

# Comparison of cardiac rehabilitation completion rate achieved with a digital program management application compared to other modes of delivery

AUTHORS: Rivers J<sup>1,2</sup>, Souris H<sup>2</sup>, Jennings G<sup>2</sup>, Kwong C<sup>2</sup>, Smith I<sup>2,3</sup>

AFFILIATIONS: 1. Queensland Cardiovascular Group, Brisbane, Australia; 2. Cardihab Pty Ltd, Brisbane, Australia; 3. St Andrew's War Memorial Hospital, Brisbane, Australia



## Background:

Cardiac rehabilitation (CR) has been proven to reduce mortality and morbidity (including hospital readmission) following a cardiac event. With the high burden of cardiovascular disease in Australia, providing high quality, effective and accessible CR should lead to an improvement in an individual patient's quality of life and reduced use of health care resources.

Data published by *Clinical Excellence Queensland* suggests the uptake of CR is comparatively low. Of the 10,647 referrals made to a public CR program in 2021, 69% proceeded to a pre-assessment with only 42% of those completing CR. This is a 29% overall completion rate.

In this study, we investigate the factors influencing CR program uptake and completion and compared outcomes achieved using a structured digital CR application (Cardihab) with those undertaking CR via various other modes.

The objectives of the study evaluated:

1. The factors which influence or inhibit the uptake of CR
2. The factors which influence CR completion

In addressing question 2, we explore what constitutes a program of CR and when a participant is viewed as completing a CR program.

## Methods:

### Uptake of CR:

- Dataset: 1000 subjects were surveyed using a novel survey platform (Pollfish). The Pollfish survey included Australian residents who had experienced a significant cardiac event (e.g. heart attack, chest pain) or heart procedure (e.g. bypass surgery, stent) in the previous 12 months. Questions covered: basic demographics and CR program details (including referral source, number of sessions and mode of CR). Of the Pollfish sample, 685 (68.5%) cases indicated they had entered a CR program. After excluding cases with insufficient data, 660 cases entering a CR program were evaluated against 312 that did not.

### Completion of CR:

- Dataset: Pollfish data for 660 cases that had entered a program were evaluated against 993 cases who had participated in a CR program managed using Cardihab.
- Due to the differing nature of these programs, the endpoint of completion of the 2 programs was defined in 2 different ways:
  - For Conventional CR - completion of 10 or more sessions (*Scherrenberg et al. International Journal of Cardiology 330 (2021): 7-11., Chaves et al. Circ Cardiovasc Qual Outcomes 13.1 (2020): e005453.*)
  - For Cardihab - completion of assigned tasks and as defined by a clinician.

## Results:

Uptake of CR: Graph showing analysis of Pollfish Data is shown in Figure 1.

