, where a large proportion of the workforce are farmers, scheduling
18 the program to run outside of seeding and harvest months (when ‘every eligible bloke
19 disappears’) was considered essential. In site 2 avoiding the cold, wet and dark winter
20 months was considered the most important factor. Stakeholders in site 3 also advised against
21 scheduling the program in the winter months and highlighted that the high proportion of fly-
22 in-fly-out/rotation workers in the area was an unavoidable barrier to participation. These
23 workers would struggle to participate in structured initiatives requiring consistent (weekly)
24 attendance.

1 **Rural Partnerships and Sustainability**

2 The concept of using Australian Football to help engage men was well received by
3 stakeholders, who could see real potential for the program in rural towns.

4 *...it's got the potential to be so successful in [site 1] I think. I think it would be...*
5 *it would be awesome. It would be really, really good. (Site 1, Focus Group 2,*
6 *Female)*

7 Whilst this stakeholder's optimism is palpable, the emphasis on the word '*potential*' in
8 the context of a discussion around program sustainability, hints at prior challenges to health
9 program implementation. Indeed, many stakeholders reflected on programs which had come
10 and gone from their communities due to funding limitations. Moreover, stakeholders
11 cautioned that, particularly where physical activity options were lacking (e.g., Site 1),
12 participants would inevitably be enquiring as to '*what [is] next?*

13 *. Especially with funded programs like that, that run for a very short period of*
14 *time. It gets very tricky. Because you know, we sort of... we manage, in the*
15 *network we manage a few funded programs which runs for a year. And there's...*
16 *people love it and then funding stops. And so yeah, you're going to have definitely*
17 *that's going to be a challenge and people... participants will definitely ask that*
18 *question. What's going to happen after 12 weeks? I mean, you do... you're going*
19 *to do a follow up in three months, but then what next? (Site 1, Focus Group 2,*
20 *Female)*

21 Various organisations that could play a role in supporting program implementation
22 were proposed, including those in health, sporting, and community sectors. With a view to
23 sustainability, developing relationships with key local partner organisations was considered
24 vital.

1 *“That’s the big word, relationship. For it to be sustainable, you’ve got to build*
 2 *on it.”* (Site 3, FG2, Male)

3 Stakeholders across the sites suggested that the Football Commission was an important
 4 potential partner to engage, ideally to help coordinate some local program logistics.

5 *... getting the footy commission side of it, so you’d often get the development*
 6 *officers down here conducting it. And that’s not saying that they would be the*
 7 *ones taking the sessions, because you can put it out to the local coaches around*
 8 *here who are AFL coaches at any level, to be the ones that administering it.*
 9 *Like WA Footy Commission is the face of it, but I think you’ll get better buy in*
 10 *down here type thing.* (Site 3, Focus Group 1, Male)

11 Rather than being promoted as a metropolitan-based university or professional football
 12 club affiliated program (as was the case in Aussie-FIT pilot deliveries), having a well-known
 13 and respected football organisation involved in grassroots work as *‘the face of it [the*
 14 *program]’* was proposed as a potentially valuable strategy for garnering local community
 15 support. This points to the prestige, respect, and potential leverage of this organisation and
 16 their employees within their respective regions. Some stakeholders agreed informally to help
 17 *‘where they can’*, whereas others pledged their support or appeared to take some ownership
 18 of the program through their choice of words (e.g., *‘that’s when we’ll really yeah, have to*
 19 *drive it...’*).

20 *...we’ll just give a pledge. [Organisation] are happy to see this you know,*
 21 *delivered within [site 2]. And we’ll do what we can to support you in that.* (Site
 22 2, Focus Group 1, Male)

23 Stakeholders emphasised that rural football clubs are volunteer run, and that capacity
 24 for active involvement from club personnel beyond their already stretched capacity was

1 unlikely. Where local government representatives were not present in focus groups,
2 stakeholders highlighted that getting their support would be important, suggesting they would
3 likely '*see the appeal*' and '*be quite receptive*' to Aussie-FIT. Where local government
4 representatives were present, they indicated that it may be possible to waive or reduce venue
5 hire fees, and that they would support program promotion efforts. Two important strategies
6 suggested for garnering support from local governments and other organisations were
7 presented. These were: first, to make it '*easy and simple for them to jump on [to support the*
8 *program]*'; and second, to highlight how supporting the program could help their
9 organisation meet key performance indicators or how it aligns with their broader public
10 health plans.

11 *...selling it to them as something that they can tick off the public health plan, and*
12 *is probably going to be your best bet to get their support* (Site 3, Focus Group 3,
13 Female)

14 **3.3.2 Aussie-FIT Adaptations for Rural Contexts**

15 Informed by the stakeholder focus group results, adaptations were made to Aussie-
16 FIT and the implementation strategies to be used for implementation in rural contexts (see
17 Table 5). Adaptations were made to program content, participant recruitment strategies,
18 marketing, coach recruitment and training delivery mode, program delivery settings, the
19 football program theme, and program partners. Focus group findings indicated that suitable
20 Aussie-FIT adaptations (to the program originally delivered in AFL clubs by AFL coaches)
21 for rural implementation include for the program to be delivered in local football settings and
22 adopting an Australian Football theme, without specific affiliation to any local or non-local
23 clubs. Rather than AFL club social media posts, the rural recruitment strategy will include
24 promotion via local media, trusted community sources, local social media pages and word of
25 mouth. The wording of marketing materials will aim to be inclusive of all eligible men. The

1 aim for inclusive language includes emphasising that the program is free, and that no prior
2 football experience or skill-level is required. The research team will aim to partner with local
3 trusted football, sporting, Aboriginal-specific and other health organisations, as well as local
4 government authorities to help support inclusivity in program implementation.

5 Specific adaptations were made to sessions that originally included a stadium tour and
6 Australian Football guest speaker, introducing more flexibility for the delivery of these
7 program components to improve the intervention fit for rural contexts. Core program
8 elements of the original Aussie-FIT program are retained. Namely, the number and length of
9 sessions (i.e., twelve; 90 minutes), mix of education and physical activity components in each
10 weekly session, session topics (e.g., food labels and alcohol), integration of behaviour change
11 techniques, theoretical underpinning (i.e., Self-Determination Theory), fostering of group
12 camaraderie and positive banter, and an overarching Australian Football program theme
13 (Quested et al., 2018). The underlying mechanisms of action to support health behaviour
14 changes are unchanged, and thus adaptations made can be considered fidelity consistent.
15 Adaptations to interventions, and strategies to implement interventions, are often necessary to
16 support the fit of the intervention to new contexts, and this can be important to preserve the
17 fidelity of interventions when delivered across different settings (Moore et al., 2021).

18

Adaptation: Implementation Strategy, Type, Nature, and Level	Pilot/Metropolitan Aussie-FIT	Rural Aussie-FIT	Rationale for Adaptation or Rural Specific Considerations	Exemplar Quotes and Linked Qualitative Themes Informing Adaptations	Generalisability, Fidelity, and Potential Outcome of Adaptation
Substitution of recruitment strategy content (organisational level).	Professional Australian Football League clubs affiliated with the Aussie-FIT programs shared promotional articles and recruitment information on their social media pages and websites to their large fan bases.	Multi-faceted approach to recruitment including Facebook promotion, via local Australian Football clubs, local media coverage (radio and newspapers), word of mouth (e.g., via community champions, local organisations and other men interested in participating).	No affiliation with AFL clubs. The rural recruitment strategies were informed by stakeholder focus groups. The goal of this adaptation is to increase the reach and health equity relevance of the program.	<p><i>Most Relevant Qualitative Themes and Sub-Themes:</i></p> <ul style="list-style-type: none"> - A Smaller Fishpond - Trust, Recognition and Credibility: The Importance of Local Champions - A Double-Edged Sword <p><i>Exemplar Stakeholder Quotations:</i></p> <p><i>'Hit the socials' [...] 'Site 1 community board goes off on Facebook' (Site 1, FG2, Female)</i></p> <p><i>'...leveraging the (local) clubs is definitely one way to do it' (Site 1, FG1)</i></p> <p><i>'...bring a friend or two is probably going to have to be a realistic approach' (Site 3, FG2, Male)</i></p> <p><i>'It's probably the medium (newspapers) that works regionally, that doesn't work metro' (Site 3, FG2)</i></p> <p><i>'...if you're talking about, how do we speak to the community, I guess I mean I, for our programs I use local radio. (FG1, Site 1, Female)</i></p>	<p>This adaptation does not impact intervention delivery or likely effectiveness and is classified as fidelity consistent.</p> <p>How effective the adapted recruitment strategy for rural areas is unknown and requires evaluation. Given the smaller rural population sizes and the that well supported professional AFL clubs with large social media followings are not promoting the program, the rate of recruitment may be reduced in comparison to the metropolitan pilot.</p> <p><i>Potential Generalisability:</i> These recruitment approaches are potentially generalisable across rural Australian towns, for both the Aussie-FIT program and/or other health initiatives or target groups.</p>

<p>The implementation strategy being modified is the marketing strategy.</p> <p>The modification is to the content of the implementation strategy</p> <p>The nature of this modification relates to tailoring, adding elements and removing elements.</p> <p>The level of the rationale for this adaptation is the implementor level.</p>	<p>Marketing of the program highlighted a <i>'behind the scenes'</i> experience at the professional AFL club men support. This included alluding to the potential for bumping into players and access to professional footy settings for the program sessions. The program was marketed as an AFL club-specific program.</p>	<p>Rural program marketing refers to the program as being <i>'footy themed'</i> in the text and images used, with no mention of specific club affiliation. The phrases <i>'no footy experience required'</i>, <i>'meeting likeminded men'</i>, <i>'having a laugh'</i>, <i>'limited places available'</i> and the potential for <i>'mental health benefits'</i> is highlighted in flyers and social media posts. The fact the program is free of charge was also highlighted.</p>	<p>Rural marketing strategies were informed by stakeholder focus groups. Adaptation reasons include to:</p> <ul style="list-style-type: none"> • make clear there is no affiliation with specific football clubs • make clear that all eligible men are welcome, regardless of their football experience • highlight potential mental health benefits and the opportunity to form connections with other likeminded men • use language that may give a sense that men may be one of the lucky few to participate • clearly highlight that the program is free of charge <p>The goal of this adaptation is to increase the appropriateness of the marketing for rural contexts without club affiliations, and to increase the potential reach and health equity relevance of the program.</p>	<p>Most Relevant Qualitative Themes and Sub-Themes:</p> <ul style="list-style-type: none"> - Engaging Rural Men and Diversity - Program Marketing and Cost - A Common Language - Local Club Rivalries <p>Exemplar Stakeholder Quotations:</p> <p><i>'...pushing the point that they probably don't need to have been a footy or played footy to participate...[...]...If that can be pushed out that you know, they may not have ever had to do a hand ball to be able to participate. (Site 1, FG1)</i></p> <p><i>'So we kind of need to develop that kind of feeling here where people feel lucky to be one of the 60' (Site 2, FG1)</i></p> <p><i>'...they formed those social groups at the end and people that maybe had been feeling a bit lonely. Particularly after this lovely year we've just had, I think that could be a real drawcard as well, around coming in, meeting new people. As opposed to perhaps going just purely for the fitness or the health angle.' (FG2, Site 2, Female)</i></p>	<p>This adaptation does not impact intervention delivery or likely effectiveness and is classified as fidelity consistent.</p> <p>How effective the adapted marketing strategies for rural areas are unknown and requires evaluation alongside the rural recruitment strategy.</p> <p>Potential Generalisability: The rural marketing strategy could be generalisable for the marketing of Aussie-FIT across rural areas. Although the marketing is specific to the Aussie-FIT program (e.g., <i>'footy themed'</i>), aspects of the approach could be generalisable to other initiatives taking a gender-tailored approach to engaging men or for programs looking to appeal to individuals from diverse backgrounds.</p>
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<p>The implementation strategy being modified is the coach recruitment strategy and coach training mode.</p> <p>The modification is to the context (setting/format and personal) in which the overall implementation strategy is delivered and the training of the implementors.</p> <p>The nature of this modification relates to tailoring and loosening structure.</p> <p>The level of the rationale for this adaptation is the implementor level.</p>	<p>The intention was for coaches to be recruited directly from AFL clubs, but ultimately, three coaches were recruited via the clubs and an additional three coaches were identified by the research team.</p> <p>The coaches attended four-half day program training workshops.</p>	<p>Coach role information will be circulated amongst local stakeholders for dissemination via email and/or social media. Stakeholders will be encouraged to share the role information to local football and other sporting clubs, and other community or health organisations.</p> <p>Key characteristics of coaches (e.g., interest in Australian Football; coaching experience, communication skills) to deliver the program are unchanged. Coaches with or without specific club affiliations are eligible.</p> <p>Flexibility of coach training delivery mode will be considered (e.g., partially online) if coordinating face-to-face training is challenging. The content of the training is unchanged.</p>	<p>The flexibility with the coach training mode is informed by pragmatism. The coach recruitment strategy is informed by the stakeholder focus groups and the fact that the rural program is not affiliated with AFL clubs. Stakeholders reported that rural football club volunteers were overburdened and, in many cases, unlikely to be able to have any active involvement in Aussie-FIT. Hence, coach recruitment efforts were not targeted solely at local football clubs.</p> <p>The goal of this adaptation is to increase the adoption of the program.</p>	<p>Most Relevant Qualitative Themes and Sub-Themes:</p> <ul style="list-style-type: none"> - A Smaller Fishpond - Trust, Recognition and Credibility: the importance of local champions - Rural Partnerships and Sustainability <p>Exemplar Stakeholder Quotations:</p> <p><i>‘So it would restrict yourself, if you're looking for coaches I wouldn't restrict yourself to the two [site 1] teams by a long shot.’ (FG1, Site1, Male)</i></p> <p><i>‘...people are over worked in footy clubs now. Like there's a small amount of volunteers doing a lot of the pulling power. So it's yeah. It's, to ask them to do more is probably unrealistic at this point I reckon.’ (FG1, Site1, Male)</i></p> <p><i>‘So I think one of your key things will be finding absolutely right person on the ground to be your go to person’ (FG3, Site3, Female)</i></p>	<p>All coaches bring their own style of delivery, and some may deliver core program components with a higher degree of fidelity than others, which could in turn influence participant health and health behaviour outcomes. However, the adaptation to the coach recruitment strategy and flexibility with training mode itself is unlikely to impact intervention delivery or program effectiveness and is classified as ‘fidelity-consistent’.</p> <p>How effective the coach recruitment strategy for rural areas is unknown and requires evaluation.</p> <p>Potential Generalisability: The adapted coach recruitment strategy and coach training mode could be generalisable to the recruitment of Aussie-FIT coaches across other rural areas and could be applicable to other rural health initiatives.</p>
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<p>The implementation strategy being modified is the program partnership organisations.</p> <p>The modification is contextual, to the organisations involved in supporting program implementation.</p> <p>The level of the rationale for this adaptation is the organisational level.</p>	<p>Professional AFL clubs were partners in the pilot Metropolitan Aussie-FIT program. Their primary role was to help promote the program to potential participants and to provide a program delivery venue.</p>	<p>Partnerships with the West Australian Football Commission, local government authorities, and other community or health organisations will be sought in the rural Aussie-FIT program. Their role will include helping to promote the program, support the identification and recruitment of coaches, and to help identify and liaise with organisations around venue bookings. Stakeholders will be consulted with on an ongoing basis, during and post-program implementation, in an advisory capacity.</p>	<p>The rural program partnerships were informed by the stakeholder focus groups and the fact that the rural program is not affiliated with AFL clubs.</p> <p>The goal of this adaptation is to increase the potential sustainability of the program, as well as the program reach, adoption and the acceptability and appropriateness of the implementation effort in rural contexts.</p>	<p><i>Most Relevant Qualitative Themes and Sub-Themes:</i></p> <ul style="list-style-type: none"> - Trust, Recognition and Credibility: the importance of local champions - Rural Partnerships and Sustainability <p><i>Exemplar Stakeholder Quotations:</i></p> <p><i>They roll out all AFL down here to the kids and everything. Yeah. So I would probably say they're the best ones to get involved in rolling this program out. (FG1, Site3, Male)</i></p> <p><i>That's the big word, relationship. For it to be sustainable, you've got to build on it (Male).... And while we've got budget, we may as well start doing that and work with them. (FG2, Site3, Female)</i></p>	<p>This adaptation does not impact intervention delivery or likely effectiveness and is classified as fidelity consistent.</p> <p>The role that program partnership organisations have undertaken during rural implementation will be reviewed and discussed with stakeholders following initial implementation efforts, with a view to working towards a sustainable program delivery model.</p> <p><i>Potential Generalisability:</i> Program partnership organisations either have equivalent organisations across rural areas, or their organisation and employee structure spans across rural Western Australia. Thus, partnerships adopted for rural implementation could be generalisable for Aussie-FIT implementation across rural areas and could be applicable to other rural health initiatives.</p>
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Program Adaptation	Pilot/Metropolitan Aussie-FIT	Rural Aussie-FIT	Rationale for Adaptation or Rural Specific Considerations	Exemplar Quotes and Linked Qualitative Themes Informing Adaptations	Core Program Components, Fidelity, and Potential Generalisability
<p>These modifications were made to the Australian football theme/framing and related program content.</p> <p>These modifications cut across community coach, target group, and organisational levels.</p> <p>The nature of these modifications relates to tailoring/ tweaking, changes in packaging or materials, and substituting aspects of the existing program.</p>	<p>Delivered in association with specific professional AFL clubs to specifically engage men that support those teams. <i>'Behind the scenes'</i> program feel, with coaches wearing club shirts and men participating getting a free club/team shirt to wear during the program.</p> <p>Session 1: 'Behind the scenes' tour of club facilities, walk around the oval with club insider stories.</p> <p>Session 6: A club player, former player, coach, or other 'celebrity' is invited to the session to talk to the men about the football club and reflect on setbacks they have overcome in their career, and how men might relate to setbacks they may experience.</p>	<p>An Australian Football themed program, not delivered in association with any specific local or non-local clubs, to appeal to men that may have an interest in Australian Football. Local community program, run by local coaches, with coaches wearing Aussie-FIT shirts, and participants wearing an Aussie-FIT team t-shirt.</p> <p>Session 1: Will likely differ across rural programs depending on the context, but often a walk around the oval, and sharing stories about the history of football in the area or local clubs.</p> <p>Session 6: If a local football guest is not available to come and speak to the men, the coach and participants will share stories of when they have experienced a setback (football related or other).</p>	<p>The goal of these adaptations was to improve intervention fit for the context. The reason for these adaptations was the location/accessibility.</p> <p>Rural contexts with no access to professional AFL club facilities. Program is not affiliated with professional AFL clubs. The program framing and theme were informed by stakeholder focus groups. Stakeholders did not discuss specific program content, with these adaptations made by the research team.</p> <p>Session 1: Rural context with no access to professional AFL club facilities.</p> <p>Session 6: Access to a 'celebrity guest' likely more difficult in rural contexts, without AFL club affiliation.</p> <p>Where relevant, program materials (e.g., participant booklets) were tweaked to correspond with these adaptations (e.g., removing or replacing mentions of 'your club').</p>	<p><i>Most Relevant Qualitative Themes and Sub-Themes:</i></p> <ul style="list-style-type: none"> - A Common Language - Popularity of Australian Football - Local Club Rivalries <p><i>Exemplar Stakeholder Quotations:</i></p> <p><i>...you're on a winner with the access to you know, something that is common language which is AFL. Everyone, every dad, and their kids... male has had exposure to it. May have loved it or hated it, but at least they're aware of it. And it's in your face every day, in the paper. (FG1, Site 2, Male)</i></p> <p><i>...it probably wouldn't be best affiliated to clubs down here. Because yeah, you'll get ones that are just affiliated to that club that will go and then you might not get the others coming... (FG1, Site3, Female)</i></p>	<p>Core elements or functions of the program are preserved, and this modification is deemed fidelity consistent. The theoretical basis, behaviour change techniques utilised, and the program content designed to support men to make positive changes to their health behaviours have not been adapted.</p> <p>No tour around professional football settings and potential lack of a 'celebrity' appearance links to the rural program not being associated to professional clubs. This removes an aspect of the original program 'hook', which could influence how attractive or engaging the program is.</p> <p><i>Potential Generalisability:</i></p> <p>These adaptations are likely generalisable to many Western Australian and other rural contexts. For generalisability to parts of Australia where Australian Football is less popular, modifying the sport of choice for the program theme may be a consideration. Using sport as a program 'hook' could be applicable to other rural health initiatives to engage participants.</p>

<p>Contextual modifications made to the program delivery setting and time of year the program is delivered.</p> <p>These modifications were made for the target group.</p>	<p>Professional AFL club settings often with access to a gym onsite.</p> <p>The time of year that programs were delivered varied, with recruitment during the early months of the football season a deliberate consideration. If men were not available for the scheduled program, then they were not enrolled in the program.</p>	<p>Local rural amateur Australian Football settings.</p> <p>Program timings varied across the three rural sites. The peak winter months were avoided in sites 2 and 3. The farming season was avoided in site 1.</p>	<p>The goal of these adaptations is to improve intervention fit for the context. The reason for these adaptations was the location, accessibility, and social context (local climate and employment). Rural context with no access to professional football club facilities. The program venue choices and delivery timings were informed by pragmatism and considerations raised in stakeholder focus groups.</p> <p>In site 1, there was only one possible football oval in town. In sites 2 and 3 where there was more than one potential option, the venue was selected based on availability, accessibility, and potential to reach men from diverse backgrounds.</p> <p>In site 1, the program was no scheduled during farming season in site 1, and not scheduled during winter months in sites 2 and 3.</p>	<p>Most Relevant Qualitative Themes and Sub-Themes:</p> <ul style="list-style-type: none"> - Engaging Rural Men and Diversity - Accessibility and Rural Football Settings - Seasonality, Work and Weather <p>Exemplar Stakeholder Quotations:</p> <p><i>Public transport, there is no public transport...[.....]... So central, wherever the programs being run. (FG1, Site 2, Male)</i></p> <p><i>...location-wise and that's where [venue name] would be a good one, because that's the area where there is, a lower socioeconomic area, state housing, some Aboriginal involvement there. (FG3, Site 3, Male)</i></p> <p><i>...weather is a bit of an issue down here. So if you're having an outdoor program and you're doing it in July, you're not going to get many participants... (FG1, Site2, Female)</i></p> <p><i>...every eligible bloke disappears over harvest time. (FG2, Site 1, Female)</i></p>	<p>These modifications do not impact core elements or functions of the program and are deemed fidelity consistent.</p> <p>Potential Generalisability: Local contextual factors (e.g., weather, employment) will vary across rural sites in Australia which will influence the most appropriate program delivery settings and time of year to deliver Aussie-FIT or other health initiatives to engage the target population.</p>
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Notes.

Relevant Questions from the FRAME-IS and FRAME addressed within this table, as appropriate, are:

Q1 – Briefly describe the implementation strategy and modifications; Q2 – What is modified?; Q3 - What is the nature of the content, evaluation, or training modification?

Q4 – Potential relationship to fidelity/core elements? Q5 - What is the goal and reasons for modification? Q6 - What is the level of the rationale for modification? Q7 - At what level of delivery is the modification made (for whom/what is the modification made)?

The potential generalisability of the adaptations for Aussie-FIT implementation in other rural Australian contexts beyond the three sites and to other health initiatives or target populations within rural Australia are also considered.

1 3.4 Discussion

2 In this study we have explored rural stakeholder perspectives on existing local
3 physical activity and weight management options, and potential barriers and facilitators to
4 implementing an Australian Football-themed men's health program in rural Western
5 Australia. We describe how focus group findings have informed adaptations to Aussie-FIT
6 program content and implementation strategies for rural deliveries, to understand how to
7 begin to redress rural inequalities. Stakeholder focus groups pointed to a need to and
8 strategies to consider for adapting Aussie-FIT, whilst retaining core intervention elements
9 which are judged essential in the pathway to successful behaviour change.

