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Mental health outcomes for teenage boys and girls following a youth sports development program including a mental health program

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ABSTRACT

Youth sports programs provide an opportunity to embed mental health and wellbeing programs to reach young people with mental health support. The aims of this study were to (a) examine mental health outcomes from a youth sports program including a mental health program (Life-Fit-Learning) in adolescent boys and girls, and (b) among the larger cohort of adolescent boys, to examine whether partial or full completion of Life-Fit-Learning yielded different outcomes for boys within healthy and high-risk ranges for anxiety, depression and behavioral concerns. Participants were 503 adolescents between 12 and 16 years of age (M age = 13.36; 416 boys; 87 girls) who completed both pre- and post-program mental health assessments, and a youth rugby league program including an online and on-field mental health program (Life-Fit-Learning). From pre- to post-program for boys in high-risk ranges, anxiety and depression declined but not to within healthy ranges but did so for behavioral concerns regardless of partial or full completion of Life-Fit. Full compared to partial completion of Life-Fit was required for improvements in depression for boys within the healthy range and for improvements in self-satisfaction for boys overall. Declines in anxiety were observed in girls in high-risk ranges but there were no improvements in girls' depression, behavioral concerns or self-satisfaction. Increasing the focus on anxiety and depression may be important for strengthening outcomes in high-risk boys and incentivizing completion of mental health programs may be important for improvements in boys' depression and self-satisfaction in general. Programs may need to be tailored to girls needs to improve outcomes.

Lay summary: This study focuses on Life-Fit-Learning, a mental health program, embedded within a youth rugby league development program. The aim was to examine mental health outcomes for adolescent boys and girls and whether full or partial completion of Life-Fit-Learning influenced outcomes. The findings provided useful insight for further improvement of the program.

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IMPLICATIONS FOR PRACTICE
- This study suggests that organizers of youth sports programs need to consider gender differences in developing and integrating mental health programs for adolescents.
- The study suggests that encouraging players to complete all components of mental health initiatives within youth sports programs produces better mental health outcomes.

Introduction

Mental health is the single most critical issue faced by young people globally (Erskine et al., 2015). In Australia, adolescents are the most vulnerable group for mental health concerns, with one in five adolescents (20%) experiencing a mental health disorder, the most prevalent being anxiety and depression (Australian Mental Health Commission, 2023). Furthermore, girls are approximately twice as likely to experience high or very high psychological distress than boys (28% compared with 13%; Australian Bureau of Statistics, 2023a). While anxiety disorders are particularly prevalent among girls, and boys tend to experience higher rates of ADHD, the overall trend does show a significant gender gap with girls experiencing more mental health concerns than males across various disorders (Australian Bureau of Statistics, 2023b; National Mental Health Commission, 2023). Similar gender gap rates are also observed globally between girls' and boys' mental health, with girls more likely to experience mental health issues than boys (Institute for Health Metrics & Evaluation, 2024). Supporting mental health, particularly in youth, is crucial as it impacts their overall functioning, social relationships, happiness, school engagement (Savaglio et al., 2022), and in the worst case, can lead to suicide, which is the leading cause of death for people aged 15-24 in Australia (Australian Bureau of Statistics, 2017). Moreover, rising rates of mental health concerns in adolescence are forecasted to lead to unprecedented demands for services, further highlighting that investment in prevention and early intervention is of vital importance (Erskine et al., 2015).

Sport and mental health and wellbeing for boys and girls

Organized sport programs provide a unique opportunity to reach young people with mental health programs (e.g., Bruner et al., 2021; Larson, 2000). In Australia, 78.8% of young people (12-24 years of age) participate in organized sport (Sport Australia & AusPlay, 2022), with more boys than girls likely to continue participating in organized sport into their teenage years (AusPlay, 2024). Furthermore, some sporting organizations are trending toward use of a "plus-Sport" approach whereby there is an explicit development mandate. Specifically, sport primarily acts as the hook to attract youth into the program, however sport is not assumed to provide benefits itself, but rather the development activities that are required (e.g., such as education or health promotion; Eisenkraft Klein & Darnell, 2024). Indeed, gender inequities and barriers to sports participation for girls mean that they do not benefit from the physical and mental health

outcomes and social connection opportunities of sports participation in the same ways that boys do, and recent research has shown that girls who participated in organized sport reported lower levels of anxiety and depression than girls who previously played or never played organized sport (Massey et al., 2024). Moreover, inquiries into women and girls' participation in sport and active recreation over the past decade identified that it is not just an overall lack of participation opportunities for women and girls, but a lack of certain types of opportunities that prevent participation, such as sports that have a strong cultural history of male competition and a lack of nontraditional sports available to girls and women (VicSport, 2024).

There have been positive changes for girls and women in Australian sport. Several sporting codes, including the popular sport of rugby league, have been leading the change over the past decade to break down historical barriers to female participation. In 2022 alone, more than 34,900 girls and women participated in rugby league with 63% of players retained in 2023. Moreover, rugby league participation by girls between 13 and 16 years of age is an emerging growth area with more than 2,930 girls registered in 2022 and 65% retained in 2023 (National Rugby League, 2024).

Mental health and wellbeing programs in sport

Despite the potential for organized sport to serve as a critical access point for receiving mental health interventions for boys and girls, few sport organizations target mental health for players; (illustratively, in Australia, only 11% of sports organizations nationally offer campaigns that target mental health) (Liddle et al., 2017). However, when mental health is addressed within sports programs, there can be benefits. Vella et al. (2021) tested the effectiveness of a four-component intervention (Ahead of the Game Program) delivered with male sports participants aged 12-17 years in two regional communities. The intervention group involved two 45-minute workshops for players that focused on mental health literacy and coping strategies, 6 player online modules completed at home, a parent workshop, and two coach education workshops. At 1-month post-assessment, the intervention group ($N = 350$) showed significant improvements in depression and anxiety literacy, intentions and confidence to seek help, resilience, and wellbeing, compared to the comparison group ($N = 466$). However, there were no significant differences in improvements in players' mental health outcomes. Furthermore, it is also important to note that their attrition rates were high with only 85 out of 350 adolescent participants completing all components of the program, potentially biasing the results given that the adolescents who completed the program as per protocol had higher levels of familial support compared with adolescents who did not complete the program. As another example, Liddle et al. (2021) examined the effects of a mental health literacy program (Help Out a Mate Program) among 102 males aged 12-18 years from a community football club. The intervention involved one 45-minute group-based workshop delivered at the sports clubhouse around a usual team practice session. At 1-month post-assessment, they found an increase in anxiety literacy and a reduction in stigmatizing attitudes in the intervention group compared to a control group. More recently, Petersen et al. (2023) conducted a systematic review of 15 papers aimed at evaluating interventions targeted at the promotion of mental health and wellbeing

among young males in organized sporting contexts. Across the 8 studies that examined outcomes related to mental health literacy, 87.5% reported positive effects on one or more outcomes, including depression and anxiety literacy, help-seeking and help provision, and mental health knowledge. Of the 11 studies that measured mental health and wellbeing outcomes, 63.6% reported significant improvements in such outcomes (e.g., anxiety, resilience, coping self-efficacy). Despite this, the findings do suggest that there were either inconsistent effects or no effects in relation to many of the mental health and wellbeing outcomes. However, it should be noted that Vella et al. (2021), Liddle et al. (2021), and Petersen et al. (2023) studies, all described programs that were targeted toward young males in sports settings, possibly limiting the generalizability of the programs to female participants.

In one of the very few studies that included females, Wong et al. (2017) examined outcomes following the Gratitude Group Program, a US-based psychoeducation intervention that addresses diverse facets of gratitude among female ($n = 14$) and male ($n = 6$) athletes aged 20-34 years. They found a significant decrease in psychological distress and increase in state gratitude, satisfaction with life, and meaning in life. Similarly, Gabana et al. (2019) recruited 51 varsity student-athletes (27 male wrestlers, and 24 female swimmers) aged 18-23 years in the US to participate in a 90-minute Attitude of Gratitude workshop on campus. They found significant increases in state gratitude, sport satisfaction, and social support and significant decreases in psychological distress and athlete burnout at post-intervention. Likewise, Gabana et al. (2022) examined outcomes among 18 female high school soccer players ($M_{age} = 16.6$ years, $SD = 1.10$) who participated in The Athlete Gratitude Group (TAGG). Participants were randomly assigned to receive the intervention with or without the head coach present. TAGG involved six 1-hour sessions approximately once per week across 8-weeks. They found significant improvements in state gratitude, mental health, resilience, team cohesion, and coach-athlete relationship from pre- to post-intervention as well as sustained effects on mental health, resilience, and coach-athlete relationship at 1-month and 3-month follow-ups. Additionally, positive effects on mental health were observed for athletes in the coach group. Taken together, these studies demonstrate the importance and utility of mental health interventions for young male athletes and interventions targeting gratitude for young male and female athletes.