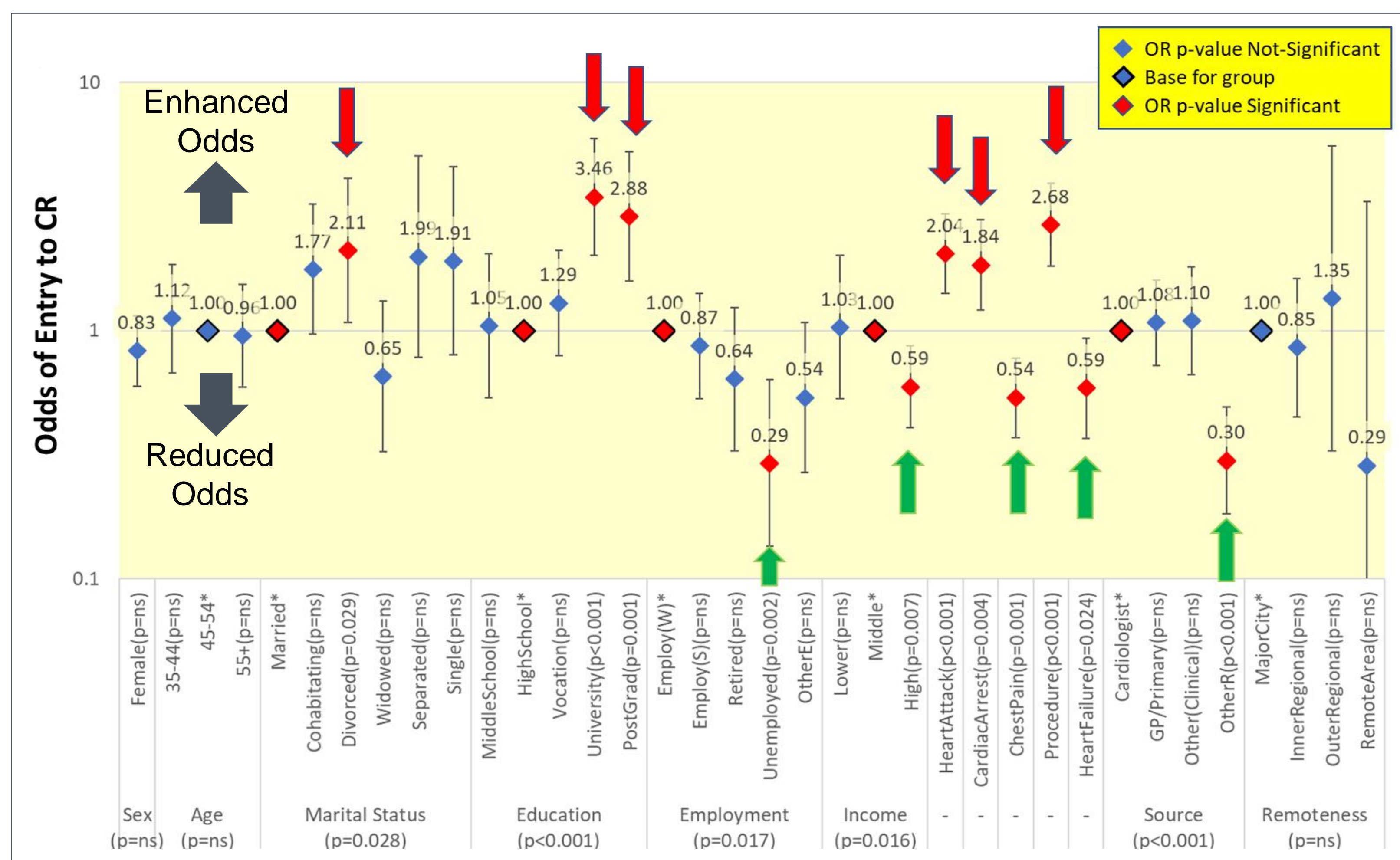


Figure 1: Patient demographic, clinical and CR mode factors associated with CR program uptake. Multivariate contribution of all factors evaluated simultaneously (Pollfish only).

## Key Points:

- The mode of CR engagement impacts completion rates, with Cardihab achieving a 5-fold increase in odds over other forms.
- Cardihab delivers a program of care over a defined patient journey instead of episodes of care connected to a funding trigger. Cardihab's focus on patient centred care will deliver improved outcomes compared to variably structured programmes.
- Patient groups with low uptake of CR (older age, remote location and financial disadvantage) should be specifically targeted with digital programs to improve treatment equity.
- There is a need to standardise CR programmes and define successful completion. The metrics that underpin completion of a CR program should be outcome focused to improve patient outcomes.

The Pollfish data highlighted the lack of standardisation in CR programs. Of patients indicating they had completed CR, only 51% attended >10 sessions (with those referred by a GP/Primary Care Physician achieving 42%). For Cardihab, the completion rate was 85% overall with the odds ratio for completion when all other factors are considered being 5.5 (p<0.001) (Figure 2). Other factors adversely linked to CR completion included; Age (p=0.041, higher with increasing age: >65yrs OR=1.50), Location (p=0.002, remoteness: remote OR=0.21) and employment status (p=0.007, Unemployed OR=0.5).

**Completion of CR:** Multivariate and univariate analysis was used to compare the Cardihab completion rate compared to the completion rate of other modes of CR (Figure 2). This confirms that once potential sources of bias are addressed, completion of CR via Cardihab is significantly higher.