10 Findings from the current study suggest that: existing access to weight management
11 services or physical activity initiatives across the rural sites is limited; men are less likely to
12 participate in mixed-gender programs that are available; but gender-tailored place-based
13 approaches could help engage many men in rural areas. Our findings resonate with recent
14 qualitative studies aimed at identifying places that foster well-being among rural men
15 (Ahmadu et al., 2021) and which have explored masculinities in the context of suicide
16 prevention with rural stakeholders (Trail et al., 2021). For instance, Ahmadu *et al* (2021)
17 reported on men being open to seeking opportunities for social connection through sporting
18 activities, but also noted that some participants experienced these environments as
19 exclusionary from broader networks or team-related conversations (Ahmadu et al., 2021).
20 Stakeholders in the current study cautioned that, although Aussie-FIT would be delivered
21 within rural football settings, the program should not be affiliated with specific local clubs to
22 minimise any incorrect perception that the program is exclusively for men already involved
23 in the local football community. As well as the physical health benefits linked to participation
24 in Aussie-FIT, stakeholders in the current study emphasised that the mental health benefits
25 linked to participation should be highlighted within the marketing materials to help appeal to

1 men who may not be involved in the sporting community and those who may be socially
2 isolated.

3 Several parallels can also be drawn between our results and a recent qualitative study
4 with local football club representatives exploring barriers and enablers of implementing
5 mental well-being programs within rural Australian football clubs (Hutchesson et al., 2021).
6 Hutchesson *et al* (2021) reported that program enablers included the social environment
7 offered by rural football club settings, the potential for having a trusted and familiar face
8 from the football community deliver programs, scheduling programs at appropriate times of
9 year, and getting the support of local football and other community organisations
10 (Hutchesson et al., 2021). Barriers to program implementation included a lack of volunteers
11 at local football clubs to support the program, cliques within individual clubs and segregation
12 between those involved in different local clubs, and a lack of appropriate community
13 champions to help drive the initiative (Hutchesson et al., 2021). Similarly, in the current
14 study, rural stakeholders highlighted the popularity of football in rural communities, the
15 sport's role in facilitating social connection amongst men, and the important role that trusted
16 local sources can play in supporting the implementation of health initiatives.

17 'Fans in training' programs around the world have typically used the appeal of
18 professional sports clubs, settings, and coaches to engage participants (Hunt, Wyke, et al.,
19 2014; Kwasnicka et al., 2020; Maddison et al., 2019; Petrella et al., 2017). In the absence of
20 the professional club '*drawcard*', replicating some of the inherent recognition and credibility
21 these clubs provide was considered important by stakeholders to help garner local trust. Thus,
22 they recommended delivering the program in association with trusted local organisations and
23 individuals. This aligns with wider literature on engaging men in health interventions,
24 emphasising the importance of using strategies that are congruent with masculine identities
25 and based on trust and rapport (Grace et al., 2018; Hunt, Gray, et al., 2014; Lefkowich et al.,

1 2017; McDonald et al., 2020). Stakeholders characterised those involved in running local
2 clubs (e.g., coaches, committee members) as overburdened volunteers, who would be
3 unlikely to be able to take on a role as an Aussie-FIT coach. Therefore, identifying suitable
4 community champions and organisations to deliver or help champion the program was
5 considered an important challenge to overcome. A recent qualitative study undertaken with
6 stakeholders experienced in sustaining public health programs highlights that finding key
7 champions within local community organisations is an important facilitator to support
8 sustainment, but that over reliance on individual champions was viewed as a potential risk to
9 the longevity of programs (Crane et al., 2022). Maintaining communication with stakeholders
10 from key organisations throughout the adaptation and implementation of Aussie-FIT in rural
11 towns, could help to facilitate future decisions around intervention scaling and sustainability.

12 **3.5 Strengths and Limitations**

13 Focus groups were undertaken across three rural towns with varied population sizes
14 and demographics. This meant that similarities and differences across sites could be
15 acknowledged within the analysis and reporting, allowing for context specific factors to be
16 considered in the adaptation of Aussie-FIT. The use of established frameworks for reporting
17 content and implementation strategy adaptations allows the reader to easily establish what
18 and why adaptations were made for rural contexts. A diverse range of stakeholders
19 participated in the focus groups within and across rural sites. Women and men participated,
20 including men (n=7 aged 30-65 years) within the target age range for the Aussie-FIT
21 program. The range of perspectives, expertise, and local knowledge expressed within the
22 focus groups strengthens this study.

23 Sites in this study are classified as ‘inner’ or ‘outer’ regional, and travel time to the
24 nearest city from these sites ranges from 1.5 to 5 hours by car. Thus, some findings from this

1 study may not be generalisable to more rural or remote settings with very low populations.
2 The views of the women (n=11) and younger men (n=5 aged 20-29 years) who participated in
3 the focus groups may not represent the Aussie-FIT target group. Moreover, although efforts
4 were made to specifically engage target group men (aged 35-65 years with a BMI >28), this
5 proved challenging unless these individuals believed that participating in focus groups fell
6 within the remit of their employment (e.g., health promotion or sporting sectors). However,
7 all participants lived and worked in rural communities, had at least some exposure to local
8 health and football settings, and had an understanding of community health behaviours and
9 how masculinity is expressed locally. Due to scheduling issues, one relatively short focus
10 group (Site 3, Focus Group 1; 39 minutes) had only two participants, both from the same
11 organisation. Although this may have limited the range of expert input provided within this
12 individual focus group, these participants did have highly relevant expertise and experience,
13 and two further focus groups with stakeholders from varied backgrounds were undertaken in
14 this site. Whilst adaptations made to the Aussie-FIT program were based on stakeholder
15 feedback, the authors took a pragmatic approach to what adaptations were feasible within the
16 project's budget and timelines. For example, one stakeholder's suggestion, to deliver an
17 Aboriginal specific program, was beyond the scope of this work. Well-funded projects that
18 utilise co-design approaches with meaningful involvement of Aboriginal individuals,
19 organisations and researchers would be required for such work.

20 **3.6 Conclusion**

21 This study supports understandings of the health promotion landscape in rural areas
22 for men, with a focus on barriers and facilitators to engaging men via local Australian
23 Football settings, and the adaptation of a successful metropolitan-based men's health program
24 for delivery in rural contexts. Rural areas were described as '*a different ball game*' when
25 compared to urban areas due to limitations with local services and resource. The power of

1 word of mouth in smaller rural communities was highlighted as a double-edged sword,
2 having the potential to influence the implementation of health programs positively or
3 negatively. In the absence of professional club settings, leveraging recognised and credible
4 local community sources to affiliate with, deliver, or otherwise champion the program was
5 viewed as fundamental to the success of the program, both in the short term and for potential
6 future sustainability. Assessing the potential program reach, and implementation barriers and
7 facilitators of the adapted Aussie-FIT program when delivered in rural contexts is now
8 required. These findings have implications for adapting health promotion programs for men
9 in rural areas within non-professional sporting contexts as one means to help redress rural
10 inequalities in men's health provisions.

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1 **4.1 Introduction**

2 Rural communities have higher rates of obesity, cardiovascular disease, type 2
3 diabetes, and high blood pressure than urban areas (Alston et al., 2020; O'Connor &
4 Wellenius, 2012; AIHW, 2022e). Obesity rates in Australia are highest in low socioeconomic
5 rural communities (Calder, 2019) where there has been a more pronounced decrease in
6 physical activity from 2002 to 2017 compared to urban areas (Moreno-Llamas et al., 2021).
7 Rural communities can face disadvantage due to a lack of access to facilities, resources, and
8 health services (AIHW, 2022e). Although behavioural weight management studies rarely
9 report participant place of residence (i.e., urban, or rural) (Birch et al., 2022), there is some
10 evidence to suggest that rural-specific weight management programs can be effective (Porter
11 et al., 2019). However engaging men from rural and lower socioeconomic areas can be
12 challenging (Ahern et al., 2016; Punt et al., 2020), and few studies specifically consider how
13 best to engage this population (see Chapter 2).

14 The construction and expression of masculine identities is influenced by social
15 context, and intersects with factors such as socioeconomic status, rurality, and cultural norms
16 (Evans et al., 2011). Traditional perceptions of masculinity, such as a need to appear stoic,
17 resilient, and strong, may be more prevalent in rural communities (Dolan, 2011; Taylor Smith
18 & Dumas, 2019). Interventions associated with making dietary changes or losing weight are
19 often viewed as female oriented (Gough & Flanders, 2009; Sabinsky et al., 2007), and
20 ostensibly counter to social ideals of masculinity (Elliott et al., 2020). The need to deliver
21 interventions in settings that are congruent with masculine identities, and the importance of
22 trust and rapport for engaging men has been previously highlighted (Archibald et al., 2015;
23 Osborne et al., 2016). A qualitative evidence synthesis identified that weight management
24 interventions incorporating physical activity and social support are more likely to attract and

1 retain men (Archibald et al., 2015). These factors may be of particular importance for
2 engaging men in rural areas.

3 One potential strategy to engage men in rural areas is to align health interventions
4 with popular sporting codes. The FFIT program, established in Scotland and delivered in
5 professional football (soccer) settings, has inspired international adaptations including in
6 Australia, Canada, New Zealand, and various European countries (Hunt et al., 2020). These
7 programs involve weekly 90-minute sessions over 12 weeks, incorporating coach-led
8 education, physical activity, and strategies to support positive health behaviour changes
9 (Hunt et al., 2014; Maddison et al., 2020; Petrella et al., 2017; Qusted et al., 2018).
10 Internationally, ‘fans in training’ programs rely on sports fans’ affiliation to professional
11 clubs and/or strong allegiance with the sport to help attract men, sustain their participation,
12 and encourage engagement with health behaviour change educational content designed to
13 support increased physical activity, dietary improvements, and weight loss (Hunt et al.,
14 2020). Typically, the program experience includes ‘behind the scenes’ access at their
15 favourite club, a tour of the professional sporting venue, and a guest visit from a current or
16 former player (Hunt, Wyke, et al., 2014; Maddison et al., 2019; Petrella et al., 2017).

17 Aussie-FIT is the Australian adaptation of the FFIT program which capitalises on the
18 appeal of professional AFL clubs to engage men in coach-led education and physical activity
19 (Kwasnicka et al., 2020; Qusted et al., 2018). Aussie-FIT embeds theoretical and evidence-
20 based strategies, fosters a fun and supportive environment for discussions around health, and
21 aims to help men improve their health in the long-term (Qusted et al., 2018). Aussie-FIT is
22 highly attractive to urban-residing men and has shown promise as a means to promote
23 physical (e.g., weight), psychological (e.g., self-esteem), and behavioural (e.g., physical
24 activity) health benefits in line with other ‘fans in training’ programs (Hunt et al., 2020;
25 Kwasnicka et al., 2021; Kwasnicka et al., 2020).

1 Qualitative data from studies of FFIT and Aussie-FIT highlight the importance
2 participants place on being around men they relate to, including their shared interest in a
3 professional sports club (Hunt, Gray, et al., 2014; Kwasnicka et al., 2021). In Scotland, the
4 geographical distribution of football clubs in the professional league has facilitated roll out
5 of FFIT in association with 36 clubs across the country, including in small rural towns (Hunt
6 et al., 2020). Australian professional sporting clubs tend to be concentrated in large cities. For
7 example, WA has two top-tier AFL clubs (West Coast Eagles and Fremantle Dockers) and
8 ten semi-professional clubs in the tier below, all based in the city of Perth or close surrounds.
9 Although a recent systematic review highlighted the utility of using professional sport to help
10 engage men in behavioural health interventions, the authors noted that the reach of
11 interventions to socioeconomically diverse populations was limited (George et al., 2022).
12 Community sport plays an important role in rural areas, with local sport settings often acting
13 as community hubs that can support social connection and cohesion (Spaaij, 2009). It is not
14 known whether amateur Australian football settings located in lower socioeconomic rural
15 areas can help attract local men to take part in group health interventions.

16 Adapting evidence-based interventions (e.g., Aussie-FIT) and strategies (e.g.,
17 recruitment) to support implementation in new contexts is important to help address health
18 inequalities where the unmodified intervention may otherwise be unappealing or unable to
19 reach specific sub-groups (Bernal & Domenech Rodríguez, 2012; Cabassa & Baumann,
20 2013). Rural stakeholder focus groups were undertaken to inform adaptations to Aussie-FIT
21 to reach men in rural locations that lack professional Australian football club facilities (see
22 Chapter 3). Program content, recruitment strategies and marketing materials were
23 subsequently adapted. The adapted program adopts an Australian Football theme that has
24 been adapted for delivery in local amateur sports settings. It is unknown whether this adapted

1 intervention ('rural Aussie-FIT') can engage men in rural contexts, without professional
2 sporting club affiliation or facilities, hence the rationale for the present study.

3 The over-arching aim of this mixed-methods study was to examine the feasibility of
4 recruiting and retaining coaches and participants to rural Aussie-FIT. The specific aims and
5 subsidiary research questions (for aims 1 and 2) were:

6 1. to describe the feasibility of recruiting and retaining coaches to deliver the Aussie-FIT
7 program in rural towns in Western Australia.

8 a) How many expressions of interest from suitably qualified applicants are received
9 and how long does it take to recruit suitable candidates?

10 b) How many rural Aussie-FIT coaches complete one program delivery of 12 sessions
11 and how many indicate a willingness to deliver subsequent rural Aussie-FIT
12 programs?

13 2. to examine whether an adapted version of Aussie-FIT ('rural Aussie-FIT') delivered
14 in rural towns in Western Australia can recruit, engage, and retain men living with
15 overweight or obesity.

16 a) How long does it take to recruit sufficient men to run two programs in rural
17 towns?

18 b) To what extent can the different recruitment methods (e.g., social media and
19 word of mouth) help reach and recruit rural men to Aussie-FIT?

20 c) What are the sample characteristics and what factors were important in rural
21 men's decision to enrol in the program?

22 d) To what extent did participants attend program sessions and what proportion
23 of men were retained in the program?

- 1 3. to explore participant views of their rural Aussie-FIT experience including barriers
2 and facilitators to the recruitment, engagement, and retention of men living with
3 overweight or obesity to this program.

4 **4.2 Methods**

5 This study received ethical approval from the Curtin University Human Research
6 Ethics Committee (HRE2021-0217) and was registered prospectively in the Australian New
7 Zealand Clinical Trials Registry (Trial ID: ACTRN12621000763842). In the trial
8 registration, we refer to this study as an Implementation-Effectiveness trial with mixed-
9 methods (pre-post) evaluation. These types of studies allow for implementation and
10 effectiveness outcomes to be assessed concurrently (Curran et al., 2012). The aims of this
11 chapter relate to the implementation of Aussie-FIT in rural contexts, and mirror the pre-
12 defined primary outcomes outlined in the trial registration. This chapter reports on data from
13 six Aussie-FIT programs delivered in three rural towns (i.e., two 12 session programs
14 delivered in each town). Funding from the Department of Health supported an evaluation of
15 six rural Aussie-FIT program deliveries. These data are reported in the present study. Two
16 subsequent rural Aussie-FIT programs were delivered (one in site 1 and one in site 3) in the
17 latter half of 2022 and included a ‘light touch’ evaluation. Inclusion of any data from these
18 deliveries was beyond the timeline and resource capacity of this PhD. Due to the relatively
19 small number of participants and, as this was a non-randomised study, intervention effects for
20 the specified secondary effectiveness outcomes listed in the trial registration have not been
21 reported (or calculated). This is in line with recommendations for studies that are not
22 powered to detect intervention effects (Eldridge et al., 2016).

23 One deviation from the pre-registration was the provision of some flexibility with the
24 original BMI inclusion criteria ($\geq 28 \text{ kg/m}^2$). When spaces on scheduled programs were still

1 available, men with a BMI 25-27.9 kg/m² attending a baseline assessment were included. It
2 was adjudged that it would be unethical to exclude individuals with a BMI 25-27.9 kg/m² that
3 could benefit from participating in rural Aussie-FIT in ways that are independent of BMI
4 (e.g., increased physical activity, improved diet, psychosocial outcomes), when the program
5 was due to run locally with places still available. In addition, stakeholders (see chapter 3)
6 highlighted that should individuals become unhappy about any aspect of the program, word
7 could easily spread in small rural towns, potentially compromising the reputation of the
8 program in the community. Finally, the community focus of the trial and focus on
9 implementation in rural towns rather than effectiveness, lends itself towards inclusivity and
10 pragmatism.

11 ***4.2.1 Participants and Settings***

12 Men aged 35–65 years with an objectively measured BMI of 28 kg/m² or higher were
13 eligible. If spaces on scheduled programs were still available, men with a BMI 25-28 kg/m²
14 could enrol. Men who knew in advance that they would be unavailable for four or more
15 sessions of a 12-week program were excluded. In line with legal requirements during
16 recruitment in site 3, men enrolling were required to provide proof of Covid-19 vaccination
17 status. Unvaccinated individuals were excluded. The recruitment target was 30 participants
18 (15 per program x 2 programs) per site.

19 Table 6 provides an overview of the study site characteristics (ABS, 2016; AIHW,
20 2022e; Calder, 2019). The sites are classified as ‘Inner Regional’ or ‘Outer Regional’ (ABS,
21 2016) and located in low-to-middle socioeconomic areas. The Australian Bureau of Statistics
22 categorises geographical locations in Australia into 5 classes of remoteness (‘Major Cities’,
23 ‘Inner Regional’, ‘Outer Regional’, ‘Remote’, and ‘Very Remote’) in relation to relative
24 access to services (AIHW, 2022e). All areas outside of Australia’s major cities can be

1 described as being ‘rural and remote’ (AIHW, 2022e). In this chapter (and throughout the
2 thesis) the term ‘rural’ is used to describe the study sites.

3 Rural Aussie-FIT was delivered in amateur Australian Football settings. In site 1, the
4 program was delivered in a modern multi-sport facility (including indoor Basketball courts,
5 swimming pool), with large indoor meeting rooms, and an Australian Football oval where
6 both local amateur clubs play. At the venue there is no spectator stand and access is
7 facilitated by the local authority on-site staff. In site 2 the program was delivered in an
8 Australian Football only venue, with modern indoor facilities (e.g., meeting rooms) and a
9 small covered seated area for spectators. This venue is shared by two local amateur
10 Australian Football clubs, and rural Aussie-FIT coaches were given an access card by the
11 local shire. In site 3 the program was delivered in an Australian Football only venue that is
12 home to one local amateur club. Access was facilitated by a representative of the local club.
13 Facilities included a small undercover seated area for spectators and a large indoor meeting
14 space.

Table 6

Overview of site characteristics

Site	Remoteness Classification	Approximate Population	SEIFA-IRSD (quintile)	Adult Overweight (Obesity) Prevalence
1	Inner Regional	6500	1	67.7% (33.8%)
2	Outer Regional	38,000	3	61.0% (27.7%)
3	Inner Regional	43,000	2	61.2% (29.0%)

Note.

Socio-Economic Indexes for Areas Index of Relative Socio-Economic Disadvantage (SEIFA-IRSD): quintile 1 represents areas within the 20% most disadvantaged in Australia and 5 within the 20% least disadvantaged

1

2 **4.2.2 Procedures**

3 **Coach Recruitment and Training.** The primary author circulated a flyer (Appendix
4 E) with information about the rural Aussie-FIT coach role to local stakeholders who were
5 asked to share the information on their social media pages and/or via their email networks to
6 local Australian Football clubs, other sporting clubs, community groups and health
7 organisations. The flyer contained information on key coach attributes, hours, pay rate, how
8 to register interest in the role, and a link to a more detailed role description on the Aussie-FIT
9 website. Key attributes highlighted in the flyer included having a passion or interest in
10 Australian Football, some coaching experience, and an interest in helping men to improve
11 their health. As the program ran at different times coach recruitment was staggered; coach
12 recruitment efforts at each site were undertaken prior to program deliveries at different times.
13 The study research team aimed to recruit two Aussie-FIT coaches in each rural site.

14 The primary author facilitated interactive coach training alongside one other
15 researcher (EQ or BS) in each site. The training was completed in stages over 12 to 15 hours.
16 The training content was largely unchanged from previous Aussie-FIT research covering
17 physical activity for health, nutrition, behaviour change strategies and integrating principles
18 of self-determination theory (Quested et al., 2018). One notable difference was the lack of
19 reference to club affiliations or the ‘behind the scenes’ experience of participants, whilst
20 retaining the football feel to the program and focus on participants bonding within a
21 supportive team environment (see Chapter 3). Unlike previous Aussie-FIT research, the
22 coach training delivery mode was not fully face-to-face across all sites due to scheduling
23 challenges with coach work commitments and researcher travel times to rural sites. Site 1
24 training was undertaken face-to-face over two training days. For site 2, training was split over

1 four segments, with two online evening sessions (2.5 hours each), followed by two face-to-
2 face evening sessions (4 hours each). For site 3, training was delivered via an online
3 introduction (1.5 hours), followed by two face-to-face sessions. In site 1, local authority staff
4 at the sports venue where Aussie-FIT was delivered were first aid trained and always present
5 when the program was delivered (they would have been working at the venue regardless of
6 whether Aussie-FIT was being delivered or not). So, the Aussie-FIT coaches in site 1 were
7 not required to be first aid certified. In sites 2 and 3, the program was delivered in unstaffed
8 football venues, and coaches that did not have a current first aid certificate were enrolled on a
9 local training course.

10 **Participant Recruitment.** Facebook, local media, and word of mouth recruitment
11 were undertaken. Local stakeholders, rurally based Aussie-FIT coaches, and the primary
12 author shared Aussie-FIT Facebook posts to relevant local pages. Paid Aussie-FIT Facebook
13 posts (Appendix F) used the ‘smart audience’ feature to target male users aged 35-65 years
14 within varying radiuses (e.g., 30 kilometres) of the program location depending on population
15 density, and a matched interest (i.e., ‘Western Australian Football League’, ‘Australian Rules
16 Football’, ‘Fremantle Football Club’ and/or ‘West Coast Eagles’). Local newspapers and
17 radio stations were approached (by stakeholders or researchers; MMcD, EQ) to run stories
18 about the upcoming rural Aussie-FIT programs. Promotional materials were circulated via
19 stakeholder networks. The primary author visited site 1 twice during recruitment to
20 encourage stakeholder promotion and place flyers on community noticeboards.

21 Program promotions encouraged men to express interest via the Aussie-FIT website
22 or contact the study researcher by phone, email, or text. The online form asked men to
23 provide contact details and self-report eligibility information (i.e., age, gender, weight, and
24 height). A researcher (MMcD, FD) then phoned men to verbally check eligibility, provide
25 program details, and schedule a baseline assessment appointment. During the screening call

1 men were asked to share promotions about the program or inform other men that may be
2 interested.

3 **Baseline Measures.** Men attended a baseline appointment where they read the
4 participant information leaflet and discussed it with the primary author or another researcher
5 (MMcD, EQ, FD) before providing written informed consent. Participants completed a
6 baseline questionnaire, and objective measures were taken by a trained researcher or
7 accredited health professional. Participants completed stage 1 of the Exercise and Sport
8 Science Australia (ESSA) screening tool (ESSA, 2019) and, if required, consulted with an
9 accredited health professional to identify if they were at very high risk of an adverse event
10 during moderate or vigorous physical activity. To reduce participant burden, an accredited
11 health professional was available at the enrolment sessions in two sites. In the third site,
12 phone calls were arranged as there was not a local person available. Individuals who were
13 judged to be very high risk based on the discussion with the health professional or had
14 elevated blood pressure levels (systolic >139mmHg or diastolic >99mmHg), required GP
15 approval prior to commencing rural Aussie-FIT.

16 **Rural Aussie-FIT.** Rural Aussie-FIT consists of 12 weekly 90-minute-long coach-led
17 face-to-face group sessions delivered in local amateur Australian Football club settings. Rural
18 Aussie-FIT has an Australian Football theme but is not affiliated with specific clubs. The
19 sessions incorporate physical activity and workshop style education. The education sessions
20 cover principles of healthy eating, behaviour change techniques and motivational principles.
21 The within-session physical activity is not prescriptive and is tailored by the coaches to suit
22 participants' capabilities. Coaches are trained by the research team in the core program
23 content and in the use of principles of motivation and behaviour change. Details of the
24 original Aussie-FIT program content (Kwasnicka et al., 2021) and adaptations for rural
25 contexts (see chapter 3) are reported elsewhere.

1 Participants received automated text and email reminders 24-hours prior to sessions.
2 Emails contained State and University guidelines for COVID-19 risk mitigation (e.g., close
3 contact guidelines). The program was delivered in sites 1 and 2 in 2021, when Covid-19
4 cases in Western Australia were very limited and there was no community spread. Program
5 deliveries in site 3 were in 2022, when community transmission of Covid-19 was widespread.

6 **Follow-Ups.** Participants attending session 12 completed a post-program evaluation
7 form and were invited to a post-program focus group. Non-completers were emailed a short
8 withdrawal survey after the program finished. Participants were provided with a \$20 voucher
9 as a thank you for participation in each data collection activity up to a maximum of three
10 vouchers (i.e., for baseline assessment, focus group, and post program evaluation or
11 withdrawal survey).