The Life-Fit-Learning system of mental health care

Over six years of research on a co-designed and co-delivered youth rugby league development program for adolescent boys, our research team has successfully integrated a mental health system of care (i.e., Life-Fit-Learning) into a nationwide junior rugby league program based in Australia (Dowell et al., 2021; Waters et al., 2022a, 2022b, 2022c). The system involves a three-step (Assess, Reflect, Connect steps) approach aimed at assessing young rugby league players' mental health. The system includes players completing an online self-report survey (Assess step), summarizing the survey information and providing immediate feedback to parents/carers rather than sports personnel to preserve player confidentiality (Reflect step), and connecting players to two types of resources: mental health workshops delivered within the youth sports program

and the provision of mental health resources and referral options to parents/carers of those youth identified with elevated mental health symptoms (Connect step). Based on components depicted in our Balance Model which underpins the Assess Step (see Waters et al., 2022a for further details), the four workshops included in the Connect Step (i.e., Healthy Habits; Strong Minds, Keep Cool, Stay Connected) target physical wellbeing (Healthy Habits), personal attributes and character strengths (Strong Minds; Stay Connected), and managing mental health symptoms (Keep Cool). The Life-Fit-Learning system is included as one component within the RISE program, which is a multi-component program focused on rugby league skills development, strength and conditioning improvements, and mental health and wellbeing to promote youth development and positive engagement in organized sport. The National Rugby League (NRL) developed the program in conjunction with university clinical and developmental psychology experts (Waters et al., 2022b). State Rugby Leagues (Queensland Rugby League (QRL) and New South Wales Rugby League (NSWRL) in conjunction with the NRL for affiliated states recruits players into the program via advertising on relevant websites (NRL, QRL, NSWRL) and information circulated to their junior sport clubs in each region prior to the season. However, it is important to note that the inclusion of the Life-Fit system in RISE uses a plus-Sport approach whereby it is the sport program (i.e., RISE) that draws young people in, but it is not hypothesized to be the mechanism for improvements of mental health outcomes.

In our prior studies with young male junior rugby league players (aged 12 to 15 years) (e.g., Dowell et al., 2021; Waters et al., 2022a, 2022b, 2022c), the Life-Fit Assess step was completed online by players, while the Reflect and Connect steps involved a combination of telephone and email support with parents/carers to provide psychoeducation, access to resources and referral options for player with high levels of mental health symptoms, and player workshops delivered in-person (Waters et al., 2022a, 2022b), remotely in real-time via video-conference by psychologists on our team (Waters et al., 2022c), or a combination of in-person, video-conference, and prerecorded video sessions (Waters et al., 2024). In a comparison with players who did not complete the program (Waters et al., 2022b), Life-Fit was found to be feasible to implement, highly acceptable to players, and efficacious in reducing anxiety, depression and behavioral concerns in high-risk players and preventing increases in depression symptoms, and behavioral concerns observed in participants who did not complete the program.

Partial completion of program content, attrition during the program and non-completion of post-program assessments are common challenges when integrating mental health and wellbeing programs within sports development programs. For example, Vella et al. (2021) included a wellbeing program as an add-on to regular organized sports participation and observed that only 85 of 350 participants completed all components of the adolescent intervention including pre- and post-assessments (i.e., 75.7% non-completion rate). We have similarly observed variable non-completion rates ranging between 16% to 70% in our prior studies (Dowell et al., 2021; Waters et al., 2022b, 2022c, 2024). To date, we and others have not consistently observed differences in mental health scores and demographic characteristics between those who do and do not complete both the pre- and post-program assessments (Dowell et al., 2021; Vella et al.,

2021; Waters et al., 2022b, 2022c, 2024). However, the extent to which baseline, demographic characteristics and mental health outcomes among completers of both assessments as a function of full relative to partial completion of the mental health and wellbeing components has not been examined. This type of investigation is useful because it can identify whether program enhancements are needed to boost completion rates or the impact on mental health concerns.

The present study: Justification, aims and hypotheses

A number of studies have demonstrated promising outcomes from including mental health and wellbeing programs within youth sports development programs. However, to date, studies have not examined whether outcomes differ as a function of the extent of completion of these programs. The overall aim of the present study was to examine mental health outcomes for adolescent boys and girls who participated in a youth rugby league development program (the RISE program) including Life-Fit online modules and on-field workshops. Consistent with our prior studies (e.g., Waters et al., 2022a), the main aim was to examine whether the degree of completion of the Life-Fit components was associated with greater mental health improvements among young people in the high-risk range (i.e., above cutoff scores based on age- and gender established normative data on mental health measures) relative to young people in the normative range for mental health concerns. In the present study, full completion was defined as completing all four Life-Fit online modules and all four Life-Fit on-field workshops; and partial completion was defined as 3 or fewer Life-Fit online modules and 3 or fewer Life-Fit on-field workshops.

As girls have not participated in the RISE program in prior years (Dowell et al., 2021; Waters et al., 2022b, 2022c, 2024) and given past evidence of gender differences in mental health concerns among youths (Lawrence et al., 2016), hypotheses were formulated separately for boys and girls. For boys, it was expected that improvements would be observed among those in the high-risk range on anxiety, depression and behavioral concerns who completed all compared to partially completed the Life-Fit components, with greater reductions observed on behavioral concerns based on our prior studies (Waters et al., 2022a). Also based on our prior studies in which all Life-Fit components were completed due to the program structure in that year (Waters et al., 2022a), for boys in the healthy range, it was expected that completion of all the Life-Fit components would prevent increases in depression and behavioral concerns and reductions in self-satisfaction that would be observed in boys in the healthy range who completed only some of the Life-Fit components. For girls, exploratory hypotheses were based on girls in the high-risk range attaining pre- to post-program reductions in anxiety, depression and behavioral concerns.

Method

Participants

A total of 1,787 male and female adolescents (12 - 16 years of age; M age $=13.36$; $SD=0.97$; $n=1,485$ boys; $n=302$ girls) enrolled in the RISE Rugby League Development Program for junior rugby players in Australia during the year 2022.

Of the 1,787 players who enrolled, 525 players (29.38%) completed the pre- and post-RISE Life-Fit assessments, and of those 525 completers, 437 were males and 88 were females. 416 of the 437 boys and 87 of the 88 girls completed at least some or all the Life-Fit components within the RISE program (i.e., the Life-Fit online modules and the Life-Fit on-field workshops) as well as the pre- and post-RISE assessments (see Figure 1). Thus, the final mental health and wellbeing outcome analyses were based on 416 boys and 87 girls. Of these participants, 12.5% ($N = 63$) of boys and girls had mental health symptoms in the high-risk range and 87.5% ($N = 440$) of boys and girls had scores within the healthy range.

For the satisfaction survey completed in the last session of the Life-Fit online modules, 407 boys and 106 girls completed the survey. Because non-completers of the post-RISE Life-Fit assessment may have completed the RISE program itself including the Life-Fit components, satisfaction survey analyses for boys were based on 241 non-completers and 166 completers of both the pre- and post-RISE Life-Fit assessments. For girls, analyses were based on 59 non-completers and 48 completers of both the pre- and post-RISE Life-Fit assessments.

