Mental skills training in elite sports environments: Current status of integration

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ABSTRACT
The role of mental skills training (MST) in elite sports is continually growing in prominence as several studies have emphasized its value to athletes and coaches for several years. Fewer studies have investigated how MST might successfully be integrated into elite sports franchises, clubs, and teams. This study examined the current status of MST integration in these environments. It also explored the obstacles to successful integration and how these might be overcome. A qualitative approach and phenomenological design were employed to collect data via emailed open-ended questions and follow-up semi-structured in-depth interviews and the data was analysed through thematic analysis (TA). Thirty-five leaders working in elite sports participated. Findings revealed that while all participants (n = 35) endorsed the importance of MST in elite sports, 11% (n = 4) had incorporated it effectively into their environments. Unsuitable practitioners, a lack of leadership support, and insufficient time for successful application were highlighted as significant obstacles hindering successful integration. Recommendations to overcome these obstacles included the prioritisation of MST by leaders of elite sports environments, formulating bespoke MST strategies for their teams, clubs, or franchises, recruiting suitably qualified MST providers, and providing them with sufficient time and resources to effectively implement these strategies.

1. Introduction

Athletes need physical and mental skills to succeed at the highest levels of their sport, especially during pinnacle events (Cottrell, 2018). Sports teams, franchises and clubs have recognized this for an extended period. For example, numerous franchises that participate in the Super Rugby tournament have incorporated mental skills training (MST) since the inception of the competition in the 1990s. This also holds true for other sports such as major League Baseball (Nightengale, 2018).

Research on the mental side of performance in sport has also expanded as athletes and teams continuously seek a competitive advantage. Numerous studies have shown how training athletes from various sporting codes in mindfulness, cognitive and behavioral mental skills contributed towards improving their overall performances (Brown & Fletcher, 2017, Bühlmayer et al., 2017, Gross et al., 2018, Gould & Maynard, 2009, Hardy et al., 2017, Harita et al., 2022, Hut et al., 2021, Noetel et al., 2019, Sparks & Ring, 2022, Vidic, 2021, Vidic & Cherup, 2022). Other studies have also found that athletes who engaged in MST participated in their sports for longer periods and at higher levels (Clowes & Knowles, 2013, Cotterill, 2011, Czech et al., 2004, Hayes, 2019, Hazell et al., 2014, Hogue, 2019, Mccann et al., 2001, McGowan et al., 2015). These athletes also tended to generally display more confidence, less pre-performance anxiety (Ong & Griva, 2017) and more emotional stability away from their sport (Hill et al. 2014, Ong & Griva, 2017, Patrick & Hrycaiko, 1998). Research has also revealed that most athletes are receptive to undergoing MST as part of their athletic development (Wrisberg et al., 2009). These apparent benefits along with the openness by athletes to engage in this form of training appear to

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highlight why it has seen a growing application in most sporting codes. However, some studies have also found that despite many coaches valuing MST, few of them made a deliberate attempt to develop these skills among their athletes (Creasy et al., 2009).

Zakrjesk et al. (2018) shed some light on why this might be the case by interviewing nine certified athletic trainers (ATs) from a National Collegiate Athletic Association Division I institution to investigate their perceptions and experiences of sport psychology services for student-athletes. Among their findings it was revealed that despite the participants being aware of these services in their environments, there still existed some confusion and uncertainty among them around what these services entailed and when, where how they could be accessed. To obtain clarity of the extent to which MST was being integrated among elite sports teams, clubs and franchises, it led the researchers to question whether mental skills were truly valued by their leaders and, to what extent they were being integrated into their overall performance strategies? Also, the researchers questioned what obstacles were potentially hindering such integration and how could they be overcome?

2. Methods

To answer the aforementioned questions, the study adopted a qualitative approach and phenomenological design. This was deemed the most suitable approach as the phenomenological design aims to explore the subjective experiences and views of a particular phenomenon from a group of people (Creswell, 2014). When considering the limited knowledge that could be identified pertaining to MST integration into elite sports environments, this approach was deemed applicable given that it was both explorative and descriptive in nature. Furthermore, phenomenological research provides a thorough understanding of participants’ lived experiences which was also sought from the participants in this study (Creswell, 2014).

In the context of this study, a team, club, or franchise was deemed elite if it competed at the highest level of the sport. This included e.g., participating in top-tier domestic competitions, transnational or international tournaments and events. It was also regarded as elite if its athletes and coaches participated on a full-time basis and were contracted and financially remunerated for their participation. Furthermore, an MST provider included both registered sports psychologists and mental skills coaches who were not necessarily registered and qualified psychologists. Therefore, all consultants who provided MST for elite sports teams, clubs, and franchises were viewed as MST providers for the purpose of this study. Finally, the following definition by Cumming (2018, para. 1) was adopted as the working definition of MST for its comprehensiveness and simplicity: “Also known as psychological skills training, MST involves the systematic development and application of mental techniques and skills to enhance mental qualities that promote performance and well-being”.

2.1. Participants

The first author invited potential participants (n = 50) to participate. Inclusion criteria stipulated that participants needed to occupy a leadership position such as a head coach, assistant coach or performance director at an elite team, club, or franchise in order to ensure that their responses were relevant to the research questions. It was also a requirement for these teams to have already engaged with MST in their environments as this was the focus of the study. They also needed to be able to converse in English, as this was the language used to gather the data.

Among the respondents who agreed to participate (n = 35), some were appointed as head or assistant coaches (n = 5) while others were performance directors (n = 30). They also identified as male (n = 32) and female (n = 3) with a mean age of 44 years. They represented different sporting codes, namely Major League Baseball, rugby union, rugby league, cricket, and field hockey. They averaged 8.3 years of leadership experience at elite teams, clubs, and franchises and represented various regions so as to obtain a broad perspective instead of solely focusing on a single sporting code within one country. These included Australia & New Zealand (n = 13), Europe & the United Kingdom (n = 11), and North America (n = 11). No additional information about them could be included in an attempt to protect their confidentiality as most of them were well-known to the public.