12 **4.2.3 Measures**

13 **Aim 1a – Coach Recruitment.** We recorded the number of people expressing interest
14 in the rural Aussie-FIT coach roles, the suitability of the candidates for the available roles,
15 and the length of time to recruit six Aussie-FIT coaches (two in each site).

16 **Aim 1b – Coach Retention.** The number and proportion of rural Aussie-FIT coaches
17 that deliver one full program of 12 sessions and the number and proportion of coaches that
18 indicate a willingness to deliver future rural Aussie-FIT programs beyond the initial programs
19 were recorded.

20 **Aim 2a – Participant Recruitment Time.** Number of participants recruited, and time
21 between initial and final expressions of interest by site prior to the scheduled start dates for
22 two concurrent programs in each rural town.

23 **Aims 2b and 2c – Reach of Recruitment Activities, Sample Characteristics and**
24 **Recruitment Reasons.** The baseline questionnaire (Appendix G) included multiple-choice

1 questions about recruitment source (e.g., *'How did you first find out about Aussie-FIT?'*),
2 what attracted participants to the program (*'How important were each of the following in*
3 *your decision to participate'*, Likert scale 1-7), and participant demographics. 'Reach' can be
4 defined as the *"absolute number, proportion, and representativeness of individuals who are*
5 *willing to participate in a given initiative, intervention, or program, and reasons why or why*
6 *not"* (Glasgow et al., 2019). The number of men enrolled relates to the 'absolute' number of
7 participants. Indications of the 'proportion' of individuals who are willing to participate are
8 calculated by reporting on the extent to which program promotions were disseminated locally
9 (e.g., Facebook post details metrics and newspaper distribution information), participant
10 recruitment source, and the number of people expressing interest and enrolling. Participant
11 demographics provide information on the 'representativeness' of the sample. Information on
12 'reasons why' individuals were willing to participate is provided by the Likert scale question
13 on what attracted men to the program. It was not possible to gain information on why men
14 decided not to participate.

15 Objective physical measures were undertaken by Accredited Exercise Physiologists
16 and/or experienced members of the research team (the primary author and EQ) in line with
17 previous protocols (Quested et al., 2018). Participants were asked to remove shoes, bulky
18 clothing, and pocket items. Weight was measured to the nearest 0.01kg using an electronic
19 scale (Seca 813 Flat Scale, Birmingham, UK). Height was measured to the nearest 0.1cm
20 using a portable stadiometer (Seca 217, Birmingham, UK). Waist circumference was
21 measured twice (three times if the first two differed by 5mm or more) to the nearest 0.1cm
22 and the average calculated. Resting blood pressure was measured with a digital blood
23 pressure monitor after 5 minutes of sitting still (Omron HEM-705CP; Milton Keynes, UK). If
24 blood pressure was elevated (systolic >139mmHg or diastolic >99mmHg), a further two
25 measures were undertaken and the average calculated.

1 **Aim 2d - Program Attendance and Retention.** Rural Aussie-FIT coaches recorded
2 attendance. The post-program evaluation form (Appendix H) asked participants to indicate
3 the extent to which they agreed with a series of statements to gauge satisfaction with the
4 Aussie-FIT program (*e.g.*, *'I enjoyed the Aussie-FIT program'*, Likert scale 1-7). The post-
5 program evaluation form also asked participants to indicate the extent to which a pre-defined
6 list of reasons accounted for any absence from sessions (*e.g.*, *'I did not enjoy the program'*,
7 Likert scale 1-7) and free text questions were included to ask participants how men could best
8 be encouraged to attend regularly. The withdrawal survey (Appendix I) included withdrawal
9 reasons, and questions that mirrored the program evaluation form (*e.g.*, program satisfaction,
10 program suggestions).

11 **Aim 3 - Barriers and Facilitators to Recruitment, Engagement, and Retention.**
12 Focus Groups were undertaken to provide insight into the barriers and facilitators to
13 recruitment, engagement, and retention of participants in rural Aussie-FIT. Coaches provided
14 information to participants on potential dates and times to attend a post-program focus group.
15 Twenty-five men participated in five face-to-face focus groups (mean duration = 60.5
16 minutes) facilitated by the primary author or another study researcher (MMcD, n=4; BS,
17 n=1). The interview guide (Appendix J) focused on their rural Aussie-FIT experiences with a
18 focus on recruitment, engagement, and retention.

19 **4.2.4 Data Analysis**

20 Recruitment (*e.g.*, N expressions of interest, attending baseline measures, and
21 recruitment source), engagement (*i.e.*, mean sessions attended) and retention (*i.e.*, N attending
22 the penultimate or final session) measures were summarised using descriptive statistics.
23 Facebook promotion data (*e.g.*, reach, number of impressions) were summed and reported by
24 site. Cost-per-engagement via this method was calculated using the total amount of money

1 spent on Facebook promotions by the number of post engagements (i.e., the number of
2 people that reacted, commented, or shared a Facebook post). Facebook cost-per-recruit was
3 determined based on participants self-reporting this method as a recruitment source.
4 ‘Participation rate’ was calculated as the proportion of men who initially expressed interest
5 that commenced the program. Participant baseline characteristics are reported as means with
6 standard deviations for continuous variables and numbers with percentages for categorical
7 variables.

8 The qualitative analysis was informed by reflexive thematic analysis (Braun &
9 Clarke, 2019), and thus draws on the primary authors experience, knowledge, and
10 subjectivity. The primary author is Scottish, has lived in Perth (WA) since 2019, and has not
11 resided in rural Australian towns. He has learned about Australian Football through his
12 involvement in this project as part of his PhD but retains a primary sporting interest in
13 another kind of football. In the years preceding his time in Australia the primary author
14 worked in disadvantaged areas of Scotland, on community-based health promotion and men’s
15 health research projects. Probably based on these experiences, he is an advocate for
16 interventions and policy change that aim to reduce health inequalities.

17 The qualitative data analysis was undertaken iteratively and guided by the six phases
18 of reflexive thematic analysis: a) familiarisation and writing familiarisation notes, b) coding,
19 c) generating initial themes from the data, d) developing and reviewing themes, e) refining,
20 defining, and naming themes, and f) writing up (Braun & Clarke, 2021a). The primary
21 author, who facilitated four of the five focus groups, familiarised himself with the data
22 through reading and re-reading each transcript, and maintaining reflexive (‘familiarisation’)
23 notes throughout the analysis process. The primary author discussed the focus group
24 conducted by BS with him, including how the group interacted and BS’s perceptions (having
25 not listened to the audio back, or read the transcript back) of the men’s Aussie-FIT

1 experiences. Free-text data from the withdrawal survey and post-program participant
2 evaluation form were also included in the analysis.

3 After initiating the analysis, the primary author returned to Scotland for four weeks,
4 allowing him space to think with the data and return to the analysis with “fresh eyes”. At the
5 forefront of the primary author’s mind throughout the analysis was how the themes were to
6 be conceptualised. In line with Braun and Clarke’s approach, themes in this paper are
7 conceptualised as patterns of shared meaning around a central concept (Braun & Clarke,
8 2014), whereby constructed themes can relate to one or multiple parts of the research
9 question (i.e., representing shared meaning across factors related to barriers and/or facilitators
10 to recruitment, engagement, or retention). As an example of this, within the overarching
11 theme ‘connection and community’ (see results section), various factors influencing rural
12 Aussie-FIT recruitment (e.g., word of mouth via community networks; the opportunity for
13 social connections attracting participants), engagement and retention (e.g., accountability to
14 peers, and valued social connections) are discussed within the same theme. After
15 familiarisation, the primary author undertook initial inductive semantic coding to organise
16 and help understand the data. Then, through immersion in the data and coding process,
17 themes were constructed with the intention of capturing more complex patterns of
18 information across the dataset. Throughout the analysis process, the primary author attempted
19 to understand (and where relevant report) which circumstances or contextual factors may
20 present as a facilitator for some men, whilst concurrently having the potential to be a barrier
21 to other men. Equally, attempts were made to acknowledge where factors could have the
22 potential to present as a facilitator at one stage of the intervention (e.g., during recruitment),
23 but the same or similar factors could potentially present as a barrier at a later stage (e.g.,
24 retention), or vice-versa.

1 The primary author took an ‘iterative’ and reflective approach to writing up. That is,
2 even in the early stages of the analysis (e.g., familiarisation and coding), he began to pull out
3 participant discussions that were particularly interesting, meaningful, rich and/or relevant to
4 the research questions. The primary author consulted with EQ throughout the analysis and
5 writing-up, for example, discussing the application of and narrowing the focus of the
6 constructed themes to address the research questions. Given the focus of this chapter and the
7 wider project, and the limited evidence for this type of intervention in rural contexts
8 (compared to urban-based programs), the primary author attempted to prioritise factors that
9 might be considered ‘rural-specific’. But it should also be acknowledged that the qualitative
10 write-up and discussion of barriers and facilitators (to recruitment, engagement, and
11 retention), inevitably includes factors that could also be relevant for ‘Fans in Training’ style
12 programs delivered in urban contexts. As the write-up was being drafted and developed, the
13 primary author annotated the document with thoughts, potential interpretations, and
14 additional quotations not included in the main text that added context. EQ provided critical
15 comment and reflection on early versions of the write-up and annotations, with all
16 supervisors/co-authors providing comments on later versions of the written report (i.e., this
17 chapter).

18 In line with the aims of this chapter, the qualitative analysis was written-up using a
19 complementary mixed-methods approach, with reference to the quantitative rural Aussie-FIT
20 results and compared to the results from the metropolitan pilot Aussie-FIT (Kwasnicka et al.,
21 2021; Kwasnicka et al., 2020). Qualitative and quantitative data are presented independently
22 or collectively, depending on what was most appropriate to address each research question. A
23 reflexive and interpretive approach to the qualitative analysis was undertaken, situating the
24 researcher’s subjectivity centrally in the analysis process (Braun & Clarke, 2021b). Rather
25 than themes simply pre-existing within the data and ‘emerging’ during the analysis, themes

1 are generated or constructed during the analysis process. This approach was used to add
2 context and depth of understanding of the diversity of factors and experiences relating to the
3 recruitment, engagement, and retention of men in rural Aussie-FIT. The analysis was framed
4 within a relativist paradigm and utilised a reflexive interpretive approach.

5 **4.3 Results**

6 Quantitative data related to coach recruitment and retention, and the recruitment,
7 engagement, and retention of men in rural Aussie-FIT is initially described. Then, results of
8 the qualitative analysis are presented, and the findings discussed with reference to the
9 quantitative results.

10 ***4.3.1 Quantitative Results***

11 **Aim 1a – Coach Recruitment.** Coach recruitment efforts yielded eight expressions
12 of interest across the 3 sites (three in site 1, three in site 2, and two in site 3). Coach
13 recruitment took longer than anticipated, taking between 2 and 3 months in each site. In site
14 1, one individual who expressed interest was not recruited due to a lack of coaching
15 experience and so recruitment efforts continued until suitably experienced coaches were
16 recruited. In site 2 one suitably qualified coach decided not to take on the role. One of the two
17 coaches ultimately recruited in site 2 heard about the Aussie-FIT coaching opportunity
18 through the other coach. Six coaches (two per site) completed the 15-hour coach training and
19 were employed by the University on a casual basis to deliver the program.

20 One coach had extensive experience in coaching Australian Football and strong links
21 with a local club. Another coach played for a local Australian Football master's club and had
22 been undertaking sports coaching qualifications. Two of the coaches played for the same
23 local Australian Football team and had a keen interest in the sport but more limited coaching
24 experience. Two coaches did not have direct links with local Australian Football clubs. One

1 of these coaches had a keen interest in Australian Football and community sport. The other
2 had broader sporting interests and was an experienced coach in other sports.

3 **Aim 1b - Coach Retention.** All six of the rural Aussie-FIT coaches
4 completed a delivery of one full-program of 12 sessions to the men allocated to their group.
5 Some sessions were co-delivered by two Aussie-FIT coaches (e.g., program session 1 across
6 all six programs) and occasionally the two local coaches provided cover for each other's
7 sessions if required. Four of the six rural Aussie-FIT coaches indicated that they were willing
8 to facilitate the program in the future beyond the initial program deliveries that are reported
9 on in this thesis.

10 **Aim 2a - Participant Recruitment Time.** Table 7 summarises rural Aussie-FIT
11 recruitment, reach, and participation reasons. One-hundred and twenty-four men expressed an
12 interest in taking part in rural Aussie-FIT, of whom 83 commenced the program. Two rural
13 Aussie-FIT programs were delivered in each site with the number of participants starting
14 each program varying from 13 to 15. Time between initial and final expressions of interest
15 were 36 days (site 1), 30 days (site 2) and 82 days (site 3). In site 3 initial expressions of
16 interest were received five weeks prior to program promotion, after some men heard about
17 the program from a rural Aussie-FIT coach.

18 **Aim 2b – Reach of Recruitment Activities.** Details on the self-reported recruitment
19 source of participants can be found in Appendix K. Half of the participants (n = 40) first
20 heard about rural Aussie-FIT via Facebook, over a third via word-of-mouth sources, and
21 seven (8.6%) from newspaper articles. Across sites, (AUD)\$390.50 was spent promoting six
22 rural Aussie-FIT Facebook page posts. These Facebook posts reached 28,551 people, with
23 half of this reach accounted for by paid promotion and half via organic reach (i.e., unpaid
24 sharing of promotions).

1 **Site 1.** In site 1, Facebook reach and promotion cost-per-recruit were low in site 1
2 (\$0.83) due to local authority page promotions (with 4700 followers) being posted free of
3 charge. The primary local authority post was shared 17 times (with 15 other engagements)
4 including to active local community boards with a high number of Facebook followers.
5 Facebook metrics (i.e., reach, impressions, and engagements) were only obtainable from paid
6 promotions posted directly on the Aussie-FIT Facebook page, and thus the ‘main’ promotions
7 in site 1 are not represented in Table 7. Eight men first heard about rural Aussie-FIT via
8 Facebook. An article about rural Aussie-FIT was published in a free local monthly newspaper
9 delivered to neighbouring town households and available in site 1 newsstands, circulating
10 5000 copies. No participants reported hearing about rural Aussie-FIT via this newspaper
11 article (see Appendix K). The proportion of participants that first heard about rural Aussie-
12 FIT via word of mouth (site 1, 66%; site 2, 38%; site 3, 15%) and heard about the program
13 from multiple sources (site 1, 62%; site 2, 54%; site 3, 23%) appeared higher in site 1
14 compared with the other sites (see Appendix K). This indicates that community information
15 sharing about, and awareness of, rural Aussie-FIT may have been comparatively higher in
16 site 1.

17 **Site 2.** In site 2 Aussie-FIT Facebook page promotions reached 7119 people
18 (AUD\$118.80 spent), 16 (62%) men first heard about the program via Facebook, and cost-
19 per-recruit first hearing via this method was \$7.43. An article about rural Aussie-FIT was
20 published in a free newspaper that circulates 30,000 copies to site 2 households and across
21 the region. The newspaper made a Facebook post with a link to the non-paywalled online
22 article. Their Facebook page has 60,000 likes and the rural Aussie-FIT post received 59
23 engagements. Six site 2 participants (23%) first heard about rural Aussie-FIT via this
24 newspaper article.

1 **Site 3.** In site 3, Aussie-FIT Facebook page promotions reached 16,658 people
2 (AUD\$265.10 spent), 16 (62%) men first heard about the program via Facebook, and cost-
3 per-recruit first hearing via this method was \$16.57. The higher cost-per-recruit via Facebook
4 may be partly due to a greater reliance on Facebook for recruitment in this site, with few
5 (n=6) participants hearing about rural Aussie-FIT via more than one source. Additional
6 Facebook posts were made by a partner football organisation (>2000 followers) and local
7 authority leisure centre (>6000 followers). A rural Aussie-FIT article was published in a free
8 local newspaper distributed to 25,000 households. The newspaper made a Facebook post with
9 a link to a non-paywalled online article. Their Facebook page has 25,000 likes and the rural
10 Aussie-FIT article received 6 engagements. Only one participant first heard about rural
11 Aussie-FIT via this newspaper article. At least two men expressing interest were ineligible
12 due to their Covid vaccination status, with other informal enquiries made by unvaccinated
13 individuals. The proportion of participants expressing interest that subsequently commenced
14 rural Aussie-FIT ('participation rate') was lowest in site 3 (site 1, 85%; site 2, 68%; site 3,
15 54%).

16 **Aim 2c - Sample characteristics and Recruitment Reasons.** Rural Aussie-FIT
17 participants had an average of 12.0 (3.1) years of education and mean age was 48.4 (9.6)
18 years. Most rural Aussie-FIT participants were resident in low-to-middle socioeconomic
19 areas (SEIFA-IRSD quintiles 1-3, 96.3%), not university educated (n=60; 74.1%) and were in
20 paid employment or self-employed (n=71, 87.7%). Most participants were Caucasian (n=73,
21 90.1%) and five Aboriginal men participated (6.2%). At baseline, the mean weight (M =
22 109.0, SD = 18.6 kg), waist circumference (M = 117.5, SD = 13.0cm), blood pressure (M =
23 141.4/90.9, SD = 9.3/14.8 mm/Hg), and BMI (M = 34.1, SD = 5.3) of participants were
24 elevated. Full details of the sample characteristics can be found in Appendix L.

1 Reasons for participation are reported in Table 7. Health (i.e., physical health, losing
 2 weight, mental health) and health behaviours (i.e., getting active, improving diet) were rated
 3 by all participants as important or very important factors influencing enrolment. The ‘footy’
 4 program theme (50/81; 61.7%), group-social environment (45/81; 55.6%), venue
 5 convenience (41/81; 50.6%), and program timings (54/81; 66.7%) were rated as important (\geq
 6 5 out of 7) for enrolment by most. The program being free of charge was rated as important
 7 by a third of participants.

8
Table 7
Rural Aussie-FIT Recruitment, Metrics of Reach, and Participation Reasons

		Site 1	Site 2	Site 3	Total
Rural Aussie-FIT Facebook Page Promotion¹					
Posts	n	1	2	3	6
Dollars (AUD) paid to boost posts (with GST)	\$	6.60	118.80	265.10	390.5
Paid impressions	n	656	13917	27567	42140
Organic impressions	n	1948	6746	8640	17334
Paid reach	n	419	5148	9251	14818
Organic reach	n	1772	5079	8200	15051
Engagements	n	40	150	233	395
Cost per engagement	\$	0.17	0.79	1.14	0.99
Cost per participant first hearing about the program via Facebook	\$	0.83	7.43	16.57	9.76
Cost per participant hearing, at any stage , about the program via Facebook	\$	0.51	6.25	14.73	7.81
Local media					
Newspaper articles	n	1	1	1	3
Radio appearances	n	2	0	2	4
Recruitment metrics					
Expressions of interest	n	34	40	50	124
Attended baseline and commenced rural Aussie-FIT ²	n	29	27	27	83
Participation rate ³	%	85.3	67.5	54.0	67.0
Importance of the following factors in deciding to participate in rural Aussie-FIT....		N=29	n=26	n=26	n=81
The group social aspect appealed to me	M (range)	4.3 (1-7)	4.7 (1-7)	5.1 (2-7)	4.7 (1-7)
The footy program theme appealed to me	M (range)	4.7 (1-7)	4.8 (1-7)	4.9 (1-7)	4.8 (1-7)
I wanted to improve my physical health	M (range)	6.6 (4-7)	6.5 (4-7)	6.7 (5-7)	6.6 4-7)

I wanted to improve my mental health	M (range)	5.4 (1-7)	5.5 (1-7)	6.0 (3-7)	5.6 (1-7)
My partner encouraged me to take part	M (range)	4.4 (1-7)	4.0 (1-7)	3.6 (1-7)	4.0 (1-7)
A local organization employee/volunteer encouraged me	M (range)	1.9 (1-7)	1.5 (1-7)	2.0 (1-6)	1.8 (1-7)
I wanted to become more active	M (range)	6.4 (4-7)	6.2 (4-7)	6.4 (4-7)	6.3 (4-7)
The venue was convenient for me	M (range)	5.1 (1-7)	4.3 (1-7)	4.4 (1-7)	4.6 (1-7)
I wanted to improve my diet	M (range)	5.8 (3-7)	5.4 (3-7)	5.8 (1-7)	5.7 (1-7)
The time/day of the program was convenient	M (range)	5.4 (3-7)	5.3 (3-7)	5.1 (1-7)	5.3 (1-7)
I wanted to lose weight	M (range)	6.6 (4-7)	6.2 (4-7)	6.8 (5-7)	6.5 (4-7)
I knew guys that signed up already	M (range)	2.3 (1-7)	2.1 (1-7)	1.6 (1-4)	2.0 (1-7)
I knew a rural Aussie-FIT coach already	M (range)	2.4 (1-7)	1.6 (1-7)	1.7 (1-4)	1.9 (1-4)
A men-only program appealed to me	M (range)	3.1 (1-7)	2.7 (1-7)	2.0 (1-6)	2.6 (1-7)
The program was free of charge	M (range)	3.1 (1-7)	3.8 (1-7)	3.2 (1-7)	3.4 (1-7)

Note.

¹ **Impressions:** A metric counting the number of times a piece of content was on screen, can include multiple views of content by the same people. **Reach:** The estimated number of people who saw the content at least once. **Engagements:** The number of people that reacted, commented, or shared a post.

² **Attended baseline and commenced rural Aussie-FIT:** When spots were still available on scheduled programs, participants with a BMI between 25-28 were able to participate. Four men had a BMI within this range. All 83 men attending a baseline assessment commenced the program.

³ **Participation Rate:** The proportion of individuals expressing interest that commenced rural Aussie-FIT.

Self-reported data is missing for two participants (one in site 2 and one in site 3) that did not complete the baseline questionnaire.

1

2 **Aim 2d - Program Attendance and Retention.** Attendance and retention rates are
3 reported in Table 8. The mean number of sessions attended by enrolled men was 8.2 sessions
4 (out of 12). Across all sites, fifty-seven (68.7%) men completed the program. Program
5 completion varied by site (79.3% vs 64.3% vs 59.3%). Only five of the twenty-six men who
6 withdrew from the program completed the withdrawal survey, and thus insufficient data were
7 available to meaningfully report response scores. Three (of the five) participants that
8 completed the withdrawal survey were ‘satisfied’ or ‘extremely satisfied’ with the program
9 and withdrew due to personal commitments. Program attendance and withdrawal numbers in
10 site 3 were affected by community transmission of Covid-19 in WA. Details of the exact
11 number of sessions missed and withdrawals due to Covid-19 were difficult to obtain and
12 verify. But, from coach reports, at least three participants missed two sessions due to Covid-

- 1 19, and another man missed one session due to isolation requirements. One of the three
- 2 participants was classified as a ‘non-completer’ as he missed the final two sessions.

Table 8**Rural Aussie-FIT Attendance and Retention**

		Site 1 (n=29)	Site 2 (n=27)	Site 3 (n=27)	Total (n=83)
Number of sessions attended by enrolled participants	m (range)	8.3 (2-12)	8.3 (1-12)	7.9 (1-12)	8.2 (1-12)
Completers	n (%)	23 (79.3)	18 (64.3)	16 (59.3)	57 (68.7)
Non-Completers	n (%)	6 (20.7)	9 (33.3)	11 (40.7)	26 (31.3)
Sessions Attended					
<6	n (%)	6 (20.7)	6 (22.2)	5 (18.5)	17 (20.5)
6-7	n (%)	1 (3.4)	0 (0)	5 (18.5)	6 (7.3)
8-9	n (%)	10 (34.5)	8 (29.6)	6 (22.2)	24 (28.9)
10-12	n (%)	12 (41.4)	13 (48.1)	11 (40.7)	36 (43.4)

Notes

Program Completers: Participants that attended session 11 and/or session 12 were classified as completers [as pre-defined in the trial registration].

1 **4.3.2 Qualitative Results**

2 **Focus Group Participants.** Two small focus groups were undertaken in site 1 (FG 1,
3 n=3; FG 2, n=4) and site 2 (FG 1, n=5; FG2, n=2). One large focus group was undertaken in
4 site 3 (FG1, n=11). Characteristics of focus group participants (n=25) were comparable to the
5 overall sample. At baseline, the average age of focus group contributors was 52 (36 – 65)
6 years, mean BMI was 35.6 (28.4 – 49.8), and half of the samples highest level of education
7 was high school. No focus group attendees identified as Aboriginal or Torres Strait Islander.
8 Focus groups are referenced by site (i.e., 1, 2 or 3) and focus group number (i.e., 1 or 2).