Measures and materials

Anxiety. The Revised Children's Anxiety and Depression Scale (RCADS-25; 52; Chorpita et al., 2000) Anxiety Subscale (15 items) was used to assess anxiety symptoms. A sample
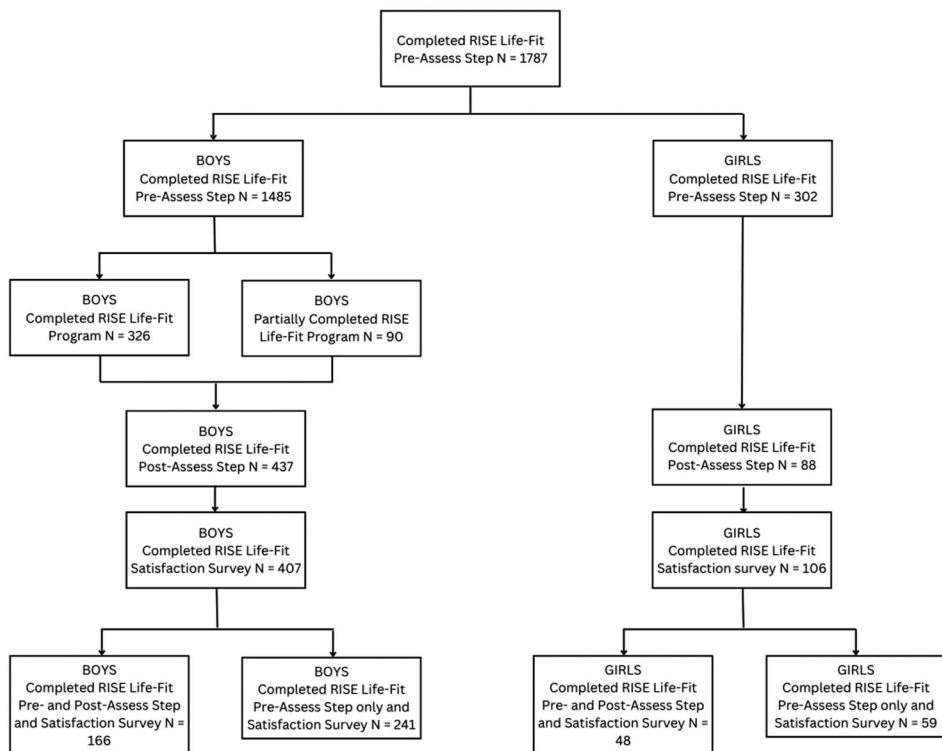

Figure 1. Flow diagram of player participation.

item is: "I worry when I think I have done poorly at something" (0 = *never*, 3 = *always*). Summing the items results in a possible range of scores from 0 to 45, with a higher score indicating a higher level of anxiety symptomology (Cronbach's $\alpha = 0.84$ at pre-assessment and $\alpha = 0.85$ at post-assessment). Participant scores were defined as being in the healthy, possible risk, and probable risk ranges based on age- and gender-established normative data (see Chorpita et al., 2000; see Waters et al., 2022a for further details).

Depression. The RCADS-25 Depression Subscale (10 items; Chorpita et al., 2000) was used to assess depressive symptoms. A sample item is: "I feel sad or empty" (0 = *never*, 3 = *always*). Summing the items results in a possible range of scores from 0 to 30, with a higher score indicating a higher level of depressive symptomology (Cronbach's $\alpha = 0.84$ and $\alpha = 0.86$ at pre- and post-assessment, respectively). Participant scores were defined as being in the healthy, possible risk, and probable risk ranges based on age- and gender-established normative data (see Chorpita et al., 2000; see Waters et al., 2022a for further details).

Behavioral concerns. Pediatric Symptom Checklist – Youth Report (Y-PSC; Jellinek et al., 1988, 1999; Little et al., 1994; Pagano et al., 1996) Conduct Subscale (7 items) was used to assess difficulties related to anger and externalizing behaviors. A sample item is: "I fight with other children" (0 = *never*, 2 = *often*). Summing the items results in a possible range of scores from 0 to 14, with a higher score indicating a higher level of anger and externalizing difficulties (i.e., a score of 7 or higher indicates high-risk in this area; Cronbach's $\alpha = 0.74$ and $\alpha = 0.73$ at pre- and post-assessment, respectively).

Self-Satisfaction. The Multidimensional Students' Life Satisfaction Scale (MSLSS; Huebner, 1994) Self-Satisfaction subscale (7 items) was used to measure the extent to which participants were satisfied with themselves. A sample item is "I am a nice person" (1 = strongly disagree, 6 = strongly agree). Items are averaged to obtain an overall score for self-satisfaction ranging from 1 to 6, with higher scores indicating greater satisfaction (Cronbach's $\alpha = 0.84$ and $\alpha = 0.88$ at pre- and post-assessment, respectively).

Grit. The Academic Grit Scale (10 items; 54) was used to assess levels of consistency of interest and perseverance toward long-term goals in general, without reference to academic activity in particular. A sample item is: "I keep trying even after I fail" (1 = *definitely not like me*, 6 = *definitely like me*). Averaging the items results in a possible range of scores from 1 to 6, with a higher score indicating a higher level of grit (Cronbach's $\alpha = .87$ and $\alpha = 88$ at pre- and post-assessment, respectively).

Gratitude. This was assessed using the Gratitude Questionnaire (GC-6; 6 items; 56), which measures the extent to which an individual possesses a grateful disposition. A sample item is "I have so much in life to be thankful for" (0 = *strongly disagree*, 6 = *strongly agree*). Summing the items results in a possible range of scores from 6 to 42, with a higher score indicating a higher level of gratitude. Scores can also be interpreted in percentile ranges (Sansone & Sansone, 2010) (Cronbach's $\alpha = .74$ and $\alpha = .74$ at pre- and post-assessment, respectively).

Satisfaction ratings. The extent to which players found the Life-Fit online modules to be helpful for improving their knowledge about mental health and wellbeing strategies and enjoyable to participate in were rated using two items completed via a link in the final Life-Fit online module. Each item was rated on a five-point scale from 1 = *not at all helpful/enjoyable* to 5 = *extremely helpful/enjoyable*.

Procedure

The study had full University ethics approval (HREC: 2018/426). The Life-Fit-Learning System (see Figure 2) was implemented within the rugby league development program in 42 metropolitan, regional and rural locations throughout two states (Queensland, NSW) and four capital cities within the NRL affiliated states. Participants received written informed consent from parents/carers via a link to the Life-Fit-Learning system from the RISE website.

The Life-Fit-Learning system was developed based on core tenets of positive psychology (Seligman et al., 2005) and psychological capital in youth (Finch et al., 2020), ecological systems theory (Bronfenbrenner, 1979), community-based participatory research (CBPR) frameworks (Minkler & Wallerstein, 2003), implementation science frameworks to improve the quality and effectiveness of health services and care (e.g., Eccles & Mittman, 2006; Greenberg et al., 2005; Nilson, 2015; Rabin & Brownson, 2012). For a full description of the Life-Fit-Learning system, please see Waters et al. (2022a).

Pre-RISE assess step. After being registered in the Life-Fit system, each participant received an email with a link to the Assess step in which they completed all measures.
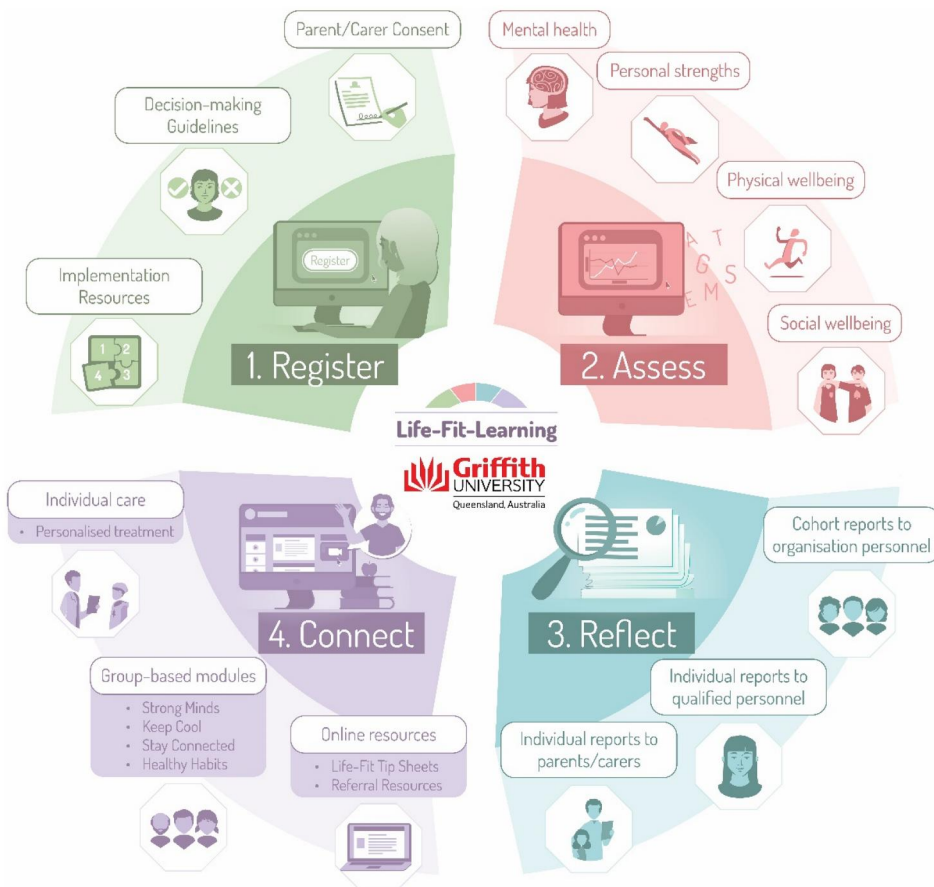