The participants formed a non-random convenience sample given that they were selected by the first author to request their participation. Convenience sampling is frequently used in qualitative research as it allows participants to be included because they are the easiest for the researcher to access (White & McBurney, 2012). This was also the case in this project because, as an experienced mental skills coach, the first author had come to know the participants through his work with various elite sports teams, clubs, and franchises. He was therefore able to utilize his existing relational network to recruit them to participate in the study. As the focus of this study was on the state of integration of MST within elite sports teams, clubs, and franchises, they were specifically approached on the basis of being experienced coaches and performance directors operating in such environments. Although they were recruited through convenience sampling, effort was made to ensure that they represented as diverse a range of sporting codes and locations as possible, thereby ensuring that the data was collected from multiple and varied sources.

The data was originally collected by the first author for service delivery purposes between 2021 and 2022. Therefore, the participants were contacted again in 2023 to request their permission to utilize the data for research purposes as well. Ethical approval was sought and granted for this purpose from the University of Otago Ethics Committee (Reference number: D23/029).

2.2. Procedure

Once all the potential participants had been identified, they were approached via email by the first author to determine their willingness to participate in the study. Only those who voluntarily agreed to participate were then emailed the questions indicated in the following section and requested to complete it within ten days. This approach was selected to make it as convenient as possible for the participants to participate given that they all had very busy schedules. They were also asked whether they would agree to a personal follow-up interview about the topic.

After ten days, those among them who agreed to participate (n = 35) had emailed their responses to the first author. Follow-up
semi-structured in-depth interviews were also conducted with those who agreed to it (n = 5) by the first author. These interviews were conducted online and lasted an average of 30 minutes each.

2.3. Data collection

The following questions were posed to the participants:

1. Do you believe MST plays an important role in overall performance?
2. Does your team, club, or franchise currently incorporate MST in its overall performance strategy?
3. Does your team, club, or franchise implement MST on a weekly basis?
4. What are the major obstacles that have prevented MST from being integrated into your team, club, or franchise?
5. How do you believe obstacles towards MST integration in elite sports environments could be overcome?

Additional probing questions were added where indicated or in instances when participants did not spontaneously elaborate on their answers during interviews.

2.4. Data quality & integrity

Participants voluntarily partook in the study and signed an informed consent form on which confidentiality and anonymity were ensured. Given the fact that many of the participants were well-known to the public, special care was taken not to reveal their identities. Furthermore, the overall trustworthiness of the study was ensured by employing the strategies of credibility, dependability, conformability and transferability throughout the project as prescribed by Guba (1981) and synthesized by Krefting (1991) as well as following the guidelines proposed by Korstjens and Moser (2018).

2.5. Data analysis

Thematic analysis (TA) was used to analyze the data and the six steps proposed by Braun and Clarke (2006) served as the primary guide for this purpose. These steps were familiarization, generating initial codes, grouping codes according to similarity, reviewing of themes, defining and naming of themes and composing the final report.

Each interview was recorded and transcribed verbatim by the first author. Following this, the first author also anonymized and reviewed each of them to ensure grammatical accuracy. Both authors completed the first three steps proposed by Braun and Clarke (2006) individually while making use of an inductive, bottom-up approach to allow the codes to interpret the data as opposed to drawing on any existing theories. This was done to minimize potential bias or influence on each other’s processes of analyzing the data during these initial steps. The authors then met to discuss their analyses and completed the remaining steps together which ultimately culminated in this publication.

Triangulation was achieved throughout this process through the frequent meetings between the authors to discuss the findings. This enabled a broader perspective to be created from which to interpret the data and allow their interpretations to be debated before agreeing on the final themes & sub-themes reported in the following section (Korstjens & Moser, 2018).

3. Results

The first question posed to all participants was whether they regarded MST to be important for overall performance. All of them answered this as ‘yes’ (100%). The second question inquired whether their team, club, or franchise possessed a mental skills strategy at the time as part of their overall performance strategy. Four participants answered this questions as ‘yes’ (11%). The third question inquired whether MST took place on a weekly basis at their club, franchise or team. Five participants (15%) answered ‘yes’ to this question.

The fourth question asked the participants what they considered the major obstacles to be that prevented MST from being integrated into their environments. Their responses yielded the following themes and sub-themes as depicted in Table 1:

Table 1: Obstacles hindering integration of mental skills training (MST).

<table>
<thead>
<tr>
<th>Theme 1: Obstacles regarding MST service providers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-theme: Difficulty identifying appropriate MST providers</td>
</tr>
<tr>
<td>Sub-theme: Inadequate understanding of elite sport environments by some MST service providers</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Theme 2: Obstacles regarding organizational cultures</th>
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<tbody>
<tr>
<td>Sub-theme: Lack of organizational support from key stakeholders</td>
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<tr>
<td>Sub-theme: Siloed organizational approaches</td>
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</tbody>
</table>

In the interest of brevity, all quotations highlighting the themes and sub-themes could not be included in this article. Those included in italic below were selected on the basis of their similarity to other related comments. Reference to the number of respondents who made similar comments was however included. A comprehensive list of the data can be made available upon request.

The first theme revolved around challenges with MST providers. The first sub-theme referred to the challenge of identifying an appropriate individual to deliver such a service. Twenty-eight participants commented on this sub-theme, with one stating that “we have struggled to find someone [MST provider] who can connect with the group and deliver quality [MST] work.” Another factor that frequently contributes to this sub-theme is the difficulty of measuring the actual impact of MST. Fourteen participants referred to this. One commented that “we have found it difficult at times to measure the impact of the mental skills work.”