9 **Aim 3 - Barriers and Facilitators to Recruitment, Engagement, and Retention.** Three
10 overarching themes that provide insights into the barriers and facilitators to recruiting,
11 engaging, and retaining men in rural Aussie-FIT were generated in the analysis process.
12 These were: i) Stereotypes and Rural Men; ii) Inclusion and Stigma; and iii) Connection and
13 Community. The first theme describes how drawing on the stereotype of men being attracted
14 by the Australian Football sporting theme rang true for many participants who found this
15 feature appealing. Equally, many other participants without a particular interest in or
16 experience of football were still drawn to participate by the potential of the program to help
17 improve their health, counter to stereotypes around men's reluctance to engage in health
18 initiatives. The second, reports on how the program being free removed a barrier to
19 participation, that participants found the group environment in rural Aussie-FIT, supportive,
20 and inclusive of all, including those less physically fit and able. This theme also highlights
21 risks to program inclusion and engagement due to physical injuries, and the slow build of
22 activity over the 12-week program potentially being counter to some more physically able
23 participants' program expectations. The third theme describes the influence of people and
24 social interaction in the recruitment and retention of participants in rural Aussie-FIT. For
25 example, word of mouth recruitment was essential for recruiting men in rural communities,

1 and many participants developed connections with their peers who they valued highly, which
 2 supported program engagement. Rural Aussie-FIT served as a social connector within rural
 3 communities, with bonds formed with between group members helping to facilitate ongoing
 4 engagement and retention in the program, and beyond for several groups where participants
 5 expressed a desire to continue meeting with their group after program completion.

6 **Stereotypes and Rural Men.** Many participants expressed their love for football, and
 7 how the sporting theme was viewed by them as an attractive feature of the program. The fact
 8 that rural Aussie-FIT was not affiliated with high profile AFL clubs or delivered in
 9 professional sports settings did not dissuade these football enthusiasts.

10 *'I'm a football tragic, so I saw a Burley or a Sherrin [well known football*
 11 *manufacturers] and I was in'* (Site 2, Focus Group 1)

12 *'The football, the Aussie Rules part you know, I grew up Aussie Rules'* (Site 1, Focus
 13 Group 1)

14 *'It (football) was the big appeal to get me moving, and that got us here wasn't it'* (Site
 15 3, Focus Group 1)

16 The site 3 participant quoted above appears to represent the group when he asserts that
 17 football *'got us here'*, suggesting that the football program theme was crucial in attracting
 18 rural men despite not being delivered in association with professional clubs. The football
 19 program theme was rated as being relatively important overall (mean importance 4.8/7, 1-7)
 20 in men's decision to enrol, but rural participant views were more mixed than amongst men
 21 that participated in metropolitan Aussie-FIT (Kwasnicka et al., 2021). Some post-program
 22 rural Aussie-FIT evaluation responses even advocated for mixed sport activity options (e.g.,
 23 *'More ball sports, not just Aussie Rules'*). The community football settings, lack of club
 24 alignment, and program marketing that aimed to be inclusive, may have helped attract some

1 rural men that do not have specific club affiliations or footballing backgrounds or interest.
 2 The following quotes illustrate diversity of footballing interests and experience, with
 3 common ground often established around health aspirations, rather than football or club
 4 allegiances.

5 *'...for me it was more about fitness and less about weight loss. I got more weight loss*
 6 *than I got fitness from that perspective, but I don't play football. It's good to have a kick*
 7 *of the footy and show them why I don't play football.'* (Site 1, Focus Group 2)

8 *'I'm actually not a fan of football, so I was looking for something social to keep me*
 9 *exercising and losing weight.'* (Site 3, Focus Group 1)

10 Countering common stereotypes centred on rural men's stoicism and reluctance to act on
 11 their health, participants consistently rated improving their health (e.g., physical, mean =
 12 6.6/7) and health behaviours (e.g., getting active, mean = 6.3/7) as being most important in
 13 their decision to participate. Most participants also rated improving their mental health
 14 (58.0%, 6-7/7) as an important enrolment reason, and mental health was openly discussed in
 15 focus groups. The relaxed atmosphere during the indoor education parts of the weekly
 16 sessions, appeared to provide an opportunity to express a degree of vulnerability and open-up
 17 to peers.

18 **P1:** *most people were comfortable with – I mean, I guess sometimes they wouldn't come*
 19 *right out and say it, but there's a couple of them here, that you know that they're having*
 20 *issues with like depression and stuff like that. And you can tell, and they mention little*
 21 *bits here and there*

22 **P2:** *Yeah, I've had issues with that for years.*

23 **P1:** *And me too, yeah* (Site 2, Focus Group 2)

1 **Inclusion and Stigma.** Pre-program, a fifth of participants rated the rural Aussie-FIT
2 program being free of charge as important in their decision to participate. The combination of
3 being ‘free’ and ‘football-based’ was irresistible for some.

4 *‘my missus saw it on Facebook, and just said, "Oh, this'd be good for you, because you*
5 *like football." And I went, "Oh beauty," and it's free. So, I said, "Sign me up"’* (Site 2,
6 Focus Group 2)

7 For many, any program cost would have prohibited participation; *‘I wouldn't be able to*
8 *afford a similar program on the disability pension’* (Site 3, Program Evaluation Form)

9 Some men expressed difficulty with enrolling into existing rural health initiatives
10 but suggested rural Aussie-FIT was *‘easy to come to’*. An element of self-preservation
11 is evident as this man hints at the potential for discomfort within group settings.

12 *‘There's been so many things that I've, over the last probably five years, have thought*
13 *of, "I'd like to maybe go and do that." But then no, I can't do it. This is the first thing*
14 *I've come to as a group where I've thought, "Well, I can fit in here..."’* (Site 3, Focus
15 Group 1)

16 The framing of the program as inclusive and relaxed within the promotional
17 materials (e.g., *‘have a laugh with likeminded blokes’*, *‘supportive easy-going setting’*),
18 may have helped reassure men they would be comfortable in this setting. Indeed,
19 participants attested that the rural Aussie-FIT social environment was not stigmatising:
20 *‘I've found no negative. It was an easy course, easy pace. Nobody felt ashamed of being*
21 *overweight, yeah it was good.’* (Site 1, Focus Group 1). A supportive and inclusive
22 environment appeared to facilitate ongoing participation. This discussion portrays a
23 non-judgemental and non-competitive environment, without damaging comparisons to
24 others.

1 **P1:** *it's not a super-competitive environment or something like that, I felt more*
 2 *relaxed about coming here. It's not like we're out playing for a trophy or*
 3 *whatever like that, we're just getting together and having a bit of fun.*

4 **P2:** *That's it. It comes back to having fun.*

5 **P3:** *And for gym, going to the gym, you have all these buff guys standing around*
 6 *you, and you're sort of going, you shrink down into the carpet because you're*
 7 *just embarrassed to be there. But here, we're all the same.*

8 **P2:** *You're not overwhelmed.* (Site 3, Focus Group 1)

9 Whilst a sense of similarity was evident, there was also clear recognition of
 10 difference (e.g., football teams supported, football interest, physical fitness levels)
 11 amongst group members. Difference and similarity both appeared to help foster
 12 togetherness, inclusion, and engagement, with intra-participant focus group interactions
 13 evidencing the rapport and relationships established. In this exchange, the joking,
 14 laughter, and encouragement for a less physically fit teammate, exemplifies this.

15 **P1:** *So, 65 [years old]. So I did all right, I thought.*

16 **P3:** *No, I think you did great.*

17 **P2:** *Yeah, bloody oath [Australian slang meaning full agreement]...[...]*

18 **P1:** *I remember the second week, I fell over trying to pick up the ball,*
 19 *because I'm not that flexible. And [Coach 1] going, "you okay? You okay?"*
 20 *[laughter]* (Site 2, Focus Group 1)

21 An important feature of Aussie-FIT is the incremental build-up of physical activity,
 22 inclusive of men with different physical fitness levels. For some, including those most in

1 need of support to improve their health, this feature was welcomed and facilitated ongoing
2 program engagement.

3 *If I'd rocked up on that first night and we'd spent 45 minutes out there running*
4 *around kicking a footy I probably wouldn't have come back the second week. So*
5 *for me to start easy, with just a few laps the first night and ease into it. (Site 1,*
6 *Focus Group 1)*

7 Equally, focus group participants suggested that the slow build-up of physical activity
8 in the initial program sessions may have been perceived by some men that withdrew from the
9 program as counter to their program expectations: *'maybe they just wanted the footy stuff.*
10 *They didn't want the bloody study side'* (Site 1, Focus Group 1). Indeed, the focus group
11 discussions pointed to the importance of the physical activity component in attracting
12 participants, and the inadvertent removal of this component due to injury, generally resulted
13 in program disengagement. The following participant associates the possibility of injury with
14 a risk of detachment and marginalisation from the group, and more generally a bleak outlook
15 ('stand in the cold') with the fun footy program theme compromised as a result.

16 *'If you tear a hammy or something, you're gone aren't you. Are you going to*
17 *come back, stand in the cold and watch you blokes having fun?'* (Site 3, Focus
18 *Group 1)*

19 Conversely, others described that the team values and a moral code of inclusion
20 may have fostered ongoing program engagement for a minority of men that picked up
21 an injury.

22 *'The poor guy's out walking laps because of his knee and the rest of us are*
23 *running around. So I think that was [participant's name] suggestion actually*

1 *which was... I thought it was a good thing to go over and walk a lap and have a*
 2 *chat. And try and keep him a part of the group.'* (Site 1, Focus Group 1)

3 **Connection and Community.** Encouraging word of mouth recruitment (via social
 4 connections and community champions) was one necessary program adaptation for rural
 5 contexts (see chapter 3). Various stakeholders supported program promotion, including
 6 Aussie-FIT coaches:

7 *'I know [Coach Name] quite well and yeah, just happened to bump into him. Can't*
 8 *remember where but bumped into him somewhere and he started talking about this*
 9 *course'* (Site 1, Focus Group 2)

10 The 'social aspect' was rated as important in a third of men's enrolment decision.
 11 For some, this was tied to a nostalgic itch to relive the team atmosphere and social
 12 connectedness of past football or other team-based sport playing days. This man, a
 13 newcomer to town, expressed his desire for social and community connection.

14 *I [am] also new to town, so wanted to meet some new people. Not for any other*
 15 *reason and to try and get back into sort of a team like atmosphere, I guess. That's*
 16 *the main reason I got into it.* (Site 1, Focus Group 2)

17 Several men reported first hearing about the program from their partners or
 18 consulting them to discuss their participation in Aussie-FIT, some of which were strongly
 19 encouraged to enrol; '*get off your arse!*'. This man's partner encouraged him to get
 20 involved to connect with other men.

21 *You know what it's like? You get a bit lonely after – you know, and she works*
 22 *away. Well, in town. So she's trying to get me amongst fellas.* (Site 2, Focus
 23 Group 1)

1 Then, he further expressed just how proud she was of his continuing engagement in the
2 program.

3 *I just enjoyed it, you know? Got out, and my wife said, “oh, I’m proud of you!”*
4 *So if the wife says that, well, well! [laughter] I’m on a roll! (Site 2, Focus Group*
5 1)

6 Some men encouraged existing connections to get involved alongside them. In site 1,
7 one participant’s withdrawal resulted in three men he helped recruit also withdrawing. This
8 influential participant was described as the *‘glue keeping them [the four men] together’*. For
9 others, fewer pre-established connections provided an opportunity for openness and
10 expansion of their local social networks.

11 *One mate influenced the other three to come. And then as soon as he pulled out,*
12 *because he went back to actually playing footy, the other three guys just dropped*
13 *out straight away. So I kinda, at first I thought I hope there’s some people there I*
14 *know. And there is a couple of guys that I knew. But I liked the idea more that I*
15 *didn’t know too many guys, and we all had to sort of talk to each other. You know,*
16 *I think it made us... it sort of makes you open up a bit more, so. (Site 1, Focus*
17 Group 1)

18 Various factors appeared to motivate men to attend, including socialisation,
19 enjoyment, and responsibility to their teammates. Although men reported on *‘tentative’*
20 early group interactions, a sense of belonging, togetherness, and community appeared
21 to develop.

22 *It progressively increased, the banter and the conversation. I mean it was*
23 *reasonably strong probably by mid-way point and perhaps that also aligned with*

1 *more weeks, having got to know people and a bit about their story...* (Site 1,
2 Focus Group 1)

3 Although group interaction was described as '*reasonably strong by the mid-way*
4 *point*', this may have been too late for the 16 men who withdrew during the first half of
5 the program. The early program sessions may present a key stage for sustaining
6 engagement. This participant provides insight into how those withdrawing may have
7 questioned if Aussie-FIT suited their needs, as he did. Ultimately, it was the social
8 connections established that kept him engaged.

9 *I really questioned it [continuing the program]. [...] But it was the blokes that I was*
10 *seeing every Thursday. I really enjoyed the guys I was with. That brought me back.*
11 (Site 2, Focus Group 1)

12 Unlike the metropolitan program where participants largely reside in disparate locations,
13 the within group connectedness naturally spilled out into the wider rural town, contributing to
14 a wider level of community connectedness.

15 *it's hilarious now, you're down the street, you bump into all these people, and they say,*
16 *"G'day," you have a yarn [chat]. And you're like, "I never knew them 12 weeks ago."*
17 (Site 2, Focus Group 2)

18 An accountability to the group was noted, with absence likely questioned the
19 following week; '*where were you?*'. Men appeared to associate this group
20 responsibility with a sense that their presence and group contribution were valued. With
21 limited information available from non-completers, it is possible that perceived
22 pressure to attend could have negatively influenced engagement.

1 **P1:** *[...] you say you're going to come, you don't keep the numbers up, you're letting*
2 *people down sort of thing. So, you try and make more of an effort consciously to get*
3 *here.*

4 **P2:** *I think we've been very lucky, because a pretty good group of blokes, so it makes*
5 *all the difference.*

6 **P3:** *Well, the group is talking about trying to continue on too. Yeah, it's kicking a ball*
7 *around, but yeah, the same people staying together. If you didn't like it, you wouldn't*
8 *say that. (Site 3, Focus Group 1)*

9 As alluded to in the above exchange, having an option to continue to meet the same
10 men was a sentiment echoed across sites. The following participant mentions (three times)
11 his desire to meet the same men post-program, pointing to the value of Aussie-FIT to him
12 and others as a social connector in rural communities, and a reluctance to leave this new
13 community behind.

14 *With the same bunch of guys. And so, you would then stay together, you'd want to stay*
15 *with the group, and you go to the next level, and the next level. (Site 3, Focus Group 1)*

16

17 **4.4 Discussion**

18 Studies seldom report in detail on the recruitment, engagement, and retention of
19 participants in behavioural health interventions. Evidence is particularly sparse for engaging
20 men in rural and lower socioeconomic areas. This chapter contributes evidence on how
21 popular amateur sporting codes and community sport settings can help engage men in lower
22 socioeconomic rural communities in a behavioural weight management intervention, and the
23 specific barriers and facilitators to implementing the Aussie-FIT program in rural towns.

1 **Aims 1a and 1b - Coach Recruitment and Retention.** Recruiting and retaining
2 coaches to deliver rural Aussie-FIT was challenging. In rural towns, there is a limited pool to
3 of potential coaches who would be a good fit for the program to draw from. Six of the eight
4 individuals who initially expressed interest in the coach roles undertook coach training and
5 facilitated the program. The Aussie-FIT coaches employed had a range of backgrounds and
6 experiences, some of which may have been better-equipped than others to deliver the
7 program with confidence. In site 2, rural Aussie-FIT coaches were unable to commit to
8 facilitating the program in the future beyond the initial two program deliveries reported on in
9 this thesis. Seeking coaches whose career aspirations, current community involvement,
10 ongoing availability, and/or coaching experience aligns well with Aussie-FIT, is likely to be
11 important for the retention of coaches and the sustainability of the program. However, the
12 limited amount of interest expressed in the coach roles restricted options.

13 **Aim 2a - Participant Recruitment Time.** In rural Aussie-FIT, a multi-faceted
14 recruitment strategy was adopted, which engaged the target group over a more protracted
15 timeframe than in the metropolitan Aussie-FIT pilot. In the metropolitan Aussie-FIT pilot,
16 426 men expressed interest in three days, with 130 men ultimately taking part due to limited
17 program places (Kwasnicka et al., 2021). The AFL club social media promotions, program
18 affiliation with two major AFL clubs, and program delivery settings were highly attractive to
19 men in metropolitan areas (Kwasnicka et al., 2021; Kwasnicka et al., 2020). These factors,
20 combined with the very large pool of potential participants resident in and around Perth,
21 yielded the target sample in a very short timeframe. Given the smaller population to draw
22 from in rural Aussie-FIT, differences in recruitment rates were anticipated.

23 **Aim 2b – Reach of Recruitment Activities.** Facebook, local media, and word of
24 mouth recruitment yielded eighty-three participants. Over half of the study sample (as
25 described in Chapter 4) first heard about rural Aussie-FIT via this route, at a mean Facebook

1 promotion cost of AUS \$7.81 per recruit. In a systematic review examining the use of
2 Facebook in recruiting participants to health research spanning different populations and
3 study types, the mean cost-per-recruit was US \$19.77 (AUS \$29.23) (Whitaker et al., 2017).
4 Thus, across rural Aussie-FIT sites, Facebook promotion cost-per-recruit appears favourable
5 when compared to the wider literature. In addition, rural Aussie-FIT Facebook promotions
6 also helped to instigate word of mouth recruitment, with individuals (e.g., partners) who
7 viewed Facebook promotions often informing potential participants about the program. This
8 finding may be unsurprising given the higher proportion of women registered as a Facebook
9 user in Australia than men (Statista, 2022). A potential drawback of recruitment via Facebook
10 and word of mouth in rural areas, is the risk of missing community members that are not
11 already connected with local organisations or may not be connected to the community on
12 Facebook themselves or via family or friends. Nevertheless, reaching the target audience for
13 rural Aussie-FIT would likely have been significantly more challenging without utilising
14 Facebook to promote the program as part of the multi-faceted recruitment approach adopted.

15 In site 1, the smallest rural Aussie-FIT site where paid Facebook promotions
16 undertaken were negligible, more participants heard about the program via word of mouth
17 and from multiple sources than the other sites. This indicates that community information
18 sharing about, and awareness of, rural Aussie-FIT may have been comparatively higher in
19 site 1. Further, this could be linked to the fact that options for participating in community
20 health, sport, and physical activity programs (see Chapter 3) were more limited in site 1
21 compared with the larger towns.

22 **Aim 2c - Sample characteristics and Recruitment Reasons.** Most rural Aussie-
23 FIT participants were resident in low-to-middle socioeconomic areas (SEIFA-IRSD quintiles
24 1-3, 96.3%) and were not university educated (n=60; 74.1%), and five Aboriginal men
25 participated. Participants in the metropolitan pilot Aussie-FIT program had fewer years of

1 education (12.0 vs 14.0 years) and no Aboriginal men participated, suggesting that rural
2 Aussie-FIT may have engaged a more diverse sample (Kwasnicka et al., 2020).

3 Unlike rural Aussie-FIT, 'fans in training' style programs typically aim to recruit
4 from the fanbases of professional sports clubs where they will be delivered and draw on
5 strong allegiances to the club or the sport (Hunt et al., 2020). Physical activity itself is an
6 attractive feature of behavioural weight management interventions for men (Archibald et al.,
7 2015). The attraction and importance of both the Australian football theme and the
8 incorporated physical activity in rural Aussie-FIT was apparent, despite the program not
9 being affiliated with professional sporting clubs. Efforts were made to market the program as
10 inclusive of those without a footballing background (see Chapter 3; e.g., '*no footy experience*
11 *required*'), which may have helped attract men with a diversity of sporting interest and
12 experience beyond football, compared to the original metropolitan pilot Aussie-FIT
13 (Kwasnicka et al., 2021).

14 **Aim 2d - Program Attendance and Retention.** Some differences in attendance
15 (mean 7.9–8.3 out of 12 sessions) and retention (59.3-79.3%) were observed between the
16 study sites, in part as a consequence of community transmission of Covid-19 in site 3.
17 Allowing for the Covid-19 context for site 3, retention and attendance in rural Aussie-FIT
18 were comparable other health promotion interventions delivered in professional sporting
19 contexts (George et al 2022). Comparing attendance and retention rates between the
20 metropolitan pilot and rural Aussie-FIT is challenging due to some coaches not following the
21 protocol for recording session attendance in the former study, and differences in how
22 program retention and completion were defined between the two studies. In rural Aussie-FIT
23 we focus on implementation outcomes rather than effectiveness outcomes and retention was
24 defined as attendance at either (or both) of the final two program sessions. Whereas in the
25 metropolitan pilot Aussie-FIT study, retention was defined as the proportion of participants

1 undertaking post-program follow-up measurements (Kwasnicka et al 2020). Thus, we are
2 unable to determine if rural Aussie-FIT was able to engage and retain men to a greater or a
3 lesser extent than the metropolitan pilot.

4 **Aim 3 - Barriers and Facilitators to Recruitment, Engagement, and Retention.**

5 To facilitate positive health behaviour changes, participant engagement in the educational
6 content with incorporated behaviour change strategies and techniques is essential. Despite
7 this, the sporting theme and program marketing may have led some men to anticipate
8 spending more time on the oval in the early program sessions, and this may have increased
9 risk of dropout. Given that Australian Football related physical activity was central to the
10 program appeal, the qualitative results suggest that physical injuries may have led some men
11 to feel marginalised or detached from the rest of the group if they could no longer participate
12 in the physical activities. These two risks to program engagement and retention are
13 juxtaposed to each other, given that more intense physical activity earlier in the program may
14 well increase the risk of injury. Rural communities are distinct from one another, and one-
15 size-fits-all approaches to rural community health and physical activity interventions are not
16 appropriate (Gilbert et al., 2019). In rural Aussie-FIT site 1, the decision to schedule the
17 program during winter months to avoid farming season (see Chapter 3) was described as
18 '*spot on*' for engaging men that would have otherwise been unavailable. In rural contexts, the
19 limited availability of appealing and affordable men's health opportunities can be a barrier to
20 participation (see Chapter 3). With stakeholder support and community enthusiasm for a new
21 program in the town helping to support the relative success of the word-of-mouth recruitment
22 efforts. Regardless of the rural location, local stakeholder support was a major facilitator to
23 the recruitment of participants.

24 Several factors discussed in this chapter that impacted on the recruitment,
25 engagement, and retention of rural men, are also likely to be relevant for metropolitan based

1 programs, including the Aussie-FIT pilot (Kwasnicka et al., 2021). For example, the group
2 camaraderie and interaction, risk of injury, accountability to the group, and the non-
3 stigmatising environment would likely be relevant in rural or urban contexts. There were also
4 several factors, that link to the themes generated in the qualitative analysis, that could be
5 considered ‘rural specific’ or have unique attributes in rural areas. For example, word of
6 mouth recruitment has not been used in previous Aussie-FIT programs but was essential for
7 engaging men in rural communities. However, this strategy appeared to pose a risk to
8 program engagement, with one participant’s influence leading to his peers, with whom he had
9 a pre-existing relationship with, also withdrawing. The local Australian Football context and
10 lack of affiliation with AFL clubs, may have contributed to a greater diversity of individuals
11 in terms of footballing background or interest.

12 **4.5 Strengths and Limitations**

13 The mixed-methods approach adds depth of understanding around complexities of
14 implementing community health initiatives and engaging men in rural Australian towns in
15 sports-setting based programs. The findings reported in this chapter may be of particular
16 relevance in countries such as Australia that face rural inequalities in health and lack
17 professional sporting contexts outside of major cities. Attendance records were fully
18 complete. Participants from each program delivery (and each site) were represented in the
19 focus groups, providing an understanding of program engagement from participant
20 perspectives across distinct rural communities. Focus group interviewees also provided
21 valuable insights as to why some of their peers disengaged.

22 Few non-completers undertook the withdrawal survey, limiting learning from those
23 least engaged. Focus group attendees were men that completed the program, so their views
24 may have been more positive than other participants. Assessing men’s adherence to health

1 behaviour change strategies was beyond the scope of this study. Rural Australia is very
2 diverse within and outside of WA. The program sites were small-to-medium sized towns with
3 football facilities available, potentially unlike more remote settings. As this study reports on
4 two initial deliveries of Aussie-FIT in each site, conclusions on men's engagement for
5 repeated or sustained rural deliveries cannot be drawn. Although five participants in the
6 current study identified as Aboriginal, additional cultural-tailoring or co-design may be
7 warranted to specifically engage Aboriginal and Torres Strait Islander Peoples in rural (and
8 urban) Australia more broadly. A further limitation is that, although the aim was to fill six
9 program deliveries across the three rural towns (n=90), a specific recruitment rate or target
10 timeframe for recruiting participants was not pre-specified. Similarly, acceptable rates of
11 attendance and retention were not pre-specified.