Figure 2. The major components of the Life-Fit-Learning system.

After submitting their responses, all participants received an email with a link to the Life-Fit-Learning website where they could download the Life-Fit Tip Sheets which provide psychoeducational resources on all topics covered within the Life-Fit system, as well as access to referral sources for further care.

Reflect step. Reflect Reports for each participant summarized scores as being in the healthy, possible risk, or probable risk range based on age- and gender-established cutoff values, normative data, or national recommendations (see Waters et al., 2022a). Reports were reviewed by the first and second authors and research assistants and then emailed to parents/carers of participants in the healthy range. For participants scoring in the possible or probable risk ranges for anxiety, depression and/or behavioral concerns at pre-assessment, parents/carers of these participants were also telephoned by a member of the Griffith University Life-Fit team to provide feedback, referral options and strategies for assisting their child, before being emailed their child's Reflect Report.

Connect step. All participants were registered to complete four online Life-Fit modules. The content included four main components applied to rugby league, family, friendships and school life in each session: (1) Healthy Habits: including interactive psycho-education activities relating to healthy eating and hydration habits, bed-time and sleep routines, and safe social media usage practices, (2) Strong Minds: including interactive psycho-education activities to understand the meaning and experience of grit and optimism through rugby league-related exercises, (3) Keep Cool: including interactive exercises to practice breathing exercises, muscle relaxation and mindfulness to manage emotions, and (4) Stay Connected: including interactive psycho-education activities to learn about, and engage in, acts of kindness and gratitude (see Dowell et al., 2021; Waters et al., 2022b, 2022c for further details). Completion rates ranged from 0 to 4 sessions. A link to the Life-Fit online modules satisfaction survey containing the learning and enjoyment questions was included at the end of the fourth module. Players clicked on the link to complete the survey, but this was not compulsory in order for them to complete the modules.

In addition to players completing online Life-Fit modules in their own time, they completed four Life-Fit on-field workshops in groups during the RISE training sessions in rotation with the rugby league skills development and strength and conditioning workshops. The content of the four Life-Fit on-field workshops was aligned with the four Life-Fit online modules and involved rugby league-related activities either in pairs and small groups that helped participants to engage with, and understand, the core Life-Fit content in a fun, physically active, and socially connected manner. The content of the activities was co-designed by NRL, QRL, NSWRL rugby league coaches and the Griffith Life-Fit team (first and second authors).

The Life-Fit on-field workshops were facilitated by a volunteer Life-Fit Coach who was recruited at each location by the RISE Program Head Coach. To prepare for the role, the Life-Fit Coach completed five online modules about the Life-Fit Program and the content players covered in the online modules. They also attended an online 1-hour Life-Fit Coaches Workshop with the first author and received a detailed Life-Fit Coaches Handbook that provided detailed information and illustrative examples about each activity within each workshop as well as QR codes to access video demonstrations

of each activity by NRL coaches and former RISE players. An additional QR code was included after each workshop in the Handbook for Life-Fit Coaches to provide feedback about the workshop which was sent directly to the Life-Fit team. Finally, a series of Life-Fit Tip Sheets were also emailed to parents/carers of all players regardless of player risk status, which provided evidence-informed strategies and information that families could implement at home.

Post-RISE assess step. After completion of the RISE program, participants were again emailed a link to the Assess step, followed by numerous email reminders to complete the assessment. After completion of the post-assessment, individual Reflect reports were generated and emailed to parents/carers along with the Life-Fit-Learning Tip Sheets to facilitate access to these resources over time. Parents/carers of participants identified as being in the high-risk ranges at pre-assessment and post-assessment were telephoned to follow-up on action taken since the pre-assessment.

Data screening and analysis

Initial analyses comparing pre-assessment variables for study completers (participants who completed the pre- and post-RISE assessments) and non-completers (those who completed the pre- but not the post-RISE assessment) as a function of gender were conducted using χ^2 analyses and analyses of variance (ANOVA). Analyses of changes in mental health symptoms and grit, gratitude and self-satisfaction for boys from pre- to post-RISE among completers were conducted using 2 Condition (partial; full) x 2 Risk Status (high-risk range; healthy range) x 2 Time (pre-RISE; post-RISE) mixed factorial ANOVAs. For girls, analyses were of changes in mental health symptoms and grit, gratitude and self-satisfaction from pre- to post-RISE among completers using 2 Risk Status (high-risk range; healthy range) x 2 Time (pre-RISE; post-RISE) mixed factorial ANOVAs. Like our prior studies (Dowell et al., 2021; Waters et al., 2022a, 2022b, 2022c), high-risk range participants included those who scored in the possible and probable risk ranges on the anxiety, depression and/or behavioral concerns measures. Healthy range participants scored in the normative ranges on all three measures. Learning and enjoyment ratings were analyzed separately for boys and girls with one-way ANOVAs with 2 Completion Status (completer; non-completer) as the between-subjects factor. Partial vs full completion of Life-Fit modules was not examined in the satisfaction ratings analyses due to small sample sizes. Follow-up tests were performed using Tukey-Kramer post-hoc tests to control for the unequal sample sizes.

Results

Control analyses

Boys and girls who completed the pre-RISE assessment differed significantly on mental health measures. Girls reported significantly higher anxiety symptoms ($M = 9.81$, $SD = 6.32$), compared with boys ($M = 6.50$, $SD = 4.75$), $F(1, 1,786) = 107.62$, $p < .001$, $np^2 = .056$, as well as significantly higher depression scores ($M = 8.11$, $SD = 5.08$) compared with boys ($M = 5.67$, $SD = 3.83$), $F(1, 1,786) = 89.68$, $p < .001$, $np^2 = .047$.

Significant differences were not found between boys ($M = 3.36$, $SD = 1.55$) and girls ($M = 3.40$, $SD = 1.68$) on behavioral concerns, $F(1, 1,786) = 0.22$, $p = .641$. With regards to strengths-based measures, boys reported significantly higher gratitude scores ($M = 35.56$, $SD = 4.070$), compared with girls ($M = 34.48$, $SD = 5.47$), $F(1, 1,786) = 12.47$, $p < .001$, $np^2 = .007$, however there were no significant differences found between boys ($M = 4.59$, $SD = 0.78$) and girls ($M = 4.49$, $SD = 0.79$) on grit scores, $F(1, 1,786) = 3.56$, $p = .059$, $np^2 = .002$.

Descriptive information on participants who did and did not complete the pre- and post-RISE assessment is presented in Table 1 as a function of gender. There were no significant differences between non-completers and completers of the pre- and post-RISE assessment for boys or girls separately in terms of age, anxiety scores, depression scores, behavioral concerns scores, self-satisfaction, grit, and gratitude scores (all F-values < 2.89, ns.), living arrangements, country of birth, and first language spoken at home (all X^2 < 2.07, ns.). However, completers of the pre- and post-RISE assessment for boys and girls completed significantly more Life-Fit online modules compared with non-completers of the pre- and post-RISE assessment, $F(1, 1,409) = 34.30$, $p < .001$, $np^2 = .02$, $F(1, 279) = 12.75$, $p < .001$, $np^2 = .04$, respectively.