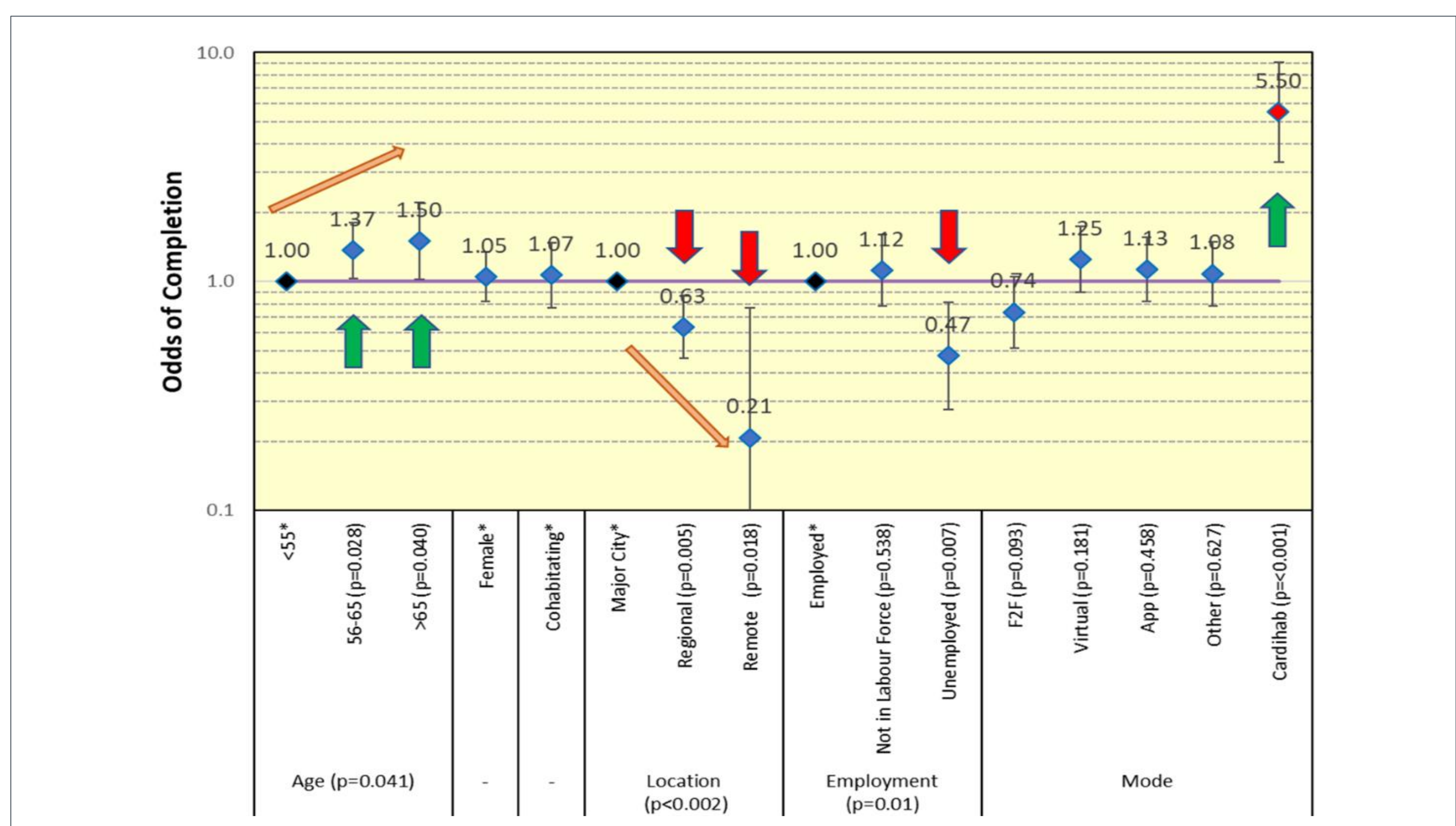


Figure 2: Factors Influencing CR Program Completion. Data drawn from Pollfish (n=660 of 685) and Cardihab (n=993 of 1477).

## Discussion & Conclusion:

In our study, we identified significant variation across groups regarding the perception of successful CR completion. This highlights the prevalent lack of standardised or universally recognised metrics to define completion of a CR program. The lack of consensus in these metrics, coupled with process metric evaluations of CR, leads to an unclear picture of CR's true value and success rates.

The move towards an outcome-oriented definition of CR is of paramount importance in optimising its benefits. The use of predefined outcome measures such as improvements in physical function, quality of life, and reduction in cardiovascular risk factors, rather than mere program participation, would provide a more comprehensive picture of the CR process. It would also facilitate a shared understanding among clinicians and patients about what it means to successfully complete CR.

This study suggests the use of digital therapeutics as an innovative solution to address these challenges and has the potential to improve access to care by providing options to better engage patients. The inherent flexibility and adaptability of digital tools can provide a more personalised approach to CR, with the addition of the ability to track and respond to individual patient outcomes over time. The utilisation of artificial intelligence and machine learning algorithms may enable clinicians to continuously tune CR programs according to the evolving health status and needs of patients, leading to optimised outcomes. In addition, digital therapeutics can provide a common platform for patients and clinicians to monitor progress, thus promoting a shared understanding of what constitutes successful CR completion. The use of universally agreed outcome metrics can also lead to less process variation and optimised outcome benefits of CR.

**There is an evident need for a more outcome-oriented and universally recognised structure for CR. In this regard, the potential of digital therapeutics is promising. Future studies should focus on how these technologies can be best implemented to refine CR definitions and practices, bridging the gap between patients and clinicians' understanding of CR, and ultimately improving patient outcomes.**

Poster presentation at the CSANZ Annual Scientific Meeting 2023, Adelaide, Australia, August 3-6 2023.