12 **4.6 Conclusions**

13 Rural Aussie-FIT, an adaptation of the metropolitan delivered Aussie-FIT program without
14 AFL club affiliation or access to professional sports club settings, successfully engaged men
15 from low-to-middle socioeconomic areas in three rural Australian towns. Facebook and
16 word-of-mouth recruitment were successful, but recruitment time was protracted compared
17 with the metropolitan program. Rural men's primary motivation to participate centred around
18 improving their health. An inclusive, non-stigmatising and supportive environment; the
19 football program theme and setting; and a within-group sense of community and
20 connectedness, facilitated program engagement. This study provides insights into how
21 popular local sporting codes and community sport settings can be utilised to help engage rural
22 men in a health behaviour change intervention.

23

24

Chapter 5: Thesis Discussion

5.1 Summary of Principal Findings

Men in rural and lower socioeconomic areas are underrepresented in weight management research and practice. This PhD aimed to contribute to efforts to address this issue via three inter-related studies. The first study (chapter 2) aimed to: investigate the extent to which socioeconomic factors have been considered in trials of men's weight management interventions. Via the systemic review I was able to demonstrate that in RCTs of men's weight management interventions, socioeconomic factors are inconsistently reported, there is rarely consultation with men from lower socioeconomic circumstances or other relevant stakeholders to inform intervention design or delivery, and overall, there is limited evidence to suggest that interventions reach or are effective in lower socioeconomic groups. Only one of the studies included in the systematic review was conducted in rural areas. In chapter 2, the importance of adaptation to extend interventions to contexts and populations that would otherwise not be reached was emphasised. The study showed that a greater consideration of socioeconomic factors is required during intervention design, conduct, analysis, and reporting.

The second thesis aim was to explore how the Aussie-FIT weight management intervention might need to be adapted for rural contexts in WA. In chapter 3 I explored rural stakeholders' views on the potential barriers and facilitators to implementing Aussie-FIT in three rural towns in Western Australia. Findings from this study were used to inform specific adaptations to both the Aussie-FIT program and implementation strategies. Stakeholders described rural areas as being a 'different ball game' in terms of access to health-related interventions and services. Themes generated in the qualitative analysis include Australian Football being a 'common language' across Western Australia, the smaller rural populations providing both challenges and opportunities (a 'double-edged sword') for program

1 implementation, considerations for program inclusivity, and the importance of trusted
2 community champions and partner organisations for sustainability. Specific adaptations from
3 the metropolitan delivered Aussie-FIT pilot included adopting an Australian Football theme
4 without specific club affiliations, use of a multi-component recruitment strategy utilising
5 trusted sources, and adapted program marketing approaches and materials to fit the rural
6 context.

7 The aims of the third study were to assess the feasibility of recruiting and retaining
8 both coaches to deliver rural Aussie-FIT and men living with overweight or obesity in lower
9 socioeconomic rural areas to participate, and to explore the associated barriers and facilitators
10 to engaging men using a mixed-methods approach. Recruiting two coaches per site was
11 feasible but took longer than anticipated, all six coaches completed the delivery of one 12-
12 session program each, and four of the six indicated that they would be willing to deliver
13 future rural Aussie-FIT programs. Facebook, local media, and word of mouth recruitment
14 yielded eighty-three rural Aussie-FIT participants. Most were resident in low-to-middle
15 socioeconomic areas, not university educated, and primarily motivated to participate to
16 improve their health or health behaviours. Recruits on average attended 8.2 of 12 (68%)
17 sessions, and fifty-seven men (68.7%) completed the program. Participant retention varied by
18 site (59.3%-79.3%), partly as a consequence of community transmission of Covid-19 in site
19 3. Qualitative data indicated that program engagement and retention were facilitated by an
20 inclusive and supportive environment, the football program theme and setting, and a within-
21 group and wider sense of community and connection.

22 In this chapter, the results of the thesis studies are discussed and contextualised in
23 relation to the wider literature. Firstly, I discuss existing systematic review evidence around
24 engaging men in weight management interventions, link to other systematic reviews with a
25 focus on inequalities in weight management and physical activity interventions, and describe

1 the novel contribution the systematic review undertaken as part of this PhD makes. Next, I
2 consider the evidence around recruiting men to weight management interventions, the
3 evidence-base for different recruitment strategies (e.g., Facebook promotion), and how this
4 body of evidence links to the contributions made in this thesis. Then, the evidence on how
5 sport can be used to engage men from rural and diverse backgrounds, and where rural Aussie-
6 FIT fits with this literature and other fans in training interventions is discussed. Finally, the
7 broader significance, recommendations for, and implications for future research, policy and
8 practice are summarised.

9 **5.2 Men's Weight Management and Health Inequalities Context**

10 Pagoto and colleagues published a systematic review in 2012 which highlighted that
11 men comprised only 27% of participants in adult weight management RCTs (Pagoto et al.,
12 2012). Since then, the number of weight management trials specifically targeting men has
13 proliferated (see Chapter 2), and several systematic reviews have been published in this area.
14 A comprehensive series of systematic reviews (the 'ROMEO' reviews), published in 2014
15 and led by researchers at the University of Aberdeen, investigated the quantitative and
16 qualitative evidence base for the management of obesity in men (Robertson et al., 2014). In a
17 systematic review and meta-analysis of interventions designed specifically for men
18 undertaken as part of the review series, interventions combining dietary and physical activity
19 components that integrated behaviour change techniques were most effective, and trial
20 retention rates suggested that once enrolled, men were generally committed to participate in
21 weight management interventions (Robertson et al., 2017). In the qualitative evidence
22 synthesis component of the review series, attractive features of weight management programs
23 for men included a focus on physical activity, retaining autonomy over their diet, and
24 convenient intervention delivery settings that were perceived as congruent with their
25 masculine identities (Archibald et al., 2015). The qualitative-evidence synthesis further

1 identified that group-based interventions, social support, and the use of humour reportedly
2 facilitated program attendance (Archibald et al., 2015). A final systematic review and meta-
3 analysis in the ROMEO series found that weight management interventions were equally
4 effective by sex, but men were underrepresented in, but more likely to complete, weight
5 management interventions in comparison to women (Robertson et al., 2016). The authors
6 concluded that men respond differently to and have different preferences for weight
7 management programs compared to women (Robertson et al., 2016). Prior to the systematic
8 review published as part of this thesis (Chapter 2), no reviews of men's weight management
9 interventions had focused on health inequalities or socioeconomic factors specifically.
10 Chapter 2 of this thesis provides a novel contribution to the literature in this field,
11 highlighting that a greater consideration of socioeconomic factors is required in men's weight
12 management trials.

13 More attention has been given to health inequalities in the wider literature around
14 behavioural health interventions (e.g., weight management, physical activity) that are not
15 specifically focussed on men. Previous systematic reviews have used varied approaches to
16 help answer different research questions related to health inequalities and health behaviour
17 change interventions. For example, some researchers have aimed to assess the representation
18 of specific groups, such as racial and ethnic minority groups in behavioural weight
19 management interventions (Haughton et al., 2018; Rosenbaum et al., 2017). Another
20 approach, used to summarise inequalities visually when a meta-analysis may not be
21 appropriate (e.g., due to heterogeneity), is the use of harvest plots (Ogilvie et al., 2008). For
22 example, harvest plots were used in a recent systematic review that examined health
23 inequalities in the uptake of, adherence to, and effectiveness of weight management trials
24 (Birch et al., 2022). Others have utilised more robust statistical methods, either examining the
25 effectiveness of interventions that have restricted participation to specific groups or

1 investigating potential differential intervention effectiveness between different groups. In an
2 example of the latter, Western et al (2021) determined that there was no evidence that digital
3 interventions to promote physical activity were effective in lower socioeconomic groups,
4 whilst the same interventions were effective for individuals with higher socioeconomic status
5 (Western et al., 2021). These systematic reviews have provided valuable evidence on the
6 reach and effectiveness of interventions, but they have typically not examined how
7 researchers have considered inequalities (e.g., socioeconomic factors) during intervention
8 design, conduct, and reporting.

9 Chapter 2 was underpinned by equity-related recommendations and adopted a novel
10 focus on the extent to which socioeconomic factors are considered in men's weight
11 management trials. Examining inequalities in a given topic area in this manner allows for the
12 assessment of how and to what extent inequalities are considered in intervention/study
13 design, conduct and reporting. The extent to which intervention research aligns with health
14 policy and other recommendations related to health inequalities can then be assessed and
15 used to inform future research in this area. In the case of chapter 2, this approach revealed
16 that socioeconomic factors are inadequately considered in the design, conduct, and reporting
17 of trials of men's weight management interventions. Thus, studies typically did not align with
18 equity-related recommendations and health policy, and only limited evidence exists for the
19 reach and effectiveness of men's weight management interventions across socioeconomic
20 groups. These types of questions need to be asked in systematic reviews examining the extent
21 to which inequalities are considered in research studies related to different health conditions
22 or health behaviours, different types of interventions, and/or different populations or
23 demographic groups if inequalities in health are to be addressed.

5.3 Recruiting Men to Weight Management Interventions

Men are underrepresented in weight management research and practice, but when they do participate, they are more likely to stay engaged than women (Robertson et al., 2016). Several studies have made concerted efforts to understand how best to recruit men to studies and interventions with a weight management component (McDonald et al., 2020; Rounds & Harvey, 2019; Ryan et al., 2019). In a robust assessment of recruitment strategies employed in a large-scale type 2 diabetes prevention RCT for men (aged 50-74 years) in Australia, unpaid 'indirect' Facebook promotions (via local organisations) and paid Facebook promotions were classified as 'ineffective' and as having 'limited effectiveness' respectively (Bracken et al., 2019). In this trial participants were randomised to receive a lifestyle intervention (Weightwatchers) plus testosterone therapy (administered via injection) or the lifestyle intervention plus placebo injection over two years, with 5% (n=1007) of men undertaking screening (n=19000) enrolled at an overall cost of AU\$594 per randomised participant (Bracken et al., 2019; Wittert et al., 2019). One barrier to participation in this trial, could be the limited proportion of men that typically accept invitations to commercial weight management interventions such as Weightwatchers (Ahern et al., 2016). In contrast, in an RCT of a text message-based intervention for adults (a majority were men) with type 2 diabetes in Australia, Facebook promotion was classified as 'highly effective' and had the lowest cost-per-recruit (AUS \$110) of the recruitment strategies undertaken (Walleria et al., 2021). Differences in the inclusion criteria, research procedures, and the nature of these two diabetes interventions may explain the differing conclusion about the effectiveness of Facebook promotion.

The extent to which study recruitment via Facebook is adjudged to be cost-efficient or effective may largely depend on the goals of the research, the resources available, and contextual factors related to the study and intervention. The effectiveness of social media

1 promotions, and indeed any recruitment strategy, is likely intrinsically linked to the research
2 being conducted, the intervention in question, and the population being targeted. The appeal
3 of program characteristics (e.g., Australian Football theme, locally delivered, free of charge,
4 gender-tailored), how the potential appeal is communicated via program marketing messages
5 (e.g., images of men on the oval, opportunity to ‘meet likeminded men’), who undertakes the
6 recruitment effort (e.g., trusted local individuals or organisations initiating or sharing
7 Facebook posts) and where exactly the recruitment effort takes place (e.g., promotional posts
8 shared on active local community Facebook pages) will likely influence whether individuals
9 decide to enrol. In addition, how restrictive and easily self-assessed the inclusion criteria are
10 (e.g., aged 35-65 years, with a BMI ≥ 28), and any anticipated burden associated with
11 participating in the intervention and the research (e.g., pragmatic, and minimal data collection
12 activities) could also impact enrolments. Thus, it should be acknowledged that assertions on
13 the cost or effectiveness of specific recruitment strategies (such as Facebook promotions),
14 depend on a variety of factors.

15 The selection and appeal of specific social media platforms may be location-specific
16 and may change over time. Many rural areas, including the rural Aussie-FIT sites, have local
17 community information sharing pages embedded within a given platform. The stakeholder-
18 informed selection of the recruitment strategies (including recommendation to utilise
19 Facebook), and tailoring of marketing messages, helped to optimise the potential for rural
20 Aussie-FIT to engage the target population. More broadly, there appears to be a dearth of
21 evidence examining the use of social media (e.g., Facebook) to recruit men to studies and
22 interventions that are comparable to Aussie-FIT. In particular, evidence on the recruitment of
23 men from lower socioeconomic and rural areas via social media is lacking. This PhD helps to
24 bridge a gap in evidence for recruiting men in rural Australian towns to a community-based
25 health interventions via Facebook.

1 To engage men from rural and lower socioeconomic areas in weight management,
2 specific targeting of interventions or recruitment efforts in these areas are likely to be
3 required. In a feasibility RCT of a text message intervention ('Game of Stones') in Scotland,
4 designed specifically for men, targeted community and GP recruitment strategies yielded a
5 majority of participants from more disadvantaged areas (quintiles 1 and 2; 60%), and most
6 were not university educated (72%) (McDonald et al., 2020). The study authors highlighted
7 the importance of trust and familiarity (e.g., local GP, or trusted community organisation) for
8 the recruitment of men from across the socioeconomic spectrum (McDonald et al., 2020).
9 Chapter 3 reports that stakeholders felt it crucial to have credible, well-recognised, and
10 trusted community champions and partner organisations for the success of rural Aussie-FIT.
11 The socioeconomic profile of participants in rural Aussie-FIT is comparable to the Game of
12 Stones study, with three-quarters (60/83) of men not educated to university level and the
13 majority resident in more disadvantaged areas (SEIFA-IRSD quintiles 1 & 2; 44/80). This
14 evidence suggests that specific targeting of recruitment strategies and gender-tailored
15 interventions can help engage men in rural and lower socioeconomic areas that may
16 otherwise have been unlikely to participate in weight management interventions.

17 More research is required on how best to recruit participants from across
18 socioeconomic groups. In the USA, Rounds and Harvey (2019) aimed to recruit men with
19 less education to their 'Gutbusters' trial of an online intervention, through word of mouth,
20 printed posters, Facebook promotion, and other online advertisements (Rounds & Harvey,
21 2019). However, only 35 men enrolled in the initial seven-month recruitment period, after
22 which recruitment efforts were broadened with the launch of a successful one-week
23 newspaper advertisement campaign. These recruitment strategies ultimately yielded a highly
24 educated sample, with only 19.6% (20/102) of participants recruited having less than two
25 years of college education (Rounds & Harvey, 2019). These results contrast with the rural

1 Aussie-FIT results (where three-quarters of participants were not educated to university
2 level). The difference in recruitment outcomes in the Gutbusters trial when compared with
3 the ‘Game of Stones’ trial in Scotland and rural Aussie-FIT, may be partly due to the extent
4 to which recruitment efforts, program delivery venue, and/or data collection methods were
5 undertaken in lower socioeconomic and rural areas (as was the case in the latter two
6 examples). As opposed to Game of Stones and rural Aussie-FIT, the Gutbusters recruitment
7 efforts targeted less educated men, rather than specific towns, locations or venues that are
8 located in lower socioeconomic and rural areas. In the case of rural Aussie-FIT, it is also
9 possible that the appeal of Australian Football across the social spectrum contributed to the
10 socioeconomic diversity of the recruited sample.

11 **5.4 Using Sport to Engage Men from Diverse Backgrounds**

12 In rural Aussie-FIT, the alignment of the intervention with a popular local sport
13 alongside the targeted recruitment efforts and local delivery settings, may have helped to
14 transcend socioeconomic and regional barriers for engaging men from varied backgrounds. A
15 geographical analysis in Australia determined that there was no significant relationship
16 between level of sport participation (in four popular sports) and socioeconomic status, and
17 that non-metropolitan regions had overall higher sport participation than metropolitan areas
18 (Eime et al., 2017). In another similar Australian analysis, participation in team sports
19 (including Australian football) was significantly associated with living in lower
20 socioeconomic areas (Eime et al., 2015). Mixed-methods data (see Chapter 4) feeds into the
21 narrative that the football program theme was crucial for attracting many of the men to
22 participate in rural Aussie-FIT. This evidence suggests that strategic alignment of
23 community-based interventions with popular local interests and activities, in this case team
24 sports like Australian Football, alongside targeted recruitment strategies and program

1 delivery location, has the potential to help address barriers to access and appeal of health
2 interventions for men in rural and lower socioeconomic areas.

3 Sport plays a critical role in the social fabric of many rural communities, with local
4 sporting clubs acting as community hubs that support social cohesion and inclusion, and often
5 becoming synonymous with regional identities (Spaaij, 2009). Team sports are inherently
6 social activities with participation often motivated by the opportunity for social connection
7 (Lim et al., 2011), and sport participation itself is associated with psychosocial benefits in
8 middle-aged and older adults (Sivaramakrishnan et al., 2021). The Covid-19 pandemic has
9 seriously impacted the mental health of many Australians, particularly in rural communities
10 (Newby et al., 2020). Rural stakeholders (see Chapter 3) emphasised that mental health was a
11 major concern in rural areas, and that the opportunity to meet other likeminded men, have a
12 laugh, be in a team environment, and more generally the potential for Aussie-FIT to support
13 improved mental health outcomes should be highlighted in the program marketing materials.
14 In rural Aussie-FIT, mixed-methods data suggests that the program's sporting theme and
15 setting presented an opportunity for social connection and a team environment that many
16 participants found attractive (see Chapter 4). Moreover, the importance of community and
17 connections for attracting men, and for their continued engagement in rural Aussie-FIT was
18 evident. These findings are consistent with qualitative literature exploring men's
19 opportunities to engage in activities that have the potential to positively influence mental
20 health, for social connectedness, and the important role sport plays in rural Australian
21 communities (Ahmadu et al., 2021; Hutchesson et al., 2021; Trail et al., 2021). For example,
22 in a qualitative analysis of community stakeholder interviews in rural Australia (Victoria),
23 Trail and colleagues (2021) highlight the importance of strengthening men's sense of
24 community belonging by offering diverse gender-sensitised approaches to engage men in
25 initiatives that provide opportunities for social connection in spaces where they feel accepted

1 and welcomed (Trail et al., 2021). The research presented in this thesis extends the evidence-
2 base in this area, moving beyond stakeholder consultations alone, and provides a case
3 example demonstrating the potential of capitalising on popular local sporting codes to deliver
4 a gender-tailored intervention that fosters community connection in rural Australian towns.

5 Given the popularity of Australian football amongst Aboriginal and Torres Strait
6 Islander men, researchers have posited that the national sport could act as a vehicle to help
7 engage this population in health promoting interventions (McCoy, 2012). This may be
8 particularly relevant in rural areas due to a higher proportion of the population in rural
9 Australia identifying as Aboriginal and Torres Strait Islander than those resident in major
10 cities (AIHW, 2022e). In addition, Aboriginal and Torres Strait Islander men
11 disproportionately face poorer health outcomes compared with non-Indigenous men
12 (Australian Government, 2019; AIHW, 2022f;). Without specific targeting or tailoring of
13 rural Aussie-FIT for Indigenous men, five (6%) participants who identified as Aboriginal and
14 Torres Strait Islander were recruited. This is a similar proportion of participants that
15 identified as Aboriginal or Torres Strait Islander in the Healthy Dads Healthy Kids regional
16 dissemination trial in New South Wales (4%) (Morgan et al., 2019). Notably, the research
17 group that developed and evaluated the Healthy Dads Healthy Kids intervention, have
18 recently been awarded funding to adapt and pilot an Indigenous-specific version of the
19 intervention. As reported in chapter 3, stakeholders from a range of different backgrounds
20 and organisations participated in the rural focus groups, including Aboriginal health
21 specialists and outreach workers. Stakeholders suggested that a version of Aussie-FIT
22 tailored and targeted specifically for Aboriginal and Torres Strait Islander men may be
23 required to engage this population more broadly. It was beyond the scope of this project and
24 my expertise to coordinate an Indigenous-specific program. Well-funded Indigenous-led
25 projects with significant community engagement would be required for such work to be

1 undertaken. Aussie-FIT or similar interventions utilising an Australian football sporting hook
2 may be well placed to engage Aboriginal and Torres Strait Islander men.

3 **5.5 Comparison to Fans in Training Studies**

4 Making comparisons between the metropolitan pilot Aussie-FIT and rural Aussie-FIT
5 in relation to program attendance and retention is challenging. In the metropolitan pilot, not
6 all coaches followed the protocol for regularly recording session attendance (mean rural
7 Aussie-FIT attendance for enrolled participants was 8.2/12). Moreover, due to the pragmatic
8 nature of rural Aussie-FIT and focus on implementation rather than effectiveness outcomes,
9 there were differences in how program retention and completion were defined. In the
10 metropolitan pilot Aussie-FIT study, retention was defined as the proportion of participants
11 undertaking post-program follow-up measurements, whereas in the current study program
12 completion was defined as attendance at either (or both) of the final two program sessions.
13 Program effectiveness outcomes (e.g., weight change) data in rural Aussie-FIT were collected
14 only for men that attended session 12 (i.e., less emphasis was placed on collecting program
15 effectiveness outcomes). Thus, we are unable to determine if rural Aussie-FIT was able to
16 engage and retain men to a greater or a lesser extent than the metropolitan pilot.

17 Objective anthropometric sample characteristics were largely comparable between the
18 two studies. Rural Aussie-FIT participants had fewer years of education (12.0 vs 14.0 years)
19 than their metropolitan counterparts, suggesting that endeavours to reach a more
20 socioeconomically diverse sample of participants were successful. In the original
21 metropolitan pilot, many participants reported travelling from different suburbs in and around
22 Perth to attend the program (Kwasnicka et al., 2021). Thus, participants in the metropolitan
23 pilot were usually not local to the program delivery venue, the socioeconomic profile of the
24 study sample was likely not specifically linked to the venue location, and the program was

1 accessible to men from less deprived areas or with more advantaged backgrounds irrespective
2 of delivery location. Community-based interventions delivered in low-to-middle
3 socioeconomic rural towns are only really accessible to members of that specific community,
4 or those travelling from neighbouring towns that typically have a similar socioeconomic
5 distribution. Thus, the socioeconomic profile of rural Aussie-FIT participants may largely
6 reflect the socioeconomic distribution within the rural towns the program was implemented.

7 As noted in chapter 2, the original FFIT RCT in Scotland reached men from across
8 the socioeconomic spectrum (Wyke et al., 2015). To enhance the reach and potential scaling
9 of the Aussie-FIT concept to lower socioeconomic rural areas, rural Aussie-FIT adopted an
10 Australian Football theme without specific professional sporting club affiliations or delivery
11 settings. This approach risked posing a threat to the original premise of Fans in Training
12 programs, including the sense of being around ‘men like me’ (e.g., having a shared interest in
13 the sport, supporting the same sports club) and the value of the program being delivered in a
14 setting that was symbolically important (i.e., the professional sports club setting of the team
15 men support) (Hunt et al., 2014; Kwasnicka et al., 2021). Hunt and colleagues (2014)
16 describe the ‘push’ (e.g., concerns for their health) and ‘pull’ (e.g., club attraction) factors
17 that informed men’s decision to participate in FFIT (Hunt et al., 2014). In rural Aussie-FIT,
18 push factors (i.e., improving health behaviours and health outcomes) were universally
19 acknowledged by participants as being important in their decision to enrol (see Chapter 4).
20 Without professional club settings in rural areas, the pull of the Australian Football program
21 theme was still evident in rural Aussie-FIT, but a greater diversity of interest and experience
22 in football was observed amongst participants. Another notable pull factor in rural Aussie-
23 FIT, which is also discussed in chapter 4 (and earlier in this chapter), was the opportunity for
24 and attraction of forming social connections within a team environment.

1 **5.6 Challenges, Opportunities, and Recommendations for Rural Implementation**

2 Recruiting and retaining coaches to deliver rural Aussie-FIT was challenging.
3 Engaging coaches with the experience and availability that best aligns with the program is
4 likely important for the retention and sustainability of Aussie-FIT and other similar programs
5 delivered in rural contexts. But the limited amount of interest expressed in the rural Aussie-
6 FIT coach roles restricted options.