Pre- to post-RISE outcomes as a function of partial vs full Life-Fit completion

Boys. Pre- and post-RISE assessment information from boys in the healthy and risk ranges who partially and fully completed all Life-Fit components (i.e., online modules and on-field workshops) within RISE is presented in Table 2. There were no significant age differences as a function of risk status and Life-Fit completion status, all F's < 0.37, n.s. The risk status (healthy; high-risk) x Life-Fit completer status (full; partial) ANOVA of number of Life-Fit online modules completed revealed a significant interaction, $F(1, 412) = 9.58$, $p < .002$, $np2 = .023$. As Life-Fit completers were selected for having completed all four Life-Fit online modules, regardless of risk status, the comparison of interest was whether boys in the risk range who partially completed the Life-Fit components completed significantly fewer online modules than boys in the healthy range who partially completed the Life-Fit components. In support, follow-up comparisons confirmed

Table 1. Descriptive statistics of non-completers and completers by gender of the pre- and post-RISE assessments.

Measure	Non-completers		Completers	
Total N of pre-RISE assessments	Boys ($n = 1,048$)	Girls ($n = 214$)	Boys ($n = 437$)	Girls ($n = 88$)
Mean age (SD)	13.31 (0.93)	13.66 (1.07)	13.28 (0.94)	13.65 (1.17)
% Born Australia (N)	94.66% (992)	96.73% (207)	94.28 % (412)	93.18% (82)
% Live both parents (N)	77.96% (817)	72.90% (156)	79.41% (347)	68.18% (60)
% Speak English (N)	99.52% (1,043)	99.53% (213)	99.54% (435)	97.73% (86)
Mean anxiety (SD)	6.52 (4.78)	9.66 (6.20)	6.46 (4.70)	10.17 (6.62)
Mean depression (SD)	5.78 (3.10)	8.17 (5.08)	5.41 (3.43)	7.95 (5.11)
Mean behavioral concerns (SD)	3.38 (1.57)	3.43 (1.70)	3.30 (1.52)	3.34 (1.66)
Mean grit (SD)	4.57 (0.79)	4.46 (0.83)	4.63 (0.75)	4.57 (0.71)
Mean gratitude (SD)	35.54 (4.74)	34.44 (5.38)	35.59 (4.61)	34.57 (5.71)
Mean self-satisfaction (SD)	4.90 (0.67)	4.69 (0.72)	4.92 (0.59)	4.71 (0.63)
Mean number Life-Fit Online modules completed (SD)*	2.96 (1.61)	2.64 (1.76)	3.47 (1.25)	3.40 (1.34)

Note: Significant difference < 0.001.

Table 2. Descriptive statistics for boys as a function of risk status and completer status at the pre- and post-RISE assessments.

	Pre-RISE				Post-RISE			
	Healthy range		Risk range		Healthy range		Risk range	
Measure	Partial	Full	Partial	Full	Partial	Full	Partial	Full
N = 416	79	294	11	32				
Mean age (SD)	13.35 (0.93)	13.26 (0.91)	13.35 (0.93)	13.26 (0.91)				
Mean number online modules completed (M; SD)	2.23 (0.09)	4.00 (0.00)	1.36 (0.22)	4.00 (0.00)				
Mean anxiety (SD)	5.97 (3.89)	5.55 (3.49)	12.27 (6.28)	13.94 (6.55)	5.79 (4.83)	5.05 (3.71)	8.18 (4.19)	8.88 (6.06)
Mean depression (SD)	5.09 (2.02)	4.83 (3.05)	11.55 (3.05)	9.47 (3.42)	5.21 (3.87)	4.40 (3.27)	7.91 (4.04)	7.41 (3.92)
Mean behavioral concerns (SD)	3.31 (1.31)	3.07 (1.36)	4.36 (2.11)	5.09 (1.04)	3.23 (1.49)	3.01 (1.38)	3.27 (1.95)	3.84 (1.97)
Mean self-satisfaction (SD)	4.99 (0.47)	4.98 (0.55)	4.82 (0.55)	4.31 (0.86)	4.92 (0.82)	5.00 (0.68)	4.65 (0.46)	4.71 (0.62)
Mean grit (SD)	4.54 (0.72)	4.70 (0.76)	4.20 (0.50)	4.25 (0.73)	4.55 (0.81)	4.75 (0.80)	4.34 (0.48)	4.58 (0.73)
Mean gratitude (SD)	34.35 (4.55)	36.33 (4.29)	33.45 (4.16)	32.84 (5.62)	34.40 (4.97)	36.45 (4.47)	33.27 (4.27)	34.41 (5.06)

that boys in the risk range who partially completed the Life-Fit online modules, completed significantly fewer online modules than boys in the healthy range, $p < .001$. Therefore, boys in the risk range who were more in need of completing the full intervention were less likely to finish it than boys in the healthy range.

The risk status (healthy; high-risk) x Life-Fit completer status (partial; full) x time (pre-; post-RISE) ANOVA of anxiety scores revealed significant main effects of time, $F(1, 411) = 43.20$, $p < .001$, $np^2 = .095$, and risk status, $F(1, 411) = 63.06$, $p < .001$, $np^2 = .113$, and a significant risk status x time interaction, $F(1, 411) = 32.04$, $p < .001$, $np^2 = .072$. No other effects were significant, all F's < 1.93, ns. As expected, boys in the high-risk range had significantly higher anxiety than boys in the healthy range at pre-RISE ($p < .001$). Whereas anxiety scores did not change significantly from pre- to post-RISE in the healthy range boys ($p = .153$), anxiety scores decreased significantly from pre- to post-RISE in boys in the high-risk range ($p < .001$). However, their scores remained significantly higher than anxiety scores of healthy range boys at post-RISE ($p < .001$).

For depression scores, the three way mixed models ANOVA revealed a significant risk status x Life-Fit completer status x time ANOVA, $F(1, 411) = 4.01$, $p < .039$, $np^2 = .022$, as well as significant main effects of time, $F(1, 411) = 28.14$, $p < .001$, $np^2 = .064$, risk status, $F(1, 411) = 60.49$, $p < .001$, $np^2 = .128$, and a significant risk status x time interaction, $F(1, 411) = 22.59$, $p < .001$, $np^2 = .052$. No other effects were significant, all F's < 2.59, $p = .09$, $np^2 = .007$. The three-way interaction reflected that, among boys within the healthy range, depression scores declined significantly from pre- to post-RISE among boys completing all Life-Fit components ($p = .016$) but not among healthy range boys who partially completed all Life-Fit components ($p = .738$). Differences in their depression scores at post-RISE approached significance, ($p = .058$). Among boys within the high-risk range, depression scores declined significantly from pre- to post-RISE in those with full and partial completion of the Life-Fit components (both $p < .001$) and did not differ significantly between groups at post-RISE ($p = .678$). At post-RISE, boys in the high-risk range continued to have significantly higher depression scores compared to boys in the healthy range, regardless of completion status (both $p < .03$).

The risk status x Life-Fit completer status x time ANOVA of behavior problem scores revealed significant main effects of time, $F(1, 411) = 16.94$, $p < .001$, $np^2 = .04$, and risk status, $F(1, 411) = 19.61$, $p < .001$, $np^2 = .046$, and a significant risk status x time interaction, $F(1, 411) = 13.78$, $p < .001$, $np^2 = .032$. No other effects were significant, all F's < 3.86, $p = .051$, $np^2 = .046$. As expected, boys in the risk range had significantly higher behavioral scores at pre-RISE than boys in the healthy range ($p < .001$). Whereas behavioral concerns scores did not change significantly from pre- to post-RISE in the healthy range participants ($p = .503$), behavioral concerns scores decreased significantly from pre- to post-RISE in boys in the risk range ($p < .001$) and were not significantly different to behavioral problem scores of health range boys at post-RISE ($p < .110$).