The next sub-theme pointed towards a lack of understanding of the particular environment by MST providers as perceived by key stakeholders. This also included a perceived lack of understanding of elite sport environments. Eighteen of the participants referred to this and one stated: “You [MST providers] have to be able to understand the pressures and demands [of elite sport] to be relevant to the players.”
The next theme centered on challenges relating to the organization’s existing culture. The first sub-theme highlighted the apparent lack of support from certain key stakeholders to include and promote MST. Sixteen participants commented on this sub-theme, one of whom highlighted the challenge of obtaining sufficient support for MST from their leaders: “The biggest challenge for us is getting the support of the GM [General Manager] and board [of Directors]. They seem to think that only weak players need help with the mind [MST] work.” A related sub-theme highlighted by the participants was that MST is often implemented separately or in a siloed manner. For instance, one participant explained: “We haven’t been able to integrate the [MST] work across our environment, we need to figure out how to do this [with other performance areas], or we won’t get the buy-in we need.”

The themes and sub-themes depicted in Table 2 emerged from participants’ responses to the fifth question of how they believed obstacles towards MST integration in elite sports teams, clubs and franchises could be overcome:

Table 2: Recommendations of how obstacles hindering integration of mental skills training (MST) could be overcome.

| Theme 1: Desirable attributes of service providers | Sub-theme | Effective communication skills |
| Theme 2: Enabling environmental factors | Sub-theme | Understanding of elite sport |
| Sub-theme | Support from leaders |
| Sub-theme | Prioritization and time allocation for mental skills training |

The first theme referred to desirable skills and attributes of MST providers. The first sub-theme was that of effective communication skills to which two participants referred. One of them indicated: “We were fortunate enough to find someone [MST provider] who was able to hold the room and engage the players as well as connect with them in a one-on-one context.” This also translated to how MST providers communicated their specific knowledge, which two participants referred to. One of them stated that “the best mental skills coaches [MST providers] I have worked with managed to create and communicate simple tools and practices that allowed theory to come alive.”

The next sub-theme which emerged from the responses referred to the importance of MST providers requiring a thorough and clear understanding of elite sport. One participant explained: “Our [MST] provider identified early the mental demands of our game at this [elite] level and was able to tailor their program to meet those needs.” Another participant stated that “there are some highly qualified people out there, but working in elite sport is very different from other jobs.”

The next theme revolved around environmental factors that enabled effective integration of MST within elite sports environments. The first sub-theme highlighted here referred to the critical role of support for MST by leaders in these environments. Three participants referred to the importance of this, with one saying: “Once our leaders believed in the [MST] work, then everyone jumped on board.” This is closely related to the next sub-theme of these teams, clubs and franchises prioritizing MST by allocating sufficient time for it to be implemented effectively. Three participants mentioned the importance of this with one explaining how this was done effectively in their environment:

We [coaches and performance directors] would do a mental review and preview each week, just like the other aspects of the game. We use an expert [MST provider] to help us with this process and provide enough time for it to be important.

In summary, the results indicated that despite all the participants agreeing that MST is important for overall performance in elite sport, most of them indicated that it was not being effectively integrated into their environments. This appeared to indicate a contrast between the perceived and actual value of MST within their environments. Furthermore, many of them did not engage the services of a MST provider on a regular basis or had included MST in the overall performance strategies for their clubs, franchises, or teams. The main reasons the participants sighted for this were difficulties with finding suitable MST providers who possessed a satisfactory understanding of elite sport environments. Furthermore, organizational challenges such as a lack of support for MST by some leaders and applying it in a siloed approach were also noted. To overcome these barriers, participants suggested that MST providers need to develop effective communication skills and a sound understanding of what the needs are of athletes and coaches at the elite level of sport. Furthermore, certain factors surrounding MST needed to be developed including more support from leaders and allocation of sufficient time for it to be incorporated effectively within elite teams, clubs, or franchises.

4. Discussion

Results from the present study offered valuable insights into coaches and performance directors from elite sport teams, clubs, and franchises’ perceptions of the integration of MST in their environments. Participants provided important insight into their perceived value of MST, the barriers hindering its optimal implementation and recommendations on how to overcome such barriers. These results are timely given the increasing interest around the globe in MST, sport psychology, mental performance, and mental health at the elite level of sport (Durand-Bush et al., 2022).

An interesting aspect that emerged from the findings of the present study was that the attributes of MST providers were highlighted in both the obstacles towards successful integration of MST as well as the recommendations of how it might be overcome. It also appeared that in instances where participants indicated successful integration had taken place, the MST providers had communicated and positioned themselves effectively within these environments. A poor understanding of the elite sport landscape by some MST providers along with a poor understanding of the unique demands that it places on athletes and coaches who operate at this level was further highlighted as a particular obstacle. Simultaneously, a clear understanding of this landscape combined with effective communication skills of MST providers were highlighted as ways to overcome this obstacle. This was closely related to the findings of a study conducted by Chandler et al. (2014) that had investigated the personal qualities of effective sport psychologists.
from the perspectives of sports physicians who closely worked with them. It found the personal qualities of empathy and trustworthiness to be particularly important to being an effective sport psychologist. It also highlighted the importance of approachability, agreeability, and possessing the general ability to get along with people to build effective relationships with coaches and athletes alike. The study also found that effective sport psychologists could portray professionalism in practice by simultaneously portraying both humility and self-confidence. Furthermore, they possessed a clear understanding of their roles within the environment in which they operated and worked solely within the boundaries of what they were qualified for. Finally, the study highlighted the importance of the sport psychologist as a person requiring a strong drive towards empowering and genuinely caring for those they worked with in combination with an ability to communicate effectively (Chandler et al., 2014).