7 In rural Aussie-FIT, coaches undertook 12-15 hours training over at least two days,
8 with most of the coach training undertaken locally in each rural site. Coordinating face-to-
9 face coach training in site 2 was particularly challenging due to the prospective coaches'
10 work commitments and distance from Perth. Thus, in site 2 training was undertaken across
11 four evenings, with two online and two face-to-face sessions. In the Healthy Dads Healthy
12 Kids regional trial in New South Wales, a train-the-trainer approach to facilitator training was
13 undertaken over 10 – 15 hours (similar to rural Aussie-FIT) (Morgan et al., 2019).
14 Experienced physical education teachers were recruited to deliver Healthy Dads Healthy
15 Kids, and face-to-face training was undertaken at the university campus (Morgan et al.,
16 2019). How to best navigate these types of project coordination and implementation
17 challenges should be carefully considered with local stakeholders during the set-up phase of
18 interventions aiming to engage rural participants, particularly if core staff are situated in
19 metropolitan areas.

20 In chapter 3 stakeholders suggested that organisations with local staff may be well-
21 placed to be the 'face of the program' rather than Curtin University. Whilst a stakeholder-
22 informed and collaborative approach was undertaken throughout this project, any future
23 attempts to implement and sustain Aussie-FIT in rural towns would benefit from local project
24 partners taking ownership of the program. A range of local stakeholders supported the

1 initiation of the program across the three rural sites (e.g., created promotional Facebook
2 posts, contacted local footy clubs to help disseminate rural Aussie-FIT promotions, and
3 coordinated with local footy clubs to help organise venues). However, it was not feasible for
4 any local organisation to lead project coordination activities at this early stage. The Aussie-
5 FIT coaches were employed on a sessional basis directly by Curtin University. For programs
6 to be delivered sustainably, adoption of the program by a local organisation is likely to be
7 required. In this way, staff residing locally that are employed by a trusted organisation can
8 navigate program set-up work, program promotions, participant onboardings, and program
9 deliveries. In Scotland, where the FFIT program has supported thousands of people to
10 improve their health, the Scottish Professional Football League Trust coordinates and is
11 responsible for all ongoing program deliveries (Hunt et al., 2020).

12 As described in chapter 2, to best inform public health policy related to health
13 inequalities in trials of men's weight management interventions, a greater consideration of
14 socioeconomic factors is required during intervention design, conduct, analysis, and
15 reporting. To attract men resident in rural areas to community health interventions, a
16 multifaceted recruitment approach that involves trusted local people and organisations,
17 facilitates word of mouth recruitment, and includes sharing of Facebook or other social media
18 promotions, as appropriate, is recommended. Importantly, weight management interventions
19 should be designed based on men's preferences and interests. Involving a diverse range of
20 stakeholders in the project set-up stages and throughout program implementation is essential.
21 Implementing the Aussie-FIT program in rural towns would not have been possible without
22 stakeholder involvement and support.

23 For the majority of the conduct of this PhD, Covid-19 had minimal impact due to WA
24 border restrictions and limited community transmission of the virus. However, as described in
25 chapter 4, the initiation of rural Aussie-FIT in site 3 coincided with the onset of widespread

1 community transmission of Covid-19 in WA. The legal requirement to provide proof of
2 vaccination status to attend venues, and isolation requirements for individuals with or close
3 contacts of individuals with Covid-19 impacted rural Aussie-FIT participation for some men
4 in site 3.

5 **5.7 Strengths and Limitations**

6 This thesis highlights that there is insufficient consideration of socioeconomic factors
7 and overall limited evidence for men's weight management interventions intended for
8 delivery in rural and lower socioeconomic areas in the published literature. It then provides a
9 case example depicting how inequalities in access to such interventions can be overcome by
10 adapting an established program for implementation in rural contexts. Specifically, the
11 findings from this thesis draw attention to where and how researchers can help to bridge this
12 gap and offer evidence on the potential for utilising a sport-themed intervention to reach men
13 resident in lower socioeconomic rural areas. A key strength of study one (Chapter 2) was the
14 use of systematic methods underpinned by men's weight management and equity-related
15 recommendations. A strength of study 2 (Chapter 3) was the diversity of stakeholders
16 participating in the focus groups across the three study sites, and the systematic method
17 adopted for reporting adaptations made to Aussie-FIT for rural contexts. A key strength of
18 study 3 (Chapter 4) was the use of mixed methods which provided depth in understanding the
19 complexities of recruiting, engaging, and retaining men in rural towns to Aussie-FIT.

20 Another key strength of the work presented in this thesis is that extensive stakeholder
21 engagement underpinned the research throughout. This is in line with recommendations for
22 designing men's weight management interventions and guidelines for adapting interventions
23 for new contexts (Moore et al., 2021; Robertson et al., 2014). Stakeholder engagement,
24 collaboration, and partnerships are also central to implementing interventions that seek to

1 tackle health inequalities (Brownson et al., 2021). In particular, the rich qualitative data from
2 focus groups with a diverse range of stakeholders supported understandings of local needs
3 and contexts. Many of the stakeholders that participated in the focus groups (Chapter 3) went
4 on to support aspects related to the implementation of Aussie-FIT in rural towns (Chapter 4),
5 providing continuity of support. The focus groups themselves demonstrated a desire to work
6 in partnership with local stakeholders and listen to community needs. This process ultimately
7 helped to garner trust and ongoing support from rural stakeholders. It is well established that
8 building trusting relationships with stakeholders is integral to supporting the implementation
9 of interventions (Metz et al., 2022). This links to several ‘strategies for change’ outlined in
10 recently published guidelines for advancing health promotion interventions in rural and
11 remote Australia (Smith et al., 2022). These strategies include investing in the local
12 workforce (e.g., rural Aussie-FIT coaches), involving local stakeholders to help ensure
13 responsiveness to the unique needs of each community, providing programs close to home
14 and growing the evidence base for innovative and effective health promotion interventions in
15 rural and remote Australia (Smith et al., 2022).

16 Rather than inputting resources into developing a new intervention (and potentially
17 contributing to research waste), this thesis builds on, and provides novel contributions to, the
18 evidence-base for a theoretically informed and evidence-based intervention (Kwasnicka et al.,
19 2020; Quested et al., 2018). The adaptation of the ‘fans in training’ approach for delivery in
20 local amateur sports settings in rural towns demonstrates the potential for Aussie-FIT to reach
21 locations without access to professional sports team’s facilities. This approach has the
22 potential to expand the reach of ‘fans in training’ interventions to underserved areas, in
23 Australia and internationally. This research also provides evidence around how popular local
24 sporting codes and amateur sporting contexts can be utilised as delivery settings to help
25 engage men in rural areas in health interventions more broadly.

1 One limitation of this research is that, although the initial intention was to engage men
2 in rural areas in the adaptation and set-up phase of the project, engaging men from the target
3 group in this phase was challenging (see Chapter 2). Involving a range of stakeholders in this
4 phase, who were typically paid members of staff at health, sporting, or other organisations,
5 proved more feasible. However, several of the stakeholders interviewed would have also
6 likely met the inclusion criteria to participate in rural Aussie-FIT, and stakeholders were
7 well-placed to represent the needs and preferences of local men. The rural Aussie-FIT
8 findings relate to three small-to-medium sized towns in WA, and therefore may not be
9 generalisable to other towns, states, or countries, or more remote settings. Differences
10 between rural communities should be acknowledged, and local stakeholder support and
11 advice sought in each locality (Gilbert et al., 2019). A limitation of the systematic review
12 (Chapter 2) is that it only included studies that used a randomised controlled trial design. If
13 the inclusion criteria incorporated other study designs, investigations focusing on other non-
14 trialled programs could have helped to inform the adaptation of Aussie-FIT for rural areas.
15 For example, the Hat-Trick program that utilised the appeal of Canadian Ice Hockey to
16 engage men in a health behaviour change intervention targeting physical activity was not
17 trialled in a randomised trial and, as such, was not included. Research concerning this
18 program could have offered relevant insights (Caperchione et al 2017).

19 Another limitation is that most of the rural Aussie-FIT project coordination activities
20 were undertaken from Perth and resources for visits to rural towns were finite, and restricted
21 to occasional trips (e.g., for coach training, program enrolments, and data collection). Thus,
22 local organisation and program promotions were largely reliant on methods that could be
23 organised from a distance and supported by local stakeholders. Although a lack of local
24 program coordination presented logistical challenges, it did necessitate a ‘hands off’ approach
25 to utilising local stakeholder support which broadly aligns with the project’s focus on

1 implementation of Aussie-FIT in the ‘real world’ with limited researcher involvement upon
2 program initiation. As discussed in chapter 4, additional rural Aussie-FIT programs
3 scheduled for delivery fell beyond the PhD timeline, and thus data from these deliveries were
4 unable to be included in this thesis.

5 **5.8 Conclusion**

6 Public health policy stipulates that interventions that reach and are effective across
7 socioeconomic groups are required to help reduce health inequalities. Men from lower
8 socioeconomic rural areas are more likely to be living with overweight or obesity, but less
9 likely to participate in weight management interventions than both urban-residing men and
10 rural-residing women. Findings presented in this thesis demonstrate that socioeconomic
11 factors are inadequately considered in trials of weight management interventions for men,
12 and that specific targeting and tailoring of effective interventions may be required to reach
13 lower socioeconomic rural areas. A successful rural stakeholder-informed adaptation of
14 Aussie-FIT was undertaken, with the adapted version of Aussie-FIT subsequently enrolling
15 83 participants across three rural towns. Rural Aussie-FIT provides insights into how popular
16 local sporting codes and community sport settings can be utilised to help engage rural men in
17 a health behaviour change intervention. The work presented in this thesis demonstrates that
18 adapting evidence-based community health interventions to reach men in lower
19 socioeconomic rural areas is possible and provides a template for how this can be achieved
20 with the support of local stakeholders.

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Appendices

Appendix A: Example Search Strategy

Medline (Ovid)

1. Obesity/

2. (obesity adj2 (morbid or diabet\$)).tw.

3. Obesity.morbid/acknow

4. Obes*.tw.

5. Weight loss/

6. (weight adj1 (los\$ or reduc\$ or maint\$ or control)).tw.

7. (diet adj5 weight).tw.

8. Body mass index/

9. Overweight.tw.

10. Or/1-9

11. Exp clinical trial/

12. Randomized Controlled Trials as Topic/

13. Randomized controlled trial/

14. Random allocation/

15. Double blind method/

16. Single blind method/

17. Clinical trial/

18. Exp Clinical Trials as Topic/

19. ((singl\$ or doubl\$ or treb\$ or tripl\$) adj (blind\$3 or mask\$3)).tw.

20. Randomly allocated.tw.

21. (allocated adj2 random).tw.

22. Or/11-21

23. (systematic review or meta-analys* or evidence synthesis).ti. or epidemiologic studies/ or exp case control studies/ or exp cohort studies/ or Case control.ti. or cohort.ti. or observational.ti. or cross-sectional.ti. or Cross-sectional studies/

24. 22 not 23

25. Exp animals/ not humans/

26. 24 not 25

27. 10 and 26

28. (letter or editorial or comment or note).pt.

- 1 29. 27 not 28
- 2 30. Surgery/ or exp drug therapy/ or exp Pharmaceutical Preparations/
- 3 31. 29 not 30
- 4 32. 31 and (male or males or men).tw.
- 5 33. 31 and male/
- 6 34. (men or male* or dad* or father* or grand*).ab.ti.
- 7 35. (32 or 33) and 34
- 8 36. Limit 35 to yr="2000-Current"
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1 **Appendix B: Risk of Bias Assessment**

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Study	Domain 1	Domain 2	Domain 3	Domain 4	Domain 5	Other
Aguiar et al 2016	Low	Some concerns	Low	Low	Low	Low
Alick et al 2017	Low	Some concerns	Low	Low	Some concerns	Low
Azar et al 2015	Low	Some concerns	Low	High	Some concerns	Low
Borg et al 2002	Some concerns	High	High	Low	Some Concerns	Low
Crane et al 2015	Low	Some concerns	Low	Low	Some concerns	Low
Demark-Wahnefried et al 2017	Some concerns	High	Some concerns	Low	Some Concerns	Low
De Melo et al 2021	Low	Some Concerns	Low	Low	Some Concerns	Low
Dombrowski et al 2020	Low	Some concerns	Low	Low	Low	Low
Esposito et al 2004	Low	Some concerns	Low	Low	Some concerns	Low
Garcia et al 2019	Low	Some concerns	Low	Low	Some concerns	Low
Gray et al 2013	Low	Some concerns	Low	Low	Some concerns	Low
Griffin et al 2019	Low	Some concerns	Some Concerns	Low	Low	Low
Hunt et al 2014	Low	Some concerns	Low	Low	Low	Low
Irvine et al 2017	Low	Some Concerns	Low	Low	Some Concerns	Low
Johansson et al 2009	Low	Some concerns	Low	Low	Some concerns	High
Kaukua et al 2002	Some concerns	Some concerns	Low	Low	High	High
Kim et al 2015	Low	Some concerns	Low	Low	Some concerns	Low
Kwasnicka et al 2020	Low	Some concerns	Low	Low	Low	Low

Maddison et al 2019	Low	Some Concerns	Some Concerns	Low	Some Concerns	Low
Mohamad et al 2019	Some concerns	Some concerns	Low	Some concerns	Some concerns	Low
Mollentze et al 2019	Some concerns	High	High	Low	Some concerns	High
Morgan et al 2013	Low	Some concerns	Low	Low	Some concerns	Low
Morgan et al 2014	Low	Some concerns	Low	Low	Some concerns	Low
Morgan et al 2011a	Low	Some concerns	Low	Low	Some concerns	Low
Morgan et al 2011b	Low	Some concerns	Low	Low	Low	Low
Morgan et al 2011cc	Low	Some concerns	Low	Low	Low	Low
O'Connor et al 2020	Low	Some Concerns	Some Concerns	Low	Some Concerns	Low
Ozaki et al 2018	Some concerns	Some concerns	Low	High	Some concerns	Low
Patrick et al 2011	Some concerns	Some concerns	Low	Low	Some concerns	High
Petrella et al 2017	Low	Some concerns	Low	Low	Low	Low
Puhkala et al 2015	Low	High	Some concerns	Low	Some concerns	Low
Rounds et al 2020	Low	Some Concerns	Some Concerns	Low	Some Concerns	Low
Shin et al 2017	Low	Some concerns	Low	Low	Low	Low
Ventura Marra et al 2019	Some concerns	Some concerns	Low	Low	Some concerns	Low
Wyke et al 2019	Low	Some concerns	Low	Low	Low	Low
Young et al 2017	Low	Some concerns	Low	Low	Low	Low

Notes

Domain 1: Randomisation Process, Domain 2: Deviations from intended interventions, Domain 3: Missing outcome data, Domain 4: Measurement of outcome, Domain 5: Selection of reported result

The 'other' category was used to capture information on potential conflicts of interest between the funder and researchers.

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Appendix C: Study Information, Socioeconomic Characteristics and Related Strength or Limitation Statements

Table S1

Study Information, Socioeconomic Characteristics and Related Strength or Limitation Statements

Primary Source	Inclusion Criteria & Baseline Information	Recruitment Methods	Socioeconomic Characteristics	Socioeconomic Sample Profile Mentioned in Relation to Study Strengths or Limitations
Aguiar <i>et al</i> 2016	18-65yrs; BMI 25-40 kg/m ² ; & high risk of T2DM N: 101, Age: 52.3, BMI: 32.4	Newspaper, radio, recruitment flyers, workplace emails and social media.	Area Level Deprivation (n) Q1: 3, Q2: 28, Q3: 49, Q4: 14, Q5: 7 Education (n) No Formal Qualifications: 4, Higher School Certificate (year 12 or equivalent): 12, Trade/apprenticeship, diploma (e.g., carpenter, chef, plumber, tiler, accountant): 54, University degree (e.g., bachelor, master, PhD): 31	Socioeconomic Profile Mentioned <i>A future large-scale, community-based trial might help to establish the generalizability of the program for men from varying ethnic backgrounds, education levels, and socioeconomic positions.</i>
Alick <i>et al</i> 2017	18-65yrs; BMI 25-45 kg/m ² ; internet & email access; black men with female partner N: 40, Age: 47.4, BMI: 35.0	Community organisations, universities, churches, fraternities, brochures, email lists, flyers, referrals, and face-to-face engagement.	Education (n) Less than college: 13, College or More: 27 Employment (n) Working Full-Time: 34, Working Not Full-Time: 6	Socioeconomic Profile Mentioned <i>Generalizability is limited by the small sample size, which is highly educated and fairly healthy.</i>

			Income (yearly)		
			<\$60,000 (US): 12, >\$60,000 (US): 24, Prefer not to say: 4		
Azar et al 2015	21-60yrs; BMI 30-40 kg/m ² ; English Language; internet connection N: 64, Age: 45.3*, BMI: 34.8*	Outpatient multi-specialty group practice organization	Education (n) College Education or Above: 50* *Calculated from percentages given	Socioeconomic Profile Mentioned <i>Our study participants were generally well educated and had internet access. A larger study is needed to truly understand which populations would benefit most from virtual groups. It is unclear as to how effective this intervention would be in lower socioeconomic populations, despite the high levels of internet access in the USA.</i>	
Borg et al 2002	35-50yrs; BMI 30-40 kg/m ² ; WC>100cm; & physically inactive. N: 90, Age: 42.6 [#] , BMI: 28.5	Newspaper advertisements	None reported	No Mention of Socioeconomic Profile	
Crane et al 2015	18-65yrs; BMI 25-40 kg/m ² ; internet access; safe to exercise N: 107, Age: 44.2*, BMI: 31.5*	Emails to the university community and local worksites, flyers distributed in surrounding communities, and word of mouth	Education (n) High school, vocational training, or partial college: 18, College Graduate or More: 89 Employment (n) Employed Full-Time: 95	Broad statement about lack of generalisability <i>Homogenous study sample is not representative of all men with overweight and obesity; thus, study results may not generalize to other groups.</i>	

Demark-Wahnefried et al 2017	19+yrs; BMI 25-50 kg/m ² ; Prostate Cancer Diagnosis; & scheduled for surgery >3wks away	Via telephone from urology clinics at a university and urology centres	Education (n) High School Graduate 8; Some College/Technical 12; College Graduate 8; Postgraduate 12	No Mention of Socioeconomic Profile
	N: 40, Age: 60.1, BMI: 31.4			
De Melo et al 2021	30-55yrs; BMI 30-45 kg/m ² ; moderate or severe Obstructive Sleep Apnoea	Via local media (advertisements, flyers, radio, newspaper, social network website)	None reported	No Mention of Socioeconomic Profile
	N: 45, Age: 40.7*, BMI: 106.6*			
Dombrowski et al 2020	18+yrs; BMI >30 kg/m ² and or waist circumference >102cm; owns mobile; English Language	GP register letters and community outreach (i.e., recruitment stalls at community venues, leaflets, word of mouth)	Area Level Deprivation (n) Q1: 38, Q2: 24, Q3: 12, Q4: 14, Q5: 16	Socioeconomic Profile Mentioned (Strength) <i>Recruitment of men focused on areas with high levels of disadvantage. The higher retention of men from those living in disadvantaged areas suggests that intervention components have the potential to positively affect health inequalities.</i>
	N: 105, Age: 52.2, BMI: 35.7		Education (n) No Formal Qualifications: 20, Standard Grade/GCSE/Intermediate 1 or 2: 17, Still Studying: 6, Vocational qualifications (=SVQ1+2): 5, Other: 1, Prefer Not to Say: 4, Bachelor Degree (=SVQ5): 24, HNC/HND (=SVQ4): 12, Higher grade/advanced	

higher/A-level or equivalent (=SVQ3): 9; Masters/PhD or equivalent: 5

Working Status (n)

Full-time student: 7, Employed full-time (30+ hours per week): 50, Employed part-time (8–29 hours per week): 6, Self-employed: 7, Not in Paid Work: 16, Retired: 18

Esposito et al 2004	35-55yrs; Erectile Dysfunction	Outpatient department for weight loss at a university	None reported	Broad statement about lack of generalisability
	N: 110, Age: 43.3*, BMI: 36.7*			<i>Our findings may not be totally generalizable to primary care populations because the intervention was intensive and involved a lot of contact with the study team</i>
Garcia et al 2019	18-64yrs; BMI 25-50 kg/m ² ; Hispanic; English &/or Spanish Language	face-to-face at an outdoor marketplace; family/friend referral; flyers and social media	Education (n) Grades 1 through 8: 8, Attended some high school: 7, Graduated high school or GED: 11, Some College: 14, Bachelor's/Graduate degree or higher: 10	Statement about lack of generalisability to other Hispanic/Latino Groups
	N: 50, Age: 43.3, BMI: 34.1		Employed (n) No: 11, Yes: 39	<i>First, our small sample size and focus on Hispanic male adults primarily from Mexican-origin decent precludes generalizability to other Hispanic or Latino racial/Garcia) subgroups.</i>
Gray et al 2013	35-65yrs; BMI>27 kg/m ²	Football club website, leaflet mailings, word of mouth, newspaper,	Area Level Deprivation (n) Q1: 17, Q2: 21, Q3: 21, Q4: 19, Q5: 25	Socioeconomic Profile Mentioned (Strength)
				<i>The recruitment of men from across the socioeconomic spectrum, without any specific</i>

	N: 103, Age: 47.1, BMI: 34.5	local venue adverts, match day advertising and media.	<p>Education (n)</p> <p>No Qualifications: 13, Standard Grades or Equivalent: 20, Highers or Equivalent: 11, Vocational Qualification: 13, HNC/HND: 17, First degree: 17, Postgraduate Qualification: 9, Other: 2, Missing: 1</p> <p>Employment Status (n)</p> <p>Full-Time Work: 79, Part-Time Work: 1, Unemployed: 13, Student: 2, Sick/Disabled: 3, Retired: 5</p>	<i>targeting of those from areas of higher deprivation, provides further support for the view that professional football clubs can help to address health inequalities by encouraging population groups at increased risk of ill health to engage in organized health promotion activities</i>
Griffin et al 2019	18-65yrs; BMI>25 or >23 kg/m ² for ethnic groups and/or WC>94cm; Fathers, Step-Fathers or Father Figures N: 43, Age: 40.0, BMI: 30.2	Flyer distribution & promotion stands at leisure, community & shopping centres, places of worship and large workplace organisations. Presentations at school assemblies & teacher meetings, stands at parent evenings, flyer distribution and talking to parents at school pick-up time. Social media promotion (Twitter and Facebook).	<p>Area Level Deprivation (n)</p> <p>Q1: 23, Q2: 9, Q3: 6, Q4: 2, Q5: 1</p> <p>Education (n)</p> <p>GCSE, CSE, O level or equivalent: 13, A level/AS level or equivalent: 5, Degree level or higher: 21, Other: 2, Missing: 2</p>	Socioeconomic Profile Mentioned (Strength) <i>In addition, very few specifically target ethnic minority population groups or recruit from socioeconomically disadvantaged populations, which is a unique contribution of this study.</i>
Hunt et al 2014	35-65yrs; BMI>28 kg/m ² ; not taken part in program previously	Football club-based recruitment (e.g., club websites, in-stadiums advertising, & match day	<p>Area Level Deprivation (n)</p> <p>Q1: 131, Q2: 131, Q3: 122, Q4: 166, Q5: 188</p>	Socioeconomic Profile Mentioned (Strength)

N: 747, Age: 47.1, BMI: 35.3	recruitment), media coverage (e.g., radio & newspapers), staff emails through employers and word-of-mouth.	<p>Education (n)</p> <p>No qualifications: 71, Standard Grade or Highers: 241, Vocational or HNC and HND: 240, University Education: 156, Other: 39</p> <p>Employment Status (n)</p> <p>Paid work: 626, Education or training: 8, Unemployed: 27, Not Working (due to long-term sickness or disability): 16, Retired: 32, Other: 36, Missing: 2</p>	<i>FFIT reached men from all socioeconomic groups showing the reach of football across social groups.</i>
Irvine et al 2017	35-64yrs; BMI>30 kg/m ² ; >21 alcohol units/week primary care registers and time-space sampling, a community outreach method	<p>Area Level Deprivation (n)</p> <p>Q1: 18, Q2: 9, Q3: 7, Q4: 16, Q5: 12</p> <p>Education (n)</p> <p>University Degree: 8, Vocational Qualification/Further Training: 19, High School: 35</p> <p>Employment Status (n)</p> <p>Employed: 48, Unemployed: 10, Retired: 4</p>	No Mention of Socioeconomic Profile