The risk status x Life-Fit completer status x time ANOVA of boys' self-satisfaction scores revealed a significant main effect of risk status, $F(1, 411) = 12.85$, $p < .001$, $np^2 = .03$, reflecting higher self-satisfaction in healthy range than high-risk range boys,

regardless of time-point, and a significant Life-Fit completer status x time interaction, $F(1, 411) = 6.59$, $p > .001$, $np^2 = .016$. The interaction reflected that at pre-RISE, self-satisfaction was significantly lower among boys who fully compared to partially completed all of the Life-Fit components ($p = .013$). Moreover, self-satisfaction increased significantly from pre- to post-RISE in boys who fully completed ($p = .001$) but not partially completed all of the Life-Fit components ($p = 279$), such that self-satisfaction scores were no longer significantly different between boys who fully completed compared to partially completed all of the Life-Fit components at post-RISE ($p = .129$). No other effects were significant, all F's < 0.51, ns.

The risk status x Life-Fit completer status x time ANOVA of grit scores revealed significant main effects of time, $F(1, 411) = 4.70$, $p = .031$, $np^2 = .011$, and risk status, $F(1, 411) = 5.12$, $p = .024$, $np^2 = .012$. No other effects were significant, all F's < 2.90, ns. The significant main effect of time reflected that boys' grit scores were higher at post- compared to pre-RISE, and the main effect of risk status indicated that boys in the healthy range had significantly higher grit scores compared to boys in the risk range, regardless of Life-Fit completer status and timepoint.

The risk status x Life-Fit completer status x time ANOVA of boys' gratitude scores revealed a significant main effect of risk status, $F(1, 411) = 6.36$, $p = .012$, $np^2 = .015$, reflecting higher gratitude in healthy range than high-risk range boys regardless of Life-Fit completer status and timepoint. No other effects were significant, all F's < 2.32, ns.

Girls. Pre- and post-RISE assessment information for girls in the healthy and risk ranges is presented in Table 3. There were no significant differences in girls' age, F's < 1.82, n.s, or number of Life-Fit online sessions completed, F's < 0.53, n.s, as a function of risk status. The risk status x time ANOVA of girls' anxiety scores revealed a significant main effect of risk status, $F(1, 85) = 41.34$, $p < .001$, $np^2 = .33$, and a significant risk status x time interaction, $F(1, 85) = 7.11$, $p = .009$, $np^2 = .077$. The time main effect was not significant, F's < 2.21, n.s. As expected, girls in the high-risk range had significantly higher anxiety scores than girls in the healthy range at pre-RISE ($p < .001$). Whereas anxiety scores did not change significantly from pre- to post-RISE in the healthy range girls ($p = .211$), anxiety scores decreased significantly from pre- to post-RISE in girls in the risk range ($p < .001$). However, they remained significantly higher than anxiety scores of girls in the healthy range at post-RISE ($p < .001$).

The risk status x time ANOVA of girls' depression scores revealed significant main effects of risk status, $F(1, 85) = 36.74$, $p < .001$, $np^2 = .33$, and a significant risk status

Table 3. Descriptive statistics for girls as a function of risk status of the pre- and post-RISE assessments.

Measure	Pre-RISE		Post-RISE	
	Healthy range	Risk range	Healthy range	Risk range
$N = 87$	67	20		
Mean age (SD)	13.60 (1.13)	13.81 (1.12)		
Number online modules completed (M; SD)	3.29 (1.43)	3.75 (0.93)		
Mean anxiety (SD)	7.78 (4.34)	17.45 (6.92)	8.61 (5.78)	14.60 (6.40)
Mean depression (SD)	6.09 (3.62)	13.85 (4.74)	6.84 (5.28)	12.35 (6.24)
Mean behavioral concerns (SD)	2.93 (1.33)	4.80 (1.88)	3.03 (1.18)	4.30 (1.63)
Mean self-satisfaction (SD)	4.79 (0.65)	4.43 (0.50)	4.79 (0.58)	4.38 (0.78)
Mean grit (SD)	4.61 (076)	4.47 (0.52)	4.56 (0.80)	4.39 (0.69)
Mean gratitude (SD)	35.55 (5.33)	31.43 (5.87)	35.03 (5.95)	32.24 (6.75)

x time interaction, $F(1, 85) = 4.53$, $p = .036$, $np^2 = .051$. The time main effect was not significant, F's < 0.51, n.s. As expected, girls in the high-risk range had significantly higher depression scores than girls in the healthy range at pre-RISE ($p < .001$). However, depression scores did not change significantly from pre- to post-RISE in healthy range girls ($p = .144$), or girls in the high-risk range ($p < .109$), and thus, remained significantly higher at post-RISE compared to girls in the healthy range ($p < .001$).

The risk status x time ANOVA of girls' behavioral concerns scores revealed a significant main effect of risk status, $F(1, 85) = 29.25$, $p < .001$, $np^2 = .256$. No other effects were significant, all F's < 2.29, ns. The significant risk status main effect reflected that girls in the risk range had significantly higher behavioral problem scores than healthy range girls regardless of time-point.

The risk status x time ANOVA of girls' self-satisfaction scores revealed a significant main effect of risk status, $F(1, 85) = 29.25$, $p < .001$, $np^2 = .256$. No other effects were significant, all F's < 0.51, ns. The significant risk status main effect reflected that girls in the risk range had significantly lower self-satisfaction scores than girls in the healthy range regardless of time-point.

The risk status x time ANOVA of girls' grit scores revealed no significant effects, all F's < 0.85, ns.

The risk status x time ANOVA of girls' gratitude scores revealed a significant main effect of risk status, $F(1, 86) = 6.70$, $p = .011$, $np^2 = .072$, reflecting that girls in the healthy range had significantly higher gratitude scores than girls in the high-risk range regardless of timepoint. No other effects were significant, all F's < 1.35, ns.

Outcomes for players in the high-risk range at pre-RISE assessment

Overall, 10.3% ($N = 43/416$) of boys and 23% of girls ($N = 20/87$) were in the high-risk range for mental health concerns at the pre-RISE assessment. In total, 12.5% ($N = 63$) of boys and girls combined were in the high-risk range, and 87.5% ($N = 440$) of boys and girls combined were in the healthy range. Of the 10.3% of boys in the high-risk range, 76.7% were no longer in the risk range at post-RISE assessment while 23.3% remained in the risk range. Supplementary analyses were performed to determine which outcome measures declined in the high-risk players who improved relative to those who remained at high-risk using time (pre-RISE; post-RISE) x change status (high-risk stable; high-risk improved) ANOVAs (see Table 4). For anxiety scores, there were significant main effects of time, $F(1, 41) = 9.20$, $p = .004$, $np^2 = .18$, and change status, $F(1, 41) = 12.86$, $p < .001$, $np^2 = .23$, and a significant time x change status interaction,

Table 4. Descriptive statistics for boys as a function of change in risk status at the pre- and post-RISE assessments.

Measure	High-risk improved ($n = 33$)		Risk-range stable ($n = 10$)	
	Pre-RISE	Post-RISE	Pre-RISE	Post-RISE
Mean anxiety (SD)	13.21 (6.86)	7.06 (4.39)	16.09 (5.05)	15.45 (4.48)
Mean depression (SD)	9.15 (3.50)	6.06 (2.94)	12.27 (2.90)	12.09 (2.77)
Mean behavioral concerns (SD)	4.91 (2.02)	3.24 (1.48)	4.73 (1.95)	4.91 (2.63)
Mean self-satisfaction (SD)	4.50 (0.85)	4.70 (0.66)	4.25 (0.62)	4.64 (0.26)
Parent/Carer contactable	70%		72%	

$F(1, 41) = 6.08$, $p = .018$, $np^2 = .126$ (see Table 4). The interaction confirmed that anxiety scores declined significantly from pre- to post-RISE in the high-risk improved group ($p < .001$), but not in the high-risk stable group ($p = .74$).

For depression scores (see Table 4), there were significant main effects of time, $F(1, 41) = 7.22$, $p = .01$, $np^2 = .147$, and change status, $F(1, 41) = 25.365$, $p = .001$, $np^2 = .377$, and a significant time x change status interaction, $F(1, 41) = 5.70$, $p = .022$, $np^2 = .12$. Depression scores declined significantly from pre- to post-RISE in the high-risk improved group ($p < .001$), but not in the high-risk stable group ($p = .86$).