Apart from the individual attributes, skills or abilities of MST practitioners, the results further highlighted that the prevailing culture at elite sports clubs, franchises and teams played an important role in either hindering or enhancing the effective integration of MST. In this regard, leaders such as coaches and performance directors seemed to play a particularly important role. This is as leaders have been identified in the literature to set the tone in the creation and maintenance of prevailing organisational cultures (Shein & Schein, 2016). Zakrasjek et al. (2014) also found in their research that it was critical to obtain the ‘buy in’ from at least one leader for MST to be successfully integrated in an organisation. This appeared similar to the findings of this study as participants also remarked that in instances where leaders where they operated had ‘bought in’ to MST, it culminated in more support and time for it to be implemented and integrated into these environments. However, it was further reported by the participants that the opposite also held true where leaders had not ‘bought in’ to MST at their clubs, franchises, or teams.

Given the aforementioned, the results from this study pointed towards a situation where a combination of factors appeared to hinder or promote the effective integration of MST into elite sporting environments. In some cases, effective integration appears to be taking place where the organisational culture and its leaders are receptive to MST in combination with a suitably qualified MST practitioner who possesses a clear understanding of the environment and optimal communication skills. In instances where this is not the case, there appears to be a lack of integration of MST. To promote effective integration of MST at elite sports teams, organisations and franchises, the authors proposed the following recommendations based on the responses from the participants.

5. Recommendations

The results of this study provided valuable insights from the perspectives of coaches and performance directors with extensive experience at the elite level of sport. These insights translated into the following practical recommendations for leaders of elite sports teams, clubs, and franchises as well as MST providers who aim to work in these environments. The following recommendations are for leaders:

5.1. Incorporate MST providers into management teams

A team can have an MST provider appointed on its payroll who is tasked with facilitating the MST, but that is very different from having this individual truly integrated into the environment as one participant explained:

I wonder if we set up the Psych's [or MST providers] for failure by not having a system in place to help them integrate. We look to the [MST] provider if things go wrong, but I wonder if we need to look at ourselves first.

It is therefore recommended that MST providers be fully incorporated such as by including them in important team management meetings as early as possible following their appointment and allowing them to provide input on decisions. As experts in mental skills, they are often in a unique position to provide valuable insights that might otherwise be overlooked.

5.2. Include an MST strategy in the overall performance strategy

If a team, club or franchise already had an MST strategy in place, it would most likely provide a clear picture of what is required from MST in that context. Leaders can then focus on recruiting a provider who is best suited to implement it. As such, it is recommended that finding an appropriate a provider take place after a clear MST strategy was first established and included in the overall performance strategy.

5.3. Ensure the MST provider possesses an understanding of elite sport

The preferred MST provider should ideally be able to provide a clear track record to illustrate their understanding of the unique contextual demands of elite sport in addition to their qualifications. Possessing certain qualifications such academic qualifications does not necessarily automatically equate to a sufficient understanding and knowledge of this environment and the pressures it places on coaches and athletes who operate within it.

5.5. Allocate sufficient time for MST

Another recommendation is to allocate sufficient time in training programs for the implementation of MST. If the work is truly regarded as valuable and relevant by key stakeholders to overall performance, there needs to be sufficient time allocated for its optimal implementation to occur. How much time is, however, difficult to determine given that each elite team, club, or franchise is unique. Time is generally also a very precious commodity in these environments. As such, to determine how much time would be sufficient will depend on the unique needs of the coaches and athletes. If they feel they are obtaining sufficient benefit from the amount of time allocated to MST, it most likely is sufficient and no changes would be required. However, one of the participants made the following statement regarding insufficient time allocated to MST: “Our [elite sports] environments are quite time poor, so the mind work [referring to MST] tends to happen behind the scenes and, to be honest, is a bit of an afterthought.”

If the views among players and coaches are like the view expressed by this participant, it might warrant more time to be allocated towards MST. A brief survey among players and
coaches might give an answer to this. The participants expressed that keeping MST behind the scenes and having someone available for it rather than intentionally integrating time for MST in their training programs could silo MST and hinder its integration. The challenge would be to carve out time to invest in this work in already busy schedules. Effective integration will, however, only occur if MST is truly regarded as a key component of overall performance and time then dedicated for players and coaches alike to grow collectively from accessing it. The next recommendations are for MST providers.

5.5. Ensure support from key stakeholders before accepting a new role

Optimal integration of MST within an elite sports team, club, or franchise depends on support from all the critical stakeholders, including athletes, coaches, support staff and performance directors to drive the work throughout their environment. The findings revealed that the work would not flourish if it was conducted in a siloed manner. Historically, MST has often been viewed as a luxury, additional service, or something athletes would engage in when recovering from injury or when noticing a dip in performance (Zakrajsek et al., 2018). In recent times, there however appears to have been a gradual move away from this perception, for instance with increasing numbers of elite athletes speaking more openly about their mental health. Despite this, a stigma associated with working with the minds of athletes still persists in some sectors (Moreland et al., 2018). For this to be overcome and optimal integration of MST to occur, it is recommended that evidence for the contribution towards overall performance of MST be presented by MST providers to all stakeholders in elite sports environments to inform them of its importance and value. An opportunity to do so should ideally be discussed and confirmed with leaders in these environments prior to accepting a role of MST provider while discussions around mutual expectations and contracting are still in progress.

5.6. Measure and communicate the impact of MST

When referring to the measurement and impact of MST, one participant stated:

In other areas of performance we give a clear mandate of what we want to happen in the program, there are regular checkpoints to ensure we are on track, and we review the work after the season, with the mental stuff [MST] we tend to find a person and just let them loose, we don’t follow best practice.