Johansson et al 2009	30-65yrs; BMI 30-40 kg/m ² , moderate-severe sleep apnoea N: 62, Age: 48.7*, BMI: 34.6*	Written invitation to eligible individuals on a patient database at a sleep clinic	None reported	No Mention of Socioeconomic Profile
Kaukua et al 2002	18-60yrs; BMI>35 kg/m ² N: 38, Age: 46.6*, BMI: 39.4*	Newspaper advert	Education (n) 'Basic': 6 'Higher': 32 'Basic' & 'Higher' levels of education are not defined. Employed (n) Employed: 29	No Mention of Socioeconomic Profile
Kim et al 2015	20-60yrs; BMI>25 kg/m ² ; owns mobile; uses SMS N: 205, Age: 41.3*, BMI: 27.8*	Through the headquarters of large companies. Participants worked at these headquarters mostly in administrative, management, or research departments.	Employment: Not reported in baseline characteristics, but all participants were working at headquarters of Korean companies.	No Mention of Socioeconomic Profile

Kwasnicka et al 2020	35-65yrs; BMI>28 kg/m ² N: 130, Age: 45.8, BMI: 35.0*	Australian Football League clubs fan emails, social media, word of mouth and study website.	<p>Education (n)</p> <p>Mean years of full-time education: 14.03</p> <p>Employment Status (n)</p> <p>In paid employment/self-employed: 121, Retired: 2, Other: 7</p>	<p>Socioeconomic Profile Mentioned</p> <p><i>Future trials should investigate whether findings can be replicated in other ethnic groups or whether the program requires additional tailoring to appeal to a more diverse sample of men in Australia (for example, men from culturally and linguistically diverse backgrounds, indigenous men, men from across the socioeconomic spectrum).</i></p>
Maddison et al 2019	25-65yrs; BMI>25 kg/m ² ; not meeting physical activity guidelines N = 96, Age: 42.7*, BMI: not reported	Professional rugby clubs' mailing lists, supporter registers, and Facebook pages; Facebook advertisements and newspaper coverage.	<p>Education (n)</p> <p>None: 7, 5th Form Qualification: 7, 6th Form Qualification: 2, School Qualification Higher than 6th Form: 7, National Certificate/Trade Certificate: 12, Polytechnic/University below Bachelor's degree: 7, Bachelor's Degree: 25, Degree Higher than Bachelor: 9, Other: 2, Refuse to Answer: 2</p> <p>Household Income (n)</p> <p>\$70,000/year or less: 36, More than \$70,000/year: 42, Don't Know/Refuse to Answer: 6</p>	<p>Statement about generalisability across Ethnic Groups</p> <p><i>Further, the inclusion of two rugby clubs located in different parts of the country with substantially distinct ethnic compositions (Auckland has a larger proportion of Māori and Pacific peoples compared with Dunedin), enhances the generalizability of the findings.</i></p>
Mohamad et al 2019	>16yrs; BMI>25 kg/m ² (or >30 for men aged 70+); prostate cancer diagnosis in last 36m N: 62, Age: 65.5, BMI: 29.6	Via the Urological Cancer database	None reported.	No Mention of Socioeconomic Profile

Mollentze et al 2019	>35yrs; BMI>35 kg/m ² ; weight <185kg; T2DM; on insulin for 12m+ or without oral hypoglycemic agents; Hb level >6.5%	Newspaper advertisement and private practices in the catchment area of the research unit	None reported.	No Mention of Socioeconomic Profile
	N: 18, Age: 55.1*, BMI: 40.7*			
Morgan et al 2013	18-65yrs; BMI 25-40 kg/m ²	Advertising (radio, TV, newspapers, University website) using the University media unit & via workplace emails and notices.	<p>Area Level Deprivation (n)</p> <p>Q1: 9, Q2: 25, Q3: 58, Q4: 47, Q5: 20</p> <p>Education (n)</p> <p>School: 42, Trade/Diploma: 78, University: 39</p> <p>Income (weekly AUS \$):</p> <p><\$1000: 20</p> <p>\$1000-1,500: 28</p> <p>\$1,500 or more: 105</p> <p>Unknown: 5</p>	No Mention of Socioeconomic Profile
	N: 159, Age: 47.5, BMI: 32.7			

Morgan et al 2014	18-65yrs; BMI 25-40 kg/m ² ; primary school attending child N: 93, Age: 40.3, BMI: 32.5	Recruitment strategies included school newsletters, school presentations, interactions with parents waiting to pick their children up from school, local media, and fliers distributed through local communities. Fathers were screened for eligibility via telephone.	Area Level Deprivation (n) Q1: 0, Q2: 3, Q3: 33, Q4: 57, Q5: 0	No Mention of Socioeconomic Profile
Morgan et al 2011a	18-65yrs; BMI 25-40 kg/m ² N: 110, Age: 44.4, BMI: 30.5	Shift workers recruited via staff email and promotion in staff meetings	Area Level Deprivation (n) Q1: 7, Q2:163, Q3: 47, Q4: 16, Q5: 3	No Mention of Socioeconomic Profile
Morgan et al 2011b	BMI 25-40 kg/m ² ; primary school aged child (5-12yrs) N: 53, Age: 40.6, BMI: 33.2	Media releases, school newsletters and paid advertisements in local newspapers	Area Level Deprivation (n) Q1: 1, Q2: 5, Q3: 22, Q4: 19, Q5: 6	No Mention of Socioeconomic Profile
Morgan et al 2011c	18-60yrs; BMI 25-37 kg/m ² ; male staff & students at a University	Advertisements placed on the University notice boards and website.	Area Level Deprivation (n) Q1: 1, Q2: 12, Q3: 12, Q4: 22, Q5: 5	Socioeconomic Profile Mentioned <i>'Despite the sample being recruited from a University population, socioeconomic status was representative of the general New South Wales population'</i>

	<p>N: 65, Age: 35.9, BMI: 30.6</p>		<p>Occupation (n) Student: 28, Non-academic Staff: 27, Academic Staff: 10</p>	
<p>O'Connor et al 2020</p>	<p>BMI 25-40 kg/m²; Hispanic or Latino; father figure to a child aged 5-12yrs; able to read or write in Spanish or English</p>	<p>Promotion (e.g., flyers, staff referring their patients) within a Family Health Clinic that is a Medicaid and Children's Health Insurance Plan provider for qualifying, low-income children.</p>	<p>Education Sixth grade or less 9, Eight grade or less 7, Attended some high school 7, High school graduate or 'General Education Development' 10, Technical school 2, College graduate 1</p> <p>Employment Status Not currently employed 0, Part-time 3, Full time 18, More than full time 15</p> <p>Occupation Construction 16, Machinist of Factory Worker 7, Skilled tradesman 8, Office or Sales 4, Other 1</p> <p>Income Less than \$25,000 14, \$25,000-\$46,999 20, Over \$47,000 2</p>	<p>Socioeconomic Profile Mentioned (Strength) <i>'We were able to reach a high-risk group that has not previously been targeted: low-income, overweight, or obese Hispanic fathers with lower educational levels to participate in a gender-tailored, culturally adapted program to help them with weight loss and to become more engaged with their children in promoting healthful eating and PA.'</i></p>

Ozaki et al 2019	18-39yrs; BMI>25 kg/m ² ; internet; ability to self-weigh at home	Private companies and local government agencies	Education (n) High School: 7, College/Special Training College: 2, University/Graduate School: 53, Other: 3	Socioeconomic Profile Mentioned <i>'the participants were urban dwellers with high education, and jobs with low physical demands; therefore, the results may not generalize to other male workers with different characteristics.'</i>
	N: 71, Age: 34.2, BMI: 28.7			
Patrick et al 2011	25-55yrs; BMI>25 kg/m ²	Printed advertisements to four local newspapers, radio advertisements played on three radio stations over the course of 1 to 2 weeks per radio station, a TV news story featuring our study, and flyers placed in local businesses and organizations such as libraries and medical office waiting rooms.	Education (n) Some HS/HS Graduate: 37, Some College: 126, College Graduate: 132, Postgraduate Training: 146	General statement about the sample being diverse <i>Strengths of the study include the randomized design, a large and diverse sample...</i>
	N: 441, Age: 43.9, BMI: 34.3*			

Petrella et al 2017	35-65yrs; BMI>28 kg/m ²	Recruitment occurred using a variety of methods (e.g., hockey team e-mail blasts and social media accounts, study Website, posters, traditional media advertisements, word of mouth, direct contact at team arena)	Education (n) Above High School: 59	Socioeconomic Profile Mentioned <i>Thus, findings from this pilot study should be interpreted in context of these demographic and health characteristics. Future research includes determining how to engage a more diverse sample of men across the socioeconomic spectrum in the Hockey FIT program</i>
Puhkala et al 2015	30-62yrs; WC>100cm; shift work in long-distance service; low physical activity; no sleep apnoea or diabetes medication N: 113, Age: 47.1, BMI: 33.0*	Advertisement in service stations, workplaces, and newspapers and through labor unions	Employment: Not mentioned in baseline characteristics, but all participants were long-distance truck or bus drivers.	Socioeconomic Profile Mentioned (Strength) <i>First, our study is the first randomized controlled trial on life- style counselling in long-distance drivers. The counselling was planned to be intensive and individually tailored as the group was known to be hard to reach and maintain involvement..</i>

Rounds et al 2020	18-65yrs; BMI 25-40 kg/m ² ; internet access	<p>Initial recruitment efforts were aimed at men in the workplace with less than or equal to 2 years of college education. After unsatisfactory interest from men and businesses recruitment methods shifted to enrol men outside the workplace from any educational background.</p> <p>Recruitment in and around the University of Vermont campus via email, printed recruitment posters, online advertisements to the university community, Facebook users, and local newspaper adverts.</p>	<p>Education (n)</p> <p><1 year of college: 12, 1-2 years of college: 8, >2 years of college: 91</p>	<p>Socioeconomic Profile Mentioned</p> <p><i>the majority of the participants were college-educated, white men, which is generally representative of the population in Burlington, Vermont but is not generalizable to the American population as a whole. Initial efforts were made to recruit men outside of these characteristics, but unfortunately they were not successful.</i></p>
Shin et al 2017	19-45yrs; BMI>27 kg/m ² ; smartphone use; University students	<p>Participants at SNU were recruited between June and July through advertisements in student information boards, on a university website, and in a group mailing to university students. All potential respondents were asked to make initial contact by telephone and were then instructed to visit the SNU Health Service Center to complete a screening and, if eligible,</p>	<p>Participants were university students.</p> <p>Academic Status (n)</p> <p>Undergraduate: 29, Master: 61, PhD: 15</p>	<p>Broad statement about lack of generalisability</p> <p><i>Major limitations of this study include a pilot-scale small sample size and selected population of male college students. Further larger-scale studies with a more general population sample, including women, would be required to assess the effectiveness and confirm the generalizability of our findings.</i></p>

written consent and baseline assessment.

			Education (n)	Socioeconomic Profile Mentioned
Ventura Marra et al 2019	40-70yrs; BMI>30 kg/m ² ; and at least one of hypertension, hyperlipidemia, pre- diabetes & diabetes	Primary Care Practitioner letter	High School Graduate: 16, Some College: 14, College Graduate: 29	<i>our sample is of higher income and educational level than the state average. The inclusion criteria requiring access to a computer and high-speed internet may have limited low-income men or those with low computer literacy from participating.</i>
	N: 59, Age: 59.0, BMI: 36.9			

Wyke et al 2019	30-65yrs; BMI>27 kg/m ²	Football clubs led recruitment of participants using emailed invitations to fans, the club website, social media posts, features in local press, and match-day recruitment.	Education (n)	Socioeconomic Profile Mentioned
	N: 1113, Age: 45.8, BMI: 33.3*		<12yrs: 256 12-15yrs: 421 >15yrs: 419	<i>Although Euro-FIT attracted men from across the socioeconomic spectrum, the majority who took part were well educated and in paid work.</i>
			Employment Status (n)	
			Working Full-Time: 882, Working Part-Time: 75, Not Working (Unable): 54, Not Working (Other): 83	
			Income Categories*:	
			1 (lowest): 64, 2: 188, 4: 269, 5: 250, Don't Know: 18, Rather Not Say: 73	
			*Income Category 3 data is missing in this paper	
Young et al 2017	18-65yrs; BMI 25-40 kg/m ²	Radio interviews and newspaper articles	Area Level Deprivation (n)	No Mention of Socioeconomic Profile
	N: 92, Age: 49.2, BMI: 30.7		Q1: 3, Q2: 12, Q3: 38, Q4: 28, Q5: 11	
			Education (n)	
			Achieved a post-school qualification: 74	

Employment Status (n)Currently Employed: 79

Notes.

*Overall mean (BMI or age) approximate due to separate reporting of intervention and control groups baseline data.

Area Level Deprivation: Q1 represents the most deprived postcode quintile areas and Q5 represents the least deprived postcode quintile areas.

For the Australian based studies, the measure used for area level deprivation was the Australian Bureau of Statistics Index of Relative Socioeconomic Advantage and Disadvantage (Morgan et al 2011a, Morgan et al 2011b, Morgan et al 2011c, Morgan et al 2013, Morgan et al 2014, Aguiar et al 2016, Young et al 2017). For studies in Scotland, the Scottish Index for Multiple Deprivation was (Gray et al 2013, Hunt et al 2014, Irvine et al 2017, Dombrowski et al 2020). One study in England used the Index of Multiple Deprivation (Griffin et al 2019).

Appendix D: Interview Topic Guide – Stakeholders

NOTE: The following content may be adapted depending on whether the interview is with an individual or a focus group.

Acknowledgement of country, specific to area the interview is undertaken [for focus groups]

Welcome. The discussion today will last around one hour. We are going to talk about how a program called Aussie-Fans in Training (Aussie-FIT) might be helpful for men living in non-metro, and rural/regional areas of Australia, and we'd like to seek your views on how we can ensure the program is appropriately customised to suit men in your area. Aussie-FIT is a footy-themed, free men's weight loss program that we have run in Perth. With some funding from the Department of Health we are looking to see if we can now run the Aussie-FIT in rural and regional WA, including X [name location of interview]. It's a program for men to help them lose some weight, by helping them become more active and to eat better. An important attraction of the Aussie-FIT program was the link to AFL clubs (Eagles and Dockers) and the 'footy feel' of the program. The program involved 12 weekly 90-minute workshops delivered to groups of 15 men by a coach with an AFL background at footy clubs. The program was delivered at footy clubs (East Perth Oval and Freo Training Facilities) and involved the guys doing some footy related training exercises. A key component of the program is the educational components designed to help motivate the men taking part to make some changes to what they eat and how active they are outside of the weekly sessions, and beyond the 12 week program.

The aim of today's discussion is to help us work out how the Aussie-Fans in Training (Aussie-FIT) program can be run in [area name] to reach a variety of men. We are keen to learn from and work with stakeholders who are from this area, or are experienced in doing similar work, to help us understand the best ways that the program can be designed to be delivered in [area name] and/or other rural/regional areas, and what changes may need to be made to the program to appeal to men from different backgrounds. Anything you say is important to me so please don't be afraid of speaking your mind. I will audio-record the discussion today. There are no right or wrong answers – just ideas and opinions, which are all valuable to us.

It will be useful to introduce ourselves to each other, say something about who you are, where you are from, your job or voluntary work, your connection with or how long you have lived in [area name] or other rural/regional areas. I will start...

Before we speak specifically about the Aussie-FIT program, the initial questions relate to what might make it easy or difficult for people living in [area name], to be active and eat a healthy diet.

- What do you think makes it difficult to be active in [area name]? What makes it easier to be active?
[prompt: park/green spaces, cost of gyms/groups etc., sports clubs, infrastructure for walking/cycling, convenience of car use, lack of options, weather, knowledge]
- Are there any differences in what makes it easy or difficult to be active between men and women in [area name]? *[prompt: weight loss groups, sports clubs, societal/cultural expectations]*
- What makes it difficult to eat a healthy diet in [area name]? What makes it easier to eat a healthy diet?
[prompt: knowledge of what is/isn't healthy, cost, availability, support from family/friends]

- Are there any differences in what makes it easy or difficult to eat well between men and women in *[area name]*? *[prompt: weight loss groups, societal/cultural expectations]*
- Do some of the factors discussed around being active and eating a healthy diet relate generally to more rural areas in Australia or are they mostly specific to *[area name]*?

The next questions are about what kind of community health promotion programs are or have been available in *[area name]* and what general factors may be important to consider for running these types of programs.

- Can you describe any examples of community health promotion programs (e.g. weight loss or physical activity programs) that are available or have been available in the area? How successful have these programs been? What challenges have you or others faced in running local programs?
- Do you know of any programs that were originally delivered in urban/city areas like Perth, before being implemented in *[area name]* or other more rural areas? Which programs?
- Are there any key factors/challenges that need to be considered when bringing any program from the city to *[area name]* or to other more rural areas? *[prompt: seasonal work, weather]*
- Is there or has there been anything targeted towards men? If you were to set up a group-based face to face health promotion (e.g. physical activity/weight management) group program specifically for men in *[area name]*, what kind of practical factors might you consider? *[prompts: time of day, venue, appeal of program, seasonality/weather]*
- Is there anything that might encourage or discourage men in *[area name]* from participating in such programs? *[prompts: time of day, program appeal/'hooks', seasonality, other commitments/family/work, societal expectations of men]*

An important draw of the Aussie-FIT program was the link to AFL clubs (Eagles and Dockers) and the fact the program was delivered at club facilities in Perth. For example, the program was publicised via the clubs social media/websites, men got behind the scenes tours, visits from a first team player and the men got club t-shirts *[researcher shows pictures/short video of Aussie-FIT in action on an I-Pad]*. These 'hooks' were very effective but maintaining these links with AFL clubs may not be possible, so creating alternatives to get the same 'buy in' from men in *[area name]* will be important. We are really interested in whether the program could be extended to areas like here in *[area name]*.

- It may not be possible, but if it were, would maintaining a link with the Eagles and/or Dockers be appealing to men in *[area name]*? Why so/why not? Are the Eagles or Dockers more popular in *[area name]*?
- How popular are local footy clubs in *[area name]*? Do many people follow a local team or go to games? Are people interested in the local clubs' results?
- Could Aussie-FIT draw on the appeal of local footy clubs rather than the AFL clubs? Could the 'behind the scenes tour/bump into players' attraction be replicated at local club level? If so, how?

- Some more rural clubs have links with WAFL clubs – do you know if any local *[area name]* clubs have this kind of link (*refer to local example, e.g. Claremont Tigers and the Great Southern*)? Could Aussie-FIT draw on WAFL club links, and might this be appealing to local men?
- Do you have any other ideas about how a similar ‘buzz’ or level of interest could be created locally if endorsement/publicity through the AFL clubs was not possible?
- Sometimes programs aimed at men struggle to get enough interest. How might we best recruit men to participate in the Aussie-FIT program within *[area name]*? *[Prompts: Local newspaper, social media, word of mouth, organisation or footy club endorsement/involvement]*
- Where might the best venue(s) be for delivering the program that would allow for some practical physical activity and educational parts of the session, but could maintain the feel of it being a men’s space or footy environment?

Most of the men that participated in Aussie-FIT were guys that lived in the Perth metro area. We want to see how best we can run the program in more rural areas to reach men from diverse backgrounds.

- How might we make the program appealing and inclusive to men from across different backgrounds in *[area name]*? *[Prompt: local community program advocates, language, getting the footy ‘hook’ right]*
- How might we best get men from different backgrounds interested in participating in the program? *[see above prompt]*
- Is there anything that has worked well or has not worked well for trying to reach diverse groups of people in programs before? *[Prompt: working with local people]*

Next, we will cover a bit more about what other factors might make it difficult to implement Aussie-FIT within *[area name]* and what factors could help the program be successful and sustainable

- What challenges could we face when delivering the program in *[area name]*? *[prompts: recruitment, venues, coaches, participant time, conflict between fans of different clubs]*
- What factors might help the program be successful? *[prompts: buy in from stakeholders, experienced/enthusiastic coaches]*
- Are these factors unique to *[area name]* or are some of these factors likely similar in other more rural areas? Are there additional or different factors that should be considered for other places that are smaller/bigger/more rural/less rural than *[area name]*?
- A key challenge is the sustainability of programs. How can programs like Aussie-FIT continue to be offered in a sustainable and inclusive way beyond the piloting stage? *[note: we want to make the program appealing for all men, including those less well-off, so providing the program free of charge to men is important]*
- What kind of things do we need to think about at this stage to work towards a sustainable offering? *[prompt: community connections, asset-based approach, funding streams]*

Thank you all for your time. Do you have any final comments that you would like to add before we finish up?

Appendix E: Rural Aussie-FIT Coach Role Flyer

Community Coach Role



Do you have...

- A passion or interest in footy?
- Some coaching experience?
- An interest in helping men improve their health?

Becoming an **Aussie-FIT** coach could be for you....

Benefits

- \$49.71/hour for 3 hours per weekly session
- have fun and help men improve their health



What is Aussie-FIT?

- Free footy-themed men's health program
- Weekly 90 minute sessions over 12 weeks
- Each session involves education & physical activity

How to find out more

Click [here](#) or scan the barcode for more detailed information



If this role could be for you, please email or phone Aussie-FIT program lead Associate Professor Eleanor Quisted to discuss this opportunity further

Phone: 08 9266 5693

Email: aussiefit@curtin.edu.au



www.aussiefit.org

Appendix F: Paid Rural Aussie-FIT Facebook Post Example

 **Aussie-FIT**
25 August 2021 · 🌐

Aussie-FIT is coming to Albany from September 2021....

Aussie-FIT is a free footy-themed program for men (aged 35-65yrs) that would like to lose some weight, get active and improve their mental health 🍌💪😊

- ✅ Unique footy-themed men's health program
- ✅ Have a laugh with likeminded blokes
- ✅ A supportive, easy-going setting
- ✅ Weekly 90 minute sessions over 12 weeks
- ✅ Indoor education & outdoor activity tailored to your fitness level
- ✅ No footy experience required

Where? Retravision Stadium, Lockyer Avenue, Albany

When? Initial program starts Thursdays (5.30-7pm) from 23rd Sept. Other program dates & timings to be confirmed.

For more info, to check the criteria, and register your interest go to: <http://www.aussiefit.org/regional-aussie-fit.html>

Or contact Matt (text, call or email) if you have any questions or queries:

📞 0481 458 730
✉️ aussiefit@curtin.edu.au

Places are limited.

This Initiative received grant funding from the Australian Government.
Curtin University Human Research Ethics Committee (HREC) has approved this study (HREC number: 2021-0217)



Appendix G: Baseline Questionnaire

1. Recruitment

We are interested in finding out how people hear about the Aussie-FIT program. How did you **FIRST** find out about Aussie-FIT? Please **TICK ONE BOX** that applies to you:

Heard about it from another man interested in taking part.

How did they hear about it? [free text]

Heard about it from a friend, family member or partner who is not taking part.

How did they hear about it? [free text]

Heard about it from a local organisation employee or volunteer

Which organization? [free text]

Social Media

Facebook Twitter

Local Media

Radio Newspaper

Promotional Materials

Flyer Leaflet

Other

Other; please say what:

We are also interested in finding out how effective our efforts to publicise the Aussie-FIT program have been, and whether you have seen or heard about the program via multiple sources. Where have you seen or heard about Aussie-FIT?

Please tick **ALL BOXES** that apply to you.

Heard about it from another man interested in taking part.

How did they hear about it? [free text]

Heard about it from a friend, family member or partner who is not taking part.

How did they hear about it? [free text]

Heard about it from a local organisation employee or volunteer

Which organization? [free text]

Social Media

Facebook Twitter

Local Media

Radio Newspaper

Promotional Materials

Flyer Leaflet

Other; please say what:

	Please indicate how important each of the following statements were in your decision to take part in the Aussie-FIT program.	Not important			Somewhat Important			Very important
A	The group social aspect appealed to me	1	2	3	4	5	6	7
B	The footy program theme appealed to me	1	2	3	4	5	6	7
C	I wanted to improve my physical health	1	2	3	4	5	6	7
D	I wanted to improve my mental health	1	2	3	4	5	6	7
E	My partner encouraged me to take part	1	2	3	4	5	6	7
F	Other family or friends encouraged me to take part	1	2	3	4	5	6	7
G	A local organization employee or volunteer encouraged me	1	2	3	4	5	6	7
H	I wanted to become more active	1	2	3	4	5	6	7
I	The venue was convenient for me	1	2	3	4	5	6	7
J	I wanted to improve my diet	1	2	3	4	5	6	7
K	The venue was convenient	1	2	3	4	5	6	7
B	The time/day of the program was convenient	1	2	3	4	5	6	7
C	I wanted to lose weight	1	2	3	4	5	6	7
D	I knew guys that signed up before coming to the program	1	2	3	4	5	6	7
E	I knew the Aussie-FIT coach before coming to the program	1	2	3	4	5	6	7
F	A men-only program appealed to me	1	2	3	4	5	6	7
G	The program was free of charge	1	2	3	4	5	6	7

Are there any other reasons, not mentioned above, that encouraged you to take part in Aussie-FIT?