For behavioral problem scores (see Table 4), there was a marginal main effect of time, $F(1, 41) = 3.89$, $p = .056$, $np^2 = .085$, a non-significant main effect of change status, $F(1, 41) = 1.82$, $p = .184$, $np^2 = .042$, and a significant time x change status interaction, $F(1, 41) = 6.011$, $p = .018$, $np^2 = .125$. Behavioral problem scores declined significantly from pre- to post-RISE in the high-risk improved group ($p < .001$) but not in the high-risk stable group ($p = .78$).

Of the 23% of girls in the risk range, 40% were no longer in the risk range at post-RISE assessment while 60% remained in the risk range. The findings of the time (pre-RISE; post-RISE) x change status (high-risk stable; high-risk improved) ANOVA for anxiety scores revealed significant main effects of time, $F(1, 18) = 8.66$, $p = .009$, $np^2 = .325$, and change status, $F(1, 41) = 12.86$, $p < .001$, $np^2 = .23$, and a significant time x change status interaction, $F(1, 41) = 6.08$, $p = .018$, $np^2 = .126$ (see Table 5). The interaction reflected that anxiety scores declined significantly from pre- to post-RISE in the high-risk improved group ($p < .001$), but not in the high-risk stable group ($p = .74$).

For depression scores (see Table 5), there were significant main effects of time, $F(1, 41) = 7.22$, $p = .01$, $np^2 = .147$, and change status, $F(1, 41) = 25.365$, $p = .001$, $np^2 = .377$, and a significant time x change status interaction, $F(1, 41) = 5.70$, $p = .022$, $np^2 = .12$. Depression scores declined significantly from pre- to post-RISE in the high-risk improved group ($p < .001$), but not in the high-risk stable group ($p = .86$).

For behavioral problem scores (see Table 5), there was a marginal main effect of time, $F(1, 41) = 3.89$, $p = .056$, $np^2 = .085$, and non-significant main effect of change status, $F(1, 41) = 1.82$, $p = .184$, $np^2 = .042$, and a significant time x change status interaction, $F(1, 41) = 6.011$, $p = .018$, $np^2 = .125$. Behavioral problem scores declined significantly from pre- to post-RISE in the high-risk improved group ($p < .001$) but not in the high-risk stable group ($p = .78$).

In terms of contact with parents/carers of boys within the high-risk range at pre-assessment, between 70 and 72% of parents/carers of high-risk improved and high-risk stable participants were contactable at the pre-RISE assessment to provide feedback and information to obtain further mental health care for their child. For girls, between 75%

Table 5. Descriptive statistics of girls as a function of change status the pre- and post-RISE assessments.

Measure	High-risk improved ($n = 8$)		Risk-range stable ($n = 12$)	
	Pre-RISE	Post-RISE	Pre-RISE	Post-RISE
Mean anxiety (SD)	18.00 (7.01)	10.00 (4.28)	17.08 (7.14)	17.67 (5.79)
Mean depression (SD)	13.13 (4.36)	7.38 (3.89)	14.33 (5.12)	15.67 (5.25)
Mean behavioral concerns (SD)	5.13 (2.17)	4.50 (1.93)	4.58 (1.73)	4.17 (1.47)
Mean self-satisfaction (SD)	4.32 (0.70)	4.82 (0.83)	4.50 (0.33)	4.08 (0.60)
Parent/Carer contactable	75%		83%	

Table 6. Life-Fit online module satisfaction ratings for boys and girls who were non-completers and completers of the pre- and post-RISE assessments.

	Non-completers		Completers	
Measure	Boys ($n = 241$)	Girls ($n = 59$)	Boys ($n = 166$)	Girls ($n = 47$)
Mean learning (SD)	4.00 (0.84)	4.19 (1.04)	4.10 (0.83)	3.96 (0.83)
Mean enjoyment (SD)	3.93 (0.92)	4.17 (1.08)	4.01 (0.92)	4.11 (0.89)

and 83% of parents/carers of high-risk improved and high-risk stable participants were contactable at the pre-RISE assessment to provide feedback and information for parents/carers to obtain further mental health care for their child. There were no significant differences between the high-risk improved and high-risk stable groups for boys and girls separately in the proportion of parents/carers who were versus were not contactable, both $\chi^2 < 0.28$, n.s. (see Tables 4 and 5).

Satisfaction ratings of online modules

Table 6 displays the mean (and *SD*s) for boys and girls who did and did not complete the pre- and post-RISE assessments (i.e., non-completers and completers), but completed the Life-Fit online modules. Among boys, there were no significant differences in mean learning and enjoyment ratings of the online modules between non-completers and completers of both the pre- and post-RISE assessments but who completed the Life-Fit online modules, both F's < 0.87, n.s. Similarly, there were no significant differences in mean learning and enjoyment ratings of the online modules for girls who did and did not complete the pre- and post-RISE assessments but who completed the Life-Fit online modules, both F's < 1.50, '.

Discussion

Organized sport programs provide an attractive opportunity to reach young people where they are, via mental health programs. At the same time, gender inequities and barriers to sports participation for girls mean that they do not always benefit from the mental health outcomes of sports participation in the same ways that boys do, even though research shows that girls who participate in organized sport fare better in their mental health outcomes relative to those who previously played or never played organized sport (Massey et al., 2024). As a result, in the present study, we examined mental health risk status, and completion of all relative to some, of a mental health program (Life-Fit-Learning) which has been shown to be effectively embedded within a youth rugby league development program and associated mental health outcomes among teenage boys and girls.

Among boys, anxiety, depression and behavioral concerns scores declined from pre- to post-RISE in boys in the high-risk range; moreover, 76% were no longer in the risk range at the post-RISE assessment. There were no differences in the extent of parent contact for boys who improved compared to remained at elevated risk by the post-RISE assessment. However, anxiety and depression scores of boys in the high-risk range remained more elevated overall, compared to boys in the healthy range at post-RISE. In

contrast, their behavioral problem scores declined to levels comparable to boys in the healthy range at post-RISE, regardless of completion status. These findings among high-risk boys of reduced, but still elevated, anxiety and depression scores and greater declines in behavioral problem scores to comparable levels to boys in the healthy range at post-RISE are consistent with those observed in our prior studies and encouraging for supporting the integration of mental health programs within youth sports development programs (e.g., Dowell et al., 2021; Waters et al., 2022a, 2022b, 2022c). Indeed, the multi-faceted, multi-agency approach, including sport skills, physical fitness, mental health and wellbeing, engagement with a range of coaches and players as well as mental health feedback and support for parents/carers within the RISE program may be particularly well suited to reducing boys' behavioral concerns. Indeed, prior studies have shown that youth sports and physical activity programs can be useful in reducing behavioral concerns when delivered as a component of a broader strategy involving multiple agencies (e.g., community, sports, school, family; Catalano et al., 1998; Morris et al., 2003). This further demonstrates the importance of integrating mental health and wellbeing components within youth sports programs which are relevant for youth and are able to target a high proportion of young people (78.8%) who participate in organized sport (Sport Australia, AusPlay, 2022).

However, findings from the present study suggest that a greater focus on internalizing symptoms of anxiety and depression in youth sports programs are required for greater benefits to be observed. Although anxiety and depression symptoms declined in boys in the high-risk range, they remained elevated compared to healthy range boys at post-RISE. Also, for boys in the healthy range, completing all compared to some of the Life-Fit online modules and on-field workshops was associated with greater declines in depression symptoms. Moreover, in our prior study of boys who participated in the RISE program in which all Life-Fit components were completed, we found participation prevented an increase in depression symptoms that was observed in boys who did not participate in the RISE program (Waters et al., 2022a). Thus, a staged model of mental health components based on mental health risk status may produce stronger outcomes, whereby healthy range boys complete the present format of the program (i.e., standard program), and high-risk range boys complete the standard program plus an additional component of an evidence-based approach, such as Cognitive-Behavioral Treatment (CBT) (Farrell et al., 2023; Rapee et al., 2023), Acceptance and Commitment Therapy (ACT) (Harris, 2006), or Emotion-Focused Therapy (EFT) (Greenberg, 2004). Given that adolescents are the most vulnerable group for mental health concerns (Australian Mental Health Commission, 2023), targeting those with a higher mental health risk status via a staged model approach is of vital importance in order to reach youth who otherwise may not have access to connect with mental health services at a developmentally critical period of their lives as they transition to adulthood.