Another participant echoed this statement in saying that “we have found it difficult at times to measure the impact of the mental skills work [MST].” These comments highlighted the importance of measuring and providing feedback by MST providers to all key stakeholders on the impact of MST. When however considering the nature of MST, this can be challenging. For instance, concrete datasets such as those produced from GPS trackers used in other performance areas cannot be produced in the same way for MST. As such, other performance areas that produces such tangible outcome datasets may be viewed by some stakeholders as more credible. This is logical given that it could be easier to determine if a training program was producing the desired outcomes if its progress was measured against such concrete data. This could also lead to situations whereby coaches and athletes may dedicate more time, resources and energy towards these performance areas given that their outcomes appear more tangible. This in turn might contribute to slower or ineffective integration of MST in elite teams, clubs, and franchises.

The more subjective nature of MST requires a different approach to measure its impact, and research is continuously providing more and improved options to do so. For instance, numerous evidence-based psychometric instruments are already available to MST providers, like the Athletics Coping Skills Inventory 28 (Smith et al., 1995), Psychological State Test for Athletes (Díaz-Tendoro et al., 2020), Sports Personality Questionnaire (Raharjo, 2018), Psychological Skill Inventory (Milavic et al., 2019) and Ottawa Mental Skills Assessment Tool – 3 (Durand-Bush et al., 2001), to name but a few. The selection of which of these instruments to use should ideally flow from a thorough analysis by MST providers of the unique needs of the elite teams, clubs, or franchises in which they operate. More recently, Durand-Bush et al. (2022) developed a comprehensive, evidence-informed framework that might also better assist MST providers as part of this process, namely the Gold Medal Profile for Sport Psychology (GMP-SP). This framework was established to guide MST providers and sports organisations with their design, delivery, tracking, and evaluation of MST. Regardless of which tools or approaches MST providers opt to use, it is recommended that they measure and provide feedback on the impact of the MST they provide to all key stakeholders at various intervals throughout their involvement to promote more effective integration of MST at elite clubs, teams, and franchises.

6. Limitations

Thirty-five participants took part in this study which represented a relatively small sample size. Due to this they could not represent all sporting codes (e.g., football, basketball, golf, and motor sports were not represented). They also held existing relationships with the first author which might have influenced their responses and only three of them identified as female. Therefore, care should be taken not to generalise the findings of the present study to all elite sports environments. In hindsight, the authors also felt there was latitude to have potentially included additional questions that might have provided more additional valuable data. Despite this, the study managed to achieve its aim of providing valuable insight on the current status of MST integration into elite sports environments from a variety of leaders with extensive experience in these contexts. For future studies it would be beneficial to expand on these findings by potentially conducting quantitative or mixed methods studies with larger sample sizes, including more female participants and more sporting codes. As athletes were not included among the respondents in this study, future studies could also include them to obtain their perspectives on the topic. Furthermore, all the participants from this study operated in countries and organisations that predominantly represented what could be described as Western cultures. It would, therefore, be beneficial for future studies to also include participants from other cultures. This would hopefully also highlight their unique perspectives and needs when it comes to MST in their environments.
7. Conclusion

Studies on the benefits of MST in sport were identified from the literature, however, few could be identified that had examined its state of integration within elite sports teams, clubs, and franchises. This study aimed to take a step towards filling this gap by obtaining an indication on the current status of MST integration within these environments. Thirty-five participants took part in the study and provided their valuable insights as experienced leaders who understood both the context and demands of elite sports environments. Despite being from different regions and involved in different sporting codes, similar ideas and challenges frequently appeared to emerge from their responses. These revealed that despite being valued, several obstacles still persisted in their environments that inhibited MST from being optimally integrated. Some recommendations were included based on these findings to potentially overcome these obstacles. Additional research is required with larger samples and different respondents on how best to overcome these obstacles and integrate MST more effectively into these environments in the future.

Conflict of Interest

The authors declare no conflict of interests.

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References


The association between motivation and physical activity among forensic and rehabilitation inpatients in Aotearoa New Zealand

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A B S T R A C T

The aim of this study was to examine the association between motivation and physical activity among forensic and rehabilitation inpatients living with serious mental illness in Aotearoa New Zealand (NZ). Patients from a long-stay forensic and rehabilitation inpatient facility were recruited to participate in an interview that collected information on their personal characteristics (e.g., age, gender), motivation to be active using the Behavioural Regulation in Exercise (BREQ\textsuperscript{3}-PA), and physical activity levels using the Simple Physical Activity Questionnaire (SIMPAQ). The association between motivation and physical activity was examined using Spearman’s rho and classified according to accepted thresholds for correlation coefficient effect sizes. All participants (n = 24) met global and national physical activity recommendations. All correlations between the different physical activity types and the relative autonomy index score were negligible (Spearman’s rho < 0.3), as were correlations between total moderate-vigorous physical activity and each of the six motivation subscales (Spearman’s rho < 0.3). Participation in exercise and sport was positively correlated with intrinsic motivation (Spearman’s rho = 0.356) and identified regulation (Spearman’s rho = 0.391). All other correlations between physical activity types and the motivation subscales were negligible (Spearman’s rho < 0.3). In summary, there was limited evidence of an association between physical activity participation and motivation to be physically active. Results may have been affected by the effects of institutionalisation within this population, whose ability to act autonomously is severely limited. Further research is required to better understand the potential benefit of motivational interventions to encourage physical activity participation, and what form they should take.

1. Introduction

The physical health of people living with mental illnesses has been noted as a priority area for clinical practice and research internationally (Firth et al., 2019) and in New Zealand (Te Pou, 2020). A considerable mortality gap exists between those with and without severe mental illness (SMIs; e.g., schizophrenia, bipolar disorder, and major depressive disorder) (Thornicroft, 2011). This persistent inequity is largely attributable to the relatively poor physical health of individuals with SMI, among whom non-communicable diseases are responsible for more premature mortality than suicide (Correll et al., 2017; Hayes et al., 2015; Olsson et al., 2015; Swaraj et al., 2019; Vancampfort et al., 2017). Review level evidence indicates that these long-term health inequities mirror lower levels of physical activity participation by people experiencing SMI and that encouraging participation in
Physical activity can be an effective intervention for improving physical health in this population group (Bull et al., 2020; Schuch et al., 2017; Stubbs et al., 2016; Vancampfort et al., 2017). Specifically, effective promotion of physical activity can contribute to improving both the physical and mental health of people experiencing SMI.

The socio-ecological model has been widely used to understand physical activity behaviour and develop interventions to improve participation (Bauman et al., 2012; Sallis & Saelens, 2000). Within populations under mental health services, physical activity is influenced by public policy (funding, restrictions imposed under the Mental Health Act such as e.g., leave status), community (facility policy, facility design and accessibility), interpersonal (peer networks, support from mental health professionals), and individual factors (e.g., self-efficacy, attitudes, motivation) and personal characteristics (e.g., gender, ethnicity, socio-economic status, health status, disability). While each of these factors are important antecedents of physical activity behaviour, an individual’s motivation has been shown to be a significant predictor of physical activity for people living with SMI (Vancampfort et al., 2017). Among the most popular conceptualisations of human motivation – supported by a large body of evidence – is self-determination theory (SDT) (Deci & Ryan, 2000).

Broadly, SDT posits that there are two types of motivation: autonomous and controlled. Autonomous motivation comes from within an individual, and is comprised of three types. Intrinsic motivation describes undertaking an activity out of enjoyment or mastery (e.g., playing a favourite sport); identified regulation describes undertaking an activity because it is aligned with one’s personal values (e.g., exercising because it improves physical health); integrated regulation describes undertaking an activity because it is linked to one’s identity (e.g., being a ‘runner’ or a ‘cyclist’). Conversely, controlled motivation is externally driven. External regulation is prototypical of this – being active on the basis of receiving a reward or avoiding a punishment. More relevant to physical activity is introjected regulation – which describes ego-based motivation such as exercising to attain a certain body ideal, often as a result of societal pressure. Individuals often experience several such types of motivation at any one time, and they can fluctuate over time (Lindwall et al., 2017). In the presence of autonomous motivation for physical activity, long-term adherence and psychological well-being are more likely if the surrounding social and physical environment are conducive to participation (Jenkins et al., 2021; Teixeira et al., 2020).

SDT also posits that key to autonomous motivation is the satisfaction of three basic psychological needs within a given behavioural context: competence, autonomy, and relatedness (Deci & Ryan, 2000). In the context of physical activity, autonomy refers to an individual feeling that they have choice in their physical activity (Ryan & Deci, 2000), competence refers to feeling able to meet specific activity-based goals (e.g., a certain amount of steps), and relatedness refers to feeling socially connected to others within the context of physical activity (e.g., peers or instructors; Edmunds et al., 2006). As a result of having these three psychological needs met within a given context, autonomous motivation is more likely. There is existing evidence regarding the importance of satisfying psychological needs in the development of motivation for physical activity (Teixeira et al., 2020).

While research into the relationship between motivational type and physical activity among individuals with SMI is limited, existing research does indicate an association between autonomous motivation for physical activity and physical activity behaviour (Sørensen, 2006; Vancampfort et al., 2015). However, despite these findings, very few studies have involved people who are institutionalised in mental health care facilities, which is a unique and important context that warrants further investigation. Our prior exploratory research in this population suggested motivation to be a key factor, with sedentary participants spontaneously raising ‘low motivation’ as a barrier to being physically active (Every-Palmer et al., 2018).

Therefore, the aim of this study was to assess the association between motivation and physical activity among a population of forensic and rehabilitation inpatients experiencing SMI in NZ. This will provide insight into the relative importance of motivation as a determinant of physical activity behaviour in this population group. In doing so, our objective is to understand how to improve support for sustained participation in physical activities that are beneficial to the physical and mental wellbeing of SMI inpatients at mental health care facilities.

2. Methods

2.1. Participants

Participants were recruited from long-stay forensic and rehabilitation inpatient units (Te Korowai Whariki) at Ratonga Rua o Porirua Hospital, which houses patients with various mental illnesses (psychosis, bipolar, schizoaffective disorder) and serves five district health boards across the lower North Island of Aotearoa New Zealand. Patients have different access to leave according to their legal status and the specific ward in which they reside (of which there were four), with these wards ranging from medium security (restricted access) to open access.

Inclusion criteria stated that participants must: be a current inpatient of the forensic and rehabilitation mental health services; have a diagnosis of a psychotic disorder and/or a mood disorder with psychotic features (ICD-10 or DSM-5 criteria); meet diagnostic criteria for a serious mental illness (clinician-administered); have the capacity to provide informed consent (as assessed by the treating psychiatrist); and have spent a minimum of two months in the service (such that treating teams could have adequate time to treat their mental state and to ascertain that they have capacity to give informed consent). Exclusion criteria included: a mental state considered by the treating psychiatrist as too unstable to participate in the trial; and an inability to speak English.

Patients were invited to study information sessions organised by hospital staff (i.e., not members of the research team, thus minimising coercion). Patients who indicated interest were provided with an information sheet that included research team contact details. Once contact was made and the patient agreed to participate, informed consent was obtained. Data collection took place from June 2021 to September 2021. Participants’ access to physical activity opportunities varied according to the ward on which they resided, but all included a minimum of weekly access.
to a personal trainer and access to cardio fitness equipment and weight areas. In addition, swimming pool access (subject to approval by an on-site occupational therapist) and a weekly sports group were available to participants. Opportunities for walking included one on-site treadmill and pathways around the facility grounds. For those with approved leave into the community, there was also the opportunity to walk to the nearest town with amenities (shops, takeaways) located approximately one kilometre away.

Ethical approval was granted by the University of Otago Ethics Committee (New Zealand). Māori consultation was undertaken with the Ngāi Tahu Māori Consultation Committee. Participants’ time was acknowledged with a NZ$40 supermarket voucher.

2.2. Procedure

Physical activity and motivation data were collected at one time point for each participant, via face-to-face interviews that lasted approximately 20 – 30 minutes. Study data were collected and managed using REDCap electronic data capture tools hosted at the University of Otago. All participants identifying information (names and other identifiable information) was removed and linked by a secure keycode. Only the principal investigator and the researcher administering the data collection tools had access to the raw data.

2.3. Measures

2.3.1. Participant characteristics

Key descriptive data collected included: age, gender, ethnicity, and smoking status. One participant did not report their smoking status. Other variables recorded included: leave status (whether the participant was able to leave their unit and if so the number of hours/week approved leave); access to physical activity support; primary psychiatric diagnosis; other psychiatric diagnoses; current psychotropic medication; patient status (forensic or rehabilitation); whether the participant was under the Mental Health Act; non-psychiatric diagnoses and associated medication; and height and weight which were used to calculate body mass index (BMI). Data were retrieved from participants’ patient records, with their explicit permission (requested during the informed consent process).

2.3.2. Physical activity

The Simple Physical Activity Questionnaire (SIMPAQ; Rosenbaum et al., 2020) was designed to measure self-reported physical activity, sedentary behaviour, and sleep of people living with a serious mental illness. The SIMPAQ consists of five sections, covering sleep, sedentary behaviour, walking, physical activities such as exercise and sport, and any other incidental physical activities (e.g., gardening, household chores). The SIMPAQ was conducted via face-to-face interviews. The SIMPAQ has been shown to be valid and reliable across various samples (Rosenbaum et al., 2020). For the purposes of this study, physical activity was separated into: i) walking; ii) exercise and sport; iii) other physical activity. As per the SIMPAQ analysis rules, total moderate-vigorous physical activity was also estimated by summing the walking and the exercise and sport domains (Rosenbaum et al., 2020; Simple Physical Activity Questionnaire, 2019).

2.3.3. Motivation for physical activity

The Behavioural Regulation in Exercise (BREQ-3-PA version; Markland & Tobin, 2004; Wilson et al., 2006) consists of 24 items, each answered on a five-point Likert-type scale from zero (not true for me) to four (very true for me). There are six subscales each containing four items: i) Intrinsic motivation (e.g., ‘I am physically active because I enjoy it’); ii) Integrated regulation (e.g., ‘I consider physical activity as part of my identity’); iii) Identified regulation (e.g., ‘It’s important to me to be regularly physically active’); iv) Introjected regulation (e.g., ‘I am physically active because other people say I should be’); v) External regulation (e.g., ‘I take part in physical activity because my friends/family/partner say I should’); and vi) Amotivation (e.g., ‘I don’t see the point in being physically active’). Mean scores were calculated for each subscale. These scores were also weighted and summed according to established protocols to give a composite overall score known as the Relative Autonomy Index (RAI) (Connell & Ryan, 1985; Grolnick & Ryan, 1987; Howard et al., 2020; Markland & Ingledew, 2007).

2.4. Statistical approach

All analyses were conducted using SPSS Version 26.0 (IBM, Armonk, NY). There were initially 38 participants who agreed to be part of the study and met the inclusion criteria. Three participants provided incomplete responses to SIMPAQ items and were excluded. A further 11 participants were excluded after applying the SIMPAQ cleaning rules (i.e., nine participants provided responses that accounted for less than 18 hours of their day and two participants reported walking and/or exercise values exceeding the 2.5 SD threshold) (Simple Physical Activity Questionnaire, 2019). Analyses were conducted on the remaining 24 participants. Descriptive statistics were computed to characterise the data. Spearman’s rho correlation coefficients were used to examine the association between each of the motivation variables and the physical activity variables because the data was not normally distributed. We applied widely accepted effect size parameters from the field of behavioural science to define the strength of association for the calculated correlation coefficients (i.e., 0.0 – 0.3 = negligible correlation, 0.3 – 0.5 = low correlation, 0.5 – 0.7 = moderate correlation, 0.7 – 0.9 = high correlation, 0.9 – 1.0 = very high correlation) (Hinkle et al., 2003).

3. Results

3.1. Participants characteristics

Descriptive statistics for the participant characteristics are presented in Table 1. The mean age of participants was 34.3 ± 12.5 years. Most participants were men (75.0%), Māori (58.3%), had leave from their unit (75.0%), used more than 10 hours of leave/week (58.3%), did not smoke (56.5%), and were classified as having obesity (70.8%). The mean BMI was 36.3 ± 7.8 kg/m².
All participants were receiving compulsory treatment under mental health legislation.

Table 1: Participant characteristics.

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>18</td>
<td>75.0</td>
</tr>
<tr>
<td>Women</td>
<td>6</td>
<td>25.0</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NZ European</td>
<td>6</td>
<td>25.0</td>
</tr>
<tr>
<td>Māori</td>
<td>14</td>
<td>58.3</td>
</tr>
<tr>
<td>Pasifika</td>
<td>3</td>
<td>12.5</td>
</tr>
<tr>
<td>MELAA</td>
<td>1</td>
<td>4.2</td>
</tr>
<tr>
<td><strong>Leave status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>18</td>
<td>75.0</td>
</tr>
<tr>
<td>No</td>
<td>6</td>
<td>25.0</td>
</tr>
<tr>
<td><strong>Amount of leave used (hours)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 – 2</td>
<td>6</td>
<td>25.0</td>
</tr>
<tr>
<td>2 – 5</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>5 – 10</td>
<td>4</td>
<td>16.7</td>
</tr>
<tr>
<td>10 – 15</td>
<td>1</td>
<td>4.2</td>
</tr>
<tr>
<td>15 – 20</td>
<td>5</td>
<td>20.8</td>
</tr>
<tr>
<td>20+</td>
<td>8</td>
<td>33.3</td>
</tr>
<tr>
<td><strong>Smoking status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoker</td>
<td>10</td>
<td>43.5</td>
</tr>
<tr>
<td>Non-smoker</td>
<td>13</td>
<td>56.5</td>
</tr>
<tr>
<td><strong>Weight status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal weight (18.5 – 24.9 kg/m²)</td>
<td>17</td>
<td>70.8</td>
</tr>
<tr>
<td>Overweight (25.0 – 29.9 kg/m²)</td>
<td>6</td>
<td>25.0</td>
</tr>
<tr>
<td>Obese (≥ 30.0 kg/m²)</td>
<td>1</td>
<td>4.2</td>
</tr>
</tbody>
</table>

Note: NZ = New Zealand; MELAA = Middle Eastern, Latin American, and African.

The most common primary diagnosis was schizophrenia (n = 21, 87.5%). The primary diagnosis of the other three participants was schizoaffective disorder, major depressive disorder, and bipolar affective disorder. Ten participants did not have a secondary psychiatric diagnosis (41.2%), though 12 had a substance use disorder (50%), two had post-traumatic stress disorder (8.3%), one had attention deficit hyperactivity disorder (4.2%), one had a history of depression (4.2%), and another had schizotypal personality disorder (4.2%).

With regards to antipsychotic medication, 14 (58.3%) participants were taking Clozapine, 11 (45.8%) were taking atypical medication (e.g., Olanzapine, Risperidone, Quetiapine, Paliperidone, Aripiprazole), four (16.7%) were taking mood stabilisers (Lithium, Sodium Valproate), two (8.3%) were taking antidepressants (SSRIs, Venlafaxine), two (8.3%) were taking benzodiazepines (Lorazepam, Diazepam, Clonazepam), and seven (29.2%) were taking other psychiatric medication. Six (25.0%) participants were taking multiple types of antipsychotic medications.

Nine participants had no comorbid physical health conditions (37.5%), whereas eight had metabolic risk factors (e.g., hypertension, hyperlipidemia) (33.3%), three had musculoskeletal affections (e.g., arthritis, chronic joint pain) (12.5%), three had breathing troubles (e.g., sleep apnea, asthma, emphysema) (12.5%), two had polycystic ovary syndrome (8.3%), two had hyperthyroidism (8.3%), two had low iron/anemia (8.3%), and three reported other conditions (12.5%).

3.2. Physical activity and motivational characteristics

Descriptive statistics for the participant physical activity duration and motivation scores are presented in Table 2. Most physical activity occurred via walking. Overall, the participants scored highest for intrinsic motivation and identified regulation, but integrated regulation was also scored highly.

All participants reported participating in at least one hour of physical activity daily and easily exceeded current global recommendations for physical activity participation (Bull et al., 2020). We note that many of our participants provided information that did not sufficiently account for 24 hours. Recall is understood to be low in this population, and for this reason the SIMPAQ includes aids to maximise recall (e.g., the interviewer totals the hours recall as the interview progresses). This is also reflected by the SIMPAQ guidelines that indicate accounting for between 18 and 30 hours is sufficient recall (Rosenbaum et al., 2020).

Table 2: Physical activity and motivation descriptive statistics.

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-reported physical activity (hrs/day)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking</td>
<td>2.2</td>
<td>2.3</td>
</tr>
<tr>
<td>Exercise and sport</td>
<td>0.5</td>
<td>0.4</td>
</tr>
<tr>
<td>Other</td>
<td>0.3</td>
<td>0.6</td>
</tr>
<tr>
<td>Moderate-vigorous</td>
<td>2.7</td>
<td>2.3</td>
</tr>
<tr>
<td>Motivation to be active (scale)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrinsic motivation</td>
<td>3.1</td>
<td>0.7</td>
</tr>
<tr>
<td>Integrated regulation</td>
<td>2.7</td>
<td>1.1</td>
</tr>
<tr>
<td>Identified regulation</td>
<td>3.1</td>
<td>0.7</td>
</tr>
<tr>
<td>Introjected regulation</td>
<td>1.9</td>
<td>1.1</td>
</tr>
<tr>
<td>External regulation</td>
<td>1.5</td>
<td>1.2</td>
</tr>
<tr>
<td>Amotivation</td>
<td>0.4</td>
<td>0.6</td>
</tr>
<tr>
<td>Relative Autonomy Index</td>
<td>11.7</td>
<td>5.0</td>
</tr>
</tbody>
</table>

3.3. Association between motivation and physical activity

Results from the correlation analyses are presented in Table 3. All correlations between the different physical activity types and the RAI score were negligible (Spearman’s ρ < 0.3). The
correlations between total moderate-vigorous physical activity and each of the six motivation subscales were also negligible (Spearman’s rho < 0.3). However, participation in exercise and sport was positively correlated with both intrinsic motivation (Spearman’s rho = 0.356) and identified regulation (Spearman’s rho = 0.391), albeit a weak association. All other correlations between physical activity types and the motivation subscales were negligible (Spearman’s rho < 0.3).

4. Discussion

We found high levels of self-reported physical activity, primarily in the form of walking, in our sample of inpatients with SMI at a