Yes No

If yes, please list the reasons here *[free text]*

1. Demographics

About You...

This section asks you for a few details about you and your current circumstances.

1. What is your postcode? _____

2. How old are you? _____

3. To which ethnic group do you most identify? (*select one*)

Aboriginal

African

Caucasian

Asian

Torres Strait Islander

Mixed

Pacific Islander

Other, please specify

4. Are you...? (*select one*)

single, that is never married

married and living with spouse

married but separated from spouse

living with someone as a couple (but not married)

divorced

widowed

other, please specify:

5. What is your highest level of education?
- No qualifications
 - High school
 - TAFE
 - University degree or above
6. How many years of full-time education have you completed? _____
7. Which of these descriptions best describes what you were doing **last week**? (*Select one*)
- in paid employment or self-employed (or temporarily away)
 - doing unpaid work for a business that you own, or that a relative owns
 - waiting to take up paid work already obtained
 - on a Government scheme for employment training
 - looking for paid work or a Government training scheme
 - intending to look for work but prevented by temporary sickness or injury
 - permanently unable to work because of long-term sickness or disability
 - going to college full-time (including on holiday)
 - retired from paid work
 - looking after home or family
 - doing something else (please specify) _____
8. How many hours do you work on **average per week**? E.g., 35 hours _____

2. Self-reported diet and drinking

Your diet and drinking

The next section looks at what you may have eaten and drunk over the **last 7 days**.

Please read each question carefully, ticking appropriate box for each option that best represents what you did.

1. About how many times **over the last 7 days** did you eat breakfast?

No times
₁

1-2 times
₂

3-5 times
₃

6 or more times
₄

2. About how many times **over the last 7 days** did you eat or drink following? (Please select one box on each line)

	No times	1-2 times	3-5 times	6 times or more
Cheddar and hard cheeses (any except cottage or ricotta)	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
Beef burgers or sausages	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
Beef, pork or lamb	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
Fried food (e.g. fried fish)	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
Hot chips or fries	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
Bacon, ham, salami or frankfurters	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
Pies, sausage rolls, quiches or pastries	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
Potato chips/crisps or twisties	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
Fast foods (burgers, pizza, chicken & chips from places like McDonalds, Hungry Jacks, Pizza Hut, KFC or Red Rooster)	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
Nuts	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄

3. Are you a vegetarian (select one)

Yes

No

4. Thinking about **the last 7 days**, about how many times a day did you eat the following: (Please select one on each line)

	Less than once a day	1-2 times a day	3-5 times a day	6 times a day or more

Fruit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
vegetables (not potatoes)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chocolate, sweets, lollies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cakes, muffins, sweet biscuits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sugary drinks (fizzy drinks, sports drinks, cordial, energy drinks, fruit drinks)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. Thinking about **the last 7 days**, about how much milk did you use in a day, for drinking or in cereal, tea or coffee? (select one)

I didn't use milk at all

Less than ½ cup

½ cup

1 cup

2 cups or more

6. What kind of milk do you usually use? (select one)

Full cream

Hilo/reduced fat

Skim

I used 'alternative' milk option, e.g., soya milk, almond milk

6 Thinking about the last 7 days how much alcohol have you had to drink each drink?

6 A Please select which day is **TODAY**

Mon Tues Wed Thurs Fri Sat Sun

6 B Starting with yesterday and work back through the week, record the number of pints, glasses etc you had **each day**.

RECORD IN PINTS	RECORD IN GLASSES 1 bottle wine = 6 glasses 1 bottle sherry = 12 glasses	RECORD IN MEASURES 1 bottle spirits = 27 measures ¼ bottle = 7 measures
------------------------	---	--

	BEER LAGER CIDER		WINE		FORTIFIED WINE		SPIRITS		OTHER (specify) <small>...</small>	
	PINTS		GLASSES		GLASSES		MEASURES			
MONDAY										
TUESDAY										
WEDNESDAY										
THURSDAY										
FRIDAY										
SATURDAY										
SUNDAY										

6 C If you selected **OTHER** in the table above, please specify:

3. Positive and Negative Affect

Reference: Thompson ER. Development and validation of an internationally reliable short-form of the positive and negative affect schedule (PANAS). *J Cross-Cult Psychol* 2007;38(2):227-42.

Your feelings and emotions

During **last month**, I generally felt: *(Please select one on each line)*

	Not at all	A little	Moderately	Quite a lot	Extremely
	Not at all	A little	Moderately	Quite a bit	Extremely
1. ... upset	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
2. ... hostile	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
3. ... alert	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
4. ... ashamed	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
5. ... inspired	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
6. ... nervous	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
7. ... determined	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
8. ... attentive	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
9. ... afraid	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
10. ... active	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

4. International Physical Activity Questionnaire (short form)

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

_____ **days per week**

No vigorous physical activities → **Skip to question 3**

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

_____ **hours per day**

_____ **minutes per day**

Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ **days per week**

No moderate physical activities → **Skip to question 5**

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

_____ **hours per day**

_____ **minutes per day**

Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____ **days per week**

No walking **→** *Skip to question 7*

6. How much time did you usually spend **walking** on one of those days?

_____ **hours per day**

_____ **minutes per day**

Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

_____ **hours per day**

_____ **minutes per day**

Don't know/Not sure

5. Self-Esteem Scale

Reference: Rosenberg M. Rosenberg self-esteem scale (RSE). Acceptance and commitment therapy Measures package 1965;61

Your thoughts about yourself

Below is a list of statements dealing with your general feelings about yourself. Please responds to the following statements thinking about how you have felt **during the last month**. (*Please select one from each line*)

	Strongly agree	Agree	Disagree	Strongly disagree
1. On the whole, I am satisfied with myself.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
2. At times, I think I am no good at all.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
3. I feel that I have a number of good qualities.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
4. I am able to do things as well as most other people.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
5. I feel I do not have much to be proud of.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
6. I certainly feel useless at times.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
7. I feel that I'm a person of worth, at least on an equal plane with others.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
8. I wish I could have more respect for myself.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
9. All in all, I am inclined to feel that I am a failure.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
10. I take a positive attitude toward myself.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄

6. Economic Evaluation Measures – EQ-5DL

Reference: Herdman M, Gudex C, Lloyd A, et al. Development and preliminary testing of the new five-level version of EQ-5D (EQ-5D-5L). *Quality of life research* 2011;20(10):1727.
EuroQol Office. EQ-5D-5L 2017 [cited 2017 29th November 2017]. Available from: <https://euroqol.org/eq-5d-instruments/eq-5d-5l-about/2017>.

Your health

Under each heading, please select the **ONE** box that best describes your health **today**

MOBILITY

- I have no problems in walking about
- I have slight problems in walking about
- I have moderate problems in walking about
- I have severe problems in walking about
- I am unable to walk about

SELF-CARE

- I have no problems washing or dressing myself
- I have slight problems washing or dressing myself
- I have moderate problems washing or dressing myself
- I have severe problems washing or dressing myself
- I am unable to wash or dress myself

USUAL ACTIVITIES (*e.g. work, study, housework, family or leisure activities*)

- I have no problems doing my usual activities
- I have slight problems doing my usual activities
- I have moderate problems doing my usual activities
- I have severe problems doing my usual activities
- I am unable to do my usual activities

PAIN / DISCOMFORT

- I have no pain or discomfort
- I have slight pain or discomfort
- I have moderate pain or discomfort
- I have severe pain or discomfort
- I have extreme pain or discomfort

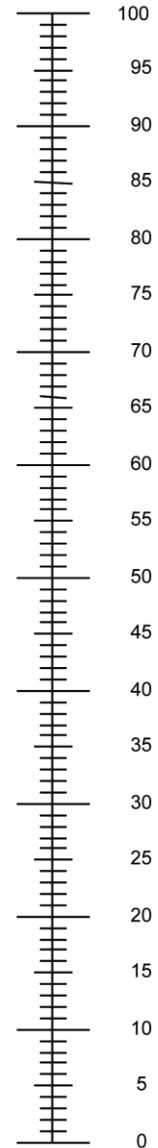
ANXIETY / DEPRESSION

- I am not anxious or depressed
- I am slightly anxious or depressed
- I am moderately anxious or depressed
- I am severely anxious or depressed
- I am extremely anxious or depressed

- We would like to know how good or bad your health is **today**.
- This scale is numbered from **0** to **100**.
- **100** means the best health you can imagine.
0 means the worst health you can imagine.
- Mark an **X** on the scale to indicate how your health is **TODAY**.
- Now, please write the number you marked on the scale in the box below.

YOUR HEALTH TODAY =

The best health
you can imagine



The worst health
you can imagine

Appendix H: Post-program Evaluation Form

Q1	Please indicate <u>the extent to which you agree</u> with the following statements about the Aussie-FIT program. Thank you!	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
A	The Aussie-FIT program was a worthwhile investment of time for me	1	2	3	4	5	6	7
B	The Aussie-FIT program was beneficial for me.	1	2	3	4	5	6	7
C	I enjoyed the Aussie-FIT program.	1	2	3	4	5	6	7
D	The program helped me to feel confident to use what we learnt to improve my eating.	1	2	3	4	5	6	7
E	The program sufficiently prepared me to improve my eating	1	2	3	4	5	6	7
F	The program helped me to feel confident to use what we learnt to be regularly physically active.	1	2	3	4	5	6	7
G	The program sufficiently prepared me to be regularly physically active in my daily life	1	2	3	4	5	6	7
H	The Aussie-FIT program met my expectations.	1	2	3	4	5	6	7
I	It was important to me that Aussie-FIT was a male only program	1	2	3	4	5	6	7
J	I would recommend the Aussie-FIT program to others	1	2	3	4	5	6	7

Q2. Aussie-FIT is currently offered free of charge and externally funded. If this were not the case, how much would you have been willing to pay for this 12-week program?

.....

.....

.....

Q3. How could we improve Aussie-FIT?

.....

.....

Q4. Did you miss any Aussie-FIT sessions? Yes No (If no, please skip this question)

	If yes, please indicate <u>the extent to which</u> the following reasons apply for missing one or more Aussie-FIT sessions	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
--	---	--------------------------	-----------------	--------------------------	----------------	-----------------------	--------------	-----------------------

A	I had other commitments with friends or family	1	2	3	4	5	6	7
B	I did not enjoy the program	1	2	3	4	5	6	7
C	It was difficult for me to get transport to the venue	1	2	3	4	5	6	7
D	I did not feel comfortable in the group	1	2	3	4	5	6	7
E	The day of the sessions was not convenient for me	1	2	3	4	5	6	7
F	The time of the sessions was not convenient for me	1	2	3	4	5	6	7
G	Mental health reasons	1	2	3	4	5	6	7
H	Physical health reasons	1	2	3	4	5	6	7
I	I did not lose weight	1	2	3	4	5	6	7
J	I did not get along with others in the group	1	2	3	4	5	6	7
K	I did not find the Aussie-FIT sessions helpful	1	2	3	4	5	6	7
L	I did not get along with the coach	1	2	3	4	5	6	7
M	I was too busy	1	2	3	4	5	6	7
N	I went on holiday	1	2	3	4	5	6	7
O	I picked up an injury	1	2	3	4	5	6	7
P	Work commitments	1	2	3	4	5	6	7
Q	I forgot	1	2	3	4	5	6	7

Are there other reasons not mentioned in question 2 for missing program sessions?

Yes No

If yes, please list any other reasons you have withdrawn from the program that are not listed *[free text]*

.....

.....

Q5. What can we do differently to support men to attend regularly and stay in the program until the end? *[free text]*

.....

.....

Q6. The statements below refer to the ways **the main coach in your Aussie-FIT sessions** may have interacted with you about physical activity and healthy eating during the program. Please respond to the statements thinking about your experiences in the last month.

	The Aussie-FIT coach...	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
A	... gave me the freedom to make my own choices	1	2	3	4	5	6	7
B	... supported my decisions	1	2	3	4	5	6	7
C	... supported the choices that I made for myself	1	2	3	4	5	6	7
D	... encouraged me to make my own decisions	1	2	3	4	5	6	7
E	... encouraged my weight loss efforts	1	2	3	4	5	6	7
F	... provided encouraging feedback	1	2	3	4	5	6	7
G	... acknowledged my ability to achieve my weight loss goals	1	2	3	4	5	6	7
H	... told me that I can accomplish things	1	2	3	4	5	6	7
I	... took an interest in my weight loss behaviours	1	2	3	4	5	6	7
J	... showed their support for me	1	2	3	4	5	6	7
K	... showed they really care about my weight loss efforts	1	2	3	4	5	6	7
L	... showed their understanding of my challenges in losing weight	1	2	3	4	5	6	7

Q7. Describe the aspects of the Aussie-FIT program which you found most useful (please elaborate as needed):

.....

.....

Q8. Describe the aspects of the Aussie-FIT which you found least useful (please elaborate as needed):

.....

.....

Q9	The Aussie-FIT program included various content and activities throughout the program to help participants change their eating and physical activity behaviours and maintain those changes. Please indicate <u>how helpful</u> you found each of the following activities, in terms of making changes to your own behaviours:	Unhelpful	Quite helpful	Very helpful	N/A – I missed this session	N/A – I Don't remember this	N/A – I chose not to do this
1	Keeping a food diary (week 1)	1	2	3			
2	Setting weight loss goals (week 2)	1	2	3			
3	Setting physical activity goals (week 2)	1	2	3			
4	Setting eating goals (week 2)	1	2	3			
5	Using the Fitbit to self-monitor my activity (throughout)	1	2	3			
6	Discussions about identifying my different types of motivation (red, green) (week 1)	1	2	3			
7	Australian guide to healthy eating/food groups and portion sizes activity (week 2)	1	2	3			
8	Talking about junk foods and food swaps (week 3)	1	2	3			
9	Learning about food labels (week 4)	1	2	3			
10	Action and coping planning (week 4)	1	2	3			
11	Cutting down on booze (week 5)	1	2	3			
12	Weights as representation of weight lost (week 7)	1	2	3			
13	Tips for decreasing sedentary time (week 7)	1	2	3			
14	Facts about fat, salt, and sugar (week 8)	1	2	3			
15	Eating out/looking at food menus (week 10)	1	2	3			
16	Tips for cooking at home (week 11)	1	2	3			
17	Tips for maintaining weight loss (week 12/throughout)	1	2	3			
18	Weekly goal reviews and revisions (throughout)	1	2	3			
19	Regular review of personal motivation (throughout)	1	2	3			

Q10. Is there anything else you would have liked to see included in Aussie-FIT?

.....

.....

Appendix I: Withdrawal Survey

We want to learn more about why some men do not complete the Aussie-FIT program. Any feedback that you can provide us with is very important to us. We will use this information to help improve the program in the future. This short survey will take approximately 5-10 minutes, and a researcher will email you a \$20 voucher as a thank you for answering the questions. Thank you for your time.

Q1	Please indicate <u>the extent to which you agree</u> with the following statements about the Aussie-FIT program. Thank you!	Strongly disagree			Neutral			Strongly agree
A	The Aussie-FIT program was a worthwhile investment of time for me	1	2	3	4	5	6	7
B	The Aussie-FIT program was beneficial for me.	1	2	3	4	5	6	7
C	I enjoyed the Aussie-FIT program.	1	2	3	4	5	6	7
D	The program helped me to feel confident to use what we learnt to improve my eating.	1	2	3	4	5	6	7
E	The program sufficiently prepared me to improve my eating	1	2	3	4	5	6	7
F	The program helped me to feel confident to use what we learnt to be regularly physically active.	1	2	3	4	5	6	7
G	The program sufficiently prepared me to be regularly physically active in my daily life	1	2	3	4	5	6	7
H	The Aussie-FIT program met my expectations.	1	2	3	4	5	6	7
I	It was important to me that Aussie-FIT was a male only program	1	2	3	4	5	6	7
J	I would recommend the Aussie-FIT program to others	1	2	3	4	5	6	7

Q2	Please indicate <u>the extent to which</u> the following reasons apply for withdrawing the Aussie-FIT program sessions.							
		Strongly disagree			Neutral			Strongly agree
A	I had other commitments with friends or family	1	2	3	4	5	6	7
B	I did not enjoy the program	1	2	3	4	5	6	7
C	It was difficult for me to get transport to the venue	1	2	3	4	5	6	7
D	I did not feel comfortable in the group	1	2	3	4	5	6	7
E	The day of the sessions was not convenient for me	1	2	3	4	5	6	7
F	The time of the sessions was not convenient for me	1	2	3	4	5	6	7
G	Mental health reasons	1	2	3	4	5	6	7
H	Physical health reasons	1	2	3	4	5	6	7
I	I did not lose weight	1	2	3	4	5	6	7
J	I did not get along with others in the group	1	2	3	4	5	6	7
K	I did not find the Aussie-FIT sessions helpful	1	2	3	4	5	6	7
L	I did not get along with the coach	1	2	3	4	5	6	7
M	I was too busy	1	2	3	4	5	6	7
N	I picked up an injury at the program	1	2	3	4	5	6	7
O	Work commitments	1	2	3	4	5	6	7

Q3. Are there other reasons not mentioned in question 2 for withdrawing the program?

Yes No

If yes, please list any other reasons you have withdrawn from the program that are not listed [*free text*]

.....

.....

Q4. What can we do differently to improve men's experience of the program? *[free text]*

.....
.....
.....

Q5. What can we do differently to support men to attend regularly and stay in the program until the end? *[free text]*

.....
.....
.....

Appendix J: Participant Focus Group Topic Guide

Introduction

- Welcome. I want to find out what prompted you to take part in the Aussie-FIT program, what you thought of the program, how it may have affected your life (or not) and any changes you would like to see made to the programme. The discussion will last about 1 hour.
- I am here as a sort of chairperson to make sure that everyone gets a chance to speak. Anything you say is important to us so please don't be afraid of speaking your mind.
- I am audio-recording the discussion, and the recordings will be kept for 7 years after the project finishes, but everything you say will be treated in the strictest confidence. All names mentioned will be changed for publication/presentation purposes
- Discuss some discussion 'rules' with the group. For example, only one person talks at a time, be respectful of others, it is important to hear everyone's ideas and opinions, there are no right or wrong answers – just ideas, experiences, and opinions, which are all valuable; important to hear all positive and negative perspectives; assure confidentiality – “what is shared in the room stays in the room”.
- Start by getting the men to introduce themselves and say what they had for breakfast (for voice identification).

Program Recruitment / Reach

Let's start by thinking back to when you first got involved in Aussie-FIT.

- How did you find out about Aussie-FIT? Why did you join the program? [probes: footy-focus; men-only; free; improve health]
- Did other people influence your decision to sign-up [probes: family, friends, partners, Aussie-FIT coach, other participants]? Did you encourage others to participate? In what ways?
- What could we have done differently to get the word out about Aussie-FIT?

Aussie-FIT Program

The next few questions are about your experience taking part in Aussie-FIT.

- What differences (positive or negative) has the Aussie-FIT program made to you? [probes: weight loss; diet; being active; making friends]
- If Aussie-FIT had a positive impact, what was it about the program that was helpful? [probes: group interaction; FitBit; Self-Monitoring; Goal Setting]. What was unhelpful?
- How would you describe the group dynamics/atmosphere during Aussie-FIT? Did this change over the 12 weeks?
- What are your thoughts on your coach's general style/approach? Did it change over the 12 weeks?
- Did you know the coach, or anyone else taking part in the program before you started? If so, was this helpful or unhelpful?
- What did you think about the program attendance over the 12 weeks?
- What do you think kept men coming along? Why do you think some men dropped out or missed sessions?
- What might encourage guys to attend regularly and/or stay until the end of the program?

Summary

Finally, I would like to discuss with you how things have been since you finished the 12-week program and some general reflections on the program.

- What is next now the program has ended? (**probes:** physical activity groups, meet other participants)
- How does living in *[area name]* affect your ability to live a healthy lifestyle? Do you foresee any challenges to maintaining any positive changes that you have made?
- For Aussie-FIT to run again in *[area name]*, or other regional towns, is there anything that you think should be done differently?
- Is there anything else that you think is important to discuss that we have not covered today?

Thank you all for your time today.

Appendix K: Self-Reported Recruitment Source

Recruitment Source		Site 1 (n=29)	Site 2 (n=26)	Site 3 (n=26)	Total (n=81)
The <u>first</u> source where participants saw or heard about rural Aussie-FIT					
Facebook	n	8	16	16	40
Another man interested in participating	n	7	1	1	9
Partner	n	6	3	3	12
Other friends, family members or colleagues	n	1	0	1	2
From an Aussie-FIT coach	n	3	0	2	5
Local organisation employee or volunteer	n	2	0	0	2
Local newspaper	n	0	6	1	7
Local football club	n	2	0	1	3
Other source	n	0	0	1	1
<u>All</u> sources where participants saw or heard about rural Aussie-FIT					
Facebook	n	13	19	18	50
Another man interested in participating	n	11	8	2	21
Partner	n	11	4	3	18
Other friends, family members or colleagues	n	5	2	2	9
From a rural Aussie-FIT coach	n	5	0	3	8
Local organisation employee or volunteer	n	4	3	2	9
Local radio	n	1	1	0	2
Local newspaper	n	0	8	2	10
Local Footy Club	n	2	3	1	4
Poster or Flyer	n	5	0	1	6
Total number of sources where participants seen or heard about rural Aussie-FIT					
One source	n	11	12	20	43
Two sources	n	12	9	3	24
Three or more sources	n	6	5	3	14

Note

Self-reported data is missing for two participants (one in site 2 and one in site 3) that did not complete the baseline questionnaire.

Appendix L: Rural Aussie-FIT Baseline Characteristics

Rural Aussie-FIT Baseline Sample Characteristics

		Site 1 (n=29)	Site 2 (n=27)	Site 3 (n=27)	Total (n=83)
Age (years)	Mean (SD)	46.1 (10.1)	49.3 (8.9)*	50.0 (9.7)	48.4 (9.6)
Weight (kg)	Mean (SD)	112.4 (19.3)	106.3 (21.8)	108.1 (12.9)	109.0 (18.6)
Height (cm)	Mean (SD)	178.3 (6.8)	179.1 (6.6)	178.6 (5.2)	178.7 (6.2)
BMI (kg/m ²)	Mean (SD)	35.4 (6.1)	33.0 (5.7)	33.9 (3.4)	34.1 (5.3)
≥25-<28	N	1	2	1	4
≥28-<30	N	5	8	2	15
≥30-<35	N	10	11	13	34
≥35-<40	N	8	3	10	21
>40	N	4	3	1	8
Waist Circumference (cm)	Mean (SD)	119.2 (14.1)	116.3 (15.2)*	116.7 (9.9)	117.5 (13.0)
Diastolic Blood Pressure (mm/Hg)	Mean (SD)	90.3 (8.9)	92.6 (9.7)	89.9 (9.4)	90.9 (9.3)
Systolic Blood Pressure (mm/Hg)	Mean (SD)	137.8 (14.3)	147.9 (14.2)	138.7 (14.1)	141.4 (14.8)
SEIFA-IRSD Index (quintiles)	N	29	26	25	80
1 (most disadvantaged)	N	16	0	1	17
2	N	8	0	19	27
3	N	2	26	5	33
4	N	3	0	0	3
5 (least disadvantaged)	N	0	0	0	0
Educational Attainment	N	29	26	26	81
No qualifications	N	0	1	0	1
High School	N	15	5	12	32
TAFE	N	4	15	8	27
University degree or above	N	10	5	6	21
Years of full-time education*	Mean (SD)	12.7 (3.6)	11.8 (2.7)	12.0 (3.0)	12.0 (3.1)
Employment	N	29	26	26	81
Paid employment or self-employed (or temporarily away)	N	26	26	19	71
Retired from paid work	N	1	0	0	1
Not Working, Other	N	2	0	7	9
Working hours per week	Mean (SD)	43.9 (15.9)	40.9 (9.1)	38.3 (15.3)	41.3 (13.9)
Ethnicity	N	29	26	26	81
Aboriginal	N	2	2	1	5
Caucasian	N	26	23	24	73
Mixed	N	0	1	0	1
Other	N	1	0	1	2

Note.

*Site 2 is missing data from one participant for age (n=26) and for six participants for waist circumference (n=21)