Additionally, boys who completed all the Life-Fit components were found to have lower pre-RISE self-satisfaction scores than boys who partially completed the Life-Fit components, and their scores improved by post-RISE to levels comparable to boys who only partially completed the Life-Fit components. Greater program completion by boys with lower self-satisfaction may be due to greater motivation and engagement to improve one's satisfaction. Indeed, previous research has shown that organized sports

participation has positive effects on life satisfaction in young people (Michaud et al., 2006). In our prior study (Waters et al., 2022a), we observed that RISE, including Life-Fit components, prevented a decline in self-satisfaction which was observed in boys who did not complete the RISE program, a decline that is common across the adolescent years (Blomfield & Barber, 2011; De Ree & Alessie, 2011; Goldbeck et al., 2007). Thus, the findings suggest that completion of the RISE program, including all Life-Fit components, may be important for boys in whom self-satisfaction is low and that the program in general might mitigate the negative effects of stressful life events and daily hassles that can contribute to the general decline in self-satisfaction during adolescence (Park, 2004).

Furthermore, although grit improved from pre- to post-RISE in boys in general, both grit and gratitude remained higher in healthy compared to high-risk boys overall. Given that programs specifically targeting gratitude have been shown to improve both gratitude and psychological wellbeing in adolescent boys and girls, increasing the specific focus on grit and gratitude within Life-Fit components, or specifically for boys in whom these personal attributes are low, may act as protective factors and produce stronger mental health outcomes that facilitate improved functioning (Gabana et al., 2022; Millonado Valdez & Daep Datu, 2021)

Overall, our findings for boys suggest that future studies of youth sports programs should consider increasing the dose of components that specifically target anxiety and depression (and possibly grit and gratitude), for boys with elevated anxiety and depression (e.g., high-risk range boys complete the standard program plus an additional evidence-based component, such as a targeted CBT, ACT, or EFT approach). Similar increases may not be necessary for behavioral concerns. Furthermore, ensuring that boys, in general, complete all components of mental health programs within youth sports programs may be particularly important for reducing boys' depression and improving their self-satisfaction in general.

Among girls, for whom there were fewer participants to consider Life-Fit completion status or mental health risk status, it was found that anxiety scores declined in girls in the high-risk range but not to levels comparable to girls in the healthy range. Furthermore, depression scores remained more elevated in girls in the high-risk than in the healthy range, and did not decline in either risk or healthy groups. Similarly, behavioral concerns were higher, and self-satisfaction was lower, in girls in the high-risk relative to healthy range, regardless of time-point. Only 40% of girls were in the healthy range at post-RISE. There were no differences in the degree of parent contact for girls who did and did not improve.

As girls have not participated in the RISE program previously, we cannot compare outcomes with prior findings. However, the present results suggest that the RISE program, including Life-Fit online and on-field modules, did not improve mental health, self-satisfaction, grit nor gratitude outcomes in girls in the way that it did for boys. One consideration is that girls' anxiety and depression scores were significantly higher than, and behavioral concerns scores were unexpectedly equivalent to, those of boys. Thus, the program overall, including the rugby league, fitness and mental health components, may not be as effective for youth in general with elevated mental health concerns. Thus, additional components, such as CBT, ACT, or EFT, specifically targeting anxiety and

depression may be required. Another consideration is that the RISE program was not initially developed or tailored to the needs and preferences of girls. Moreover, behavioral problem scores were as elevated in girls as they were in boys, yet there were no significant changes in girls' behavioral concerns scores as there was in boys. Although the Life-Fit online modules contain examples, videos and content illustrated by, and applied to, both female and male rugby league players, and the Life-Fit on-field workshops include foundation drills and activities that girls and boys complete in routine training, the content within each online module was initially developed when only boys participated in the program and is not tailored to boys and girls specifically. Also, coaches in most locations were male and although girls and boys were in separate groups in some locations, they were combined in others in which there were small numbers of girls in the program. Therefore, the on-field program was not tailored to girls' relative to boys' needs. Notably, programs focusing on gratitude have been found to produce mental health benefits in youth, including girls (Gabana et al., 2022) and although gender differences have not been examined specifically, a greater focus on positive personal attributes may produce stronger outcomes for girls. Given the small sample size of girls relative to boys in the present study, it will be important to determine if the present findings are replicated in a larger sample and to consult with, co-design, and tailor the program based on girls' needs. Research has shown that the consistent issues that girls face in Australia include body image concerns, a sense of belonging, and relationship concerns, thus it may be beneficial to tailor programs to girls' specific needs by including aspects into the program that girls might enjoy, such as opportunities for social inclusion, cohesion, and connection (Student Wellbeing Hub, 2025; Women's Health Victoria, 2017).

Several limitations of the present study should be noted. First and most notably, the low post-RISE assessment rates limit the interpretation of outcomes and although there were no pre-assessment differences between completers and non-completers; outcomes may have been different with the larger sample size. A notable observation was that completers of both the pre- and post-RISE assessments had also completed more Life-Fit online modules than non-completers of both assessments, which may suggest less engagement in the RISE program overall by non-completers relative to completers of both assessments. Second, the risk range was defined as elevated scores on anxiety, depression and/or behavioral concerns because of high rates of co-occurring elevated scores across measures and thus, outcomes could not be evaluated for each condition separately. Third, although we have shown mental health and wellbeing benefits of Life-Fit within RISE in a prior comparison with players participating in the rugby league season but not the RISE program (Waters et al., 2022c), the present study did not include a comparison group of participants who completed RISE without any Life-Fit components or a separate control group who did not complete RISE. Thus, although the mental health outcomes are similar to our prior studies, it cannot be concluded that results were due solely to Life-Fit components and to the RISE program overall. Fourth, as the program was delivered during the season, a long-term follow-up was not feasible. Fifth, the smaller sample size for girls may not have produced enough statistical power, resulting in non-significant outcomes. Sixth, girls' behavioral concerns scores were unexpectedly equivalent to those of boys, and did not reduce in the same way as it did

for boys after completion of the program. Given that girls typically tend to externalize less than boys, it is possible that the Y-PSC measure that was used may have contributed to our findings of not capturing the same behavioral changes across gender, indicating that girls may not respond to the items in the Y-PSC measure the same way that boys do. Future studies may benefit from the inclusion of a different measure to capture behavioral concerns that are more relevant for girls. Finally, as the study was conducted within a junior rugby league development program, it is not clear to what extent results will generalize to other organized sports or activities.

Conclusion

Taken together, the present findings suggest that completion of at least some of the online and on-field mental health program in addition to the other components of a youth sport program had positive effects on mental health and personal attributes (anxiety, depression, behavioral concerns, grit, gratitude) for high-risk boys. Additionally, full completion of all parts of the program was important for improvements in boys' depression and self-satisfaction. Overall, the findings that high-risk boys' anxiety and depression scores declined but remained elevated compared to the healthy range suggests they might benefit from additional modules targeting anxiety and depression (such as CBT, ACT, or EFT). Also, incentives to encourage program completion should be considered as this may enhance depression and self-satisfaction outcomes in particular. For girls in whom mental health symptoms were more elevated than boys at the pre-RISE assessment, while some improvements in anxiety among high-risk girls was observed, the program was not effective in improving depression and behavioral concerns and attributes of grit and gratitude in girls with elevated mental health symptoms. Further studies including larger samples of girls are required and mental health programs within youth sports programs may need to be tailored to girls' needs specifically through co-design and participatory research principles.

Author contributions

All authors contributed to various aspects of the study conception, design, material preparation, data collection or analysis. The first draft of the manuscript was written by the first author and all authors commented on the manuscript. All authors read and approved the final manuscript.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Ethical approval

Approval for research with human subjects was obtained from the Griffith University Ethics Committee (Ref: 2018/426). Informed consent was obtained.

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Data availability statement

The data that support the findings of this study are available from the corresponding author, AW, upon reasonable request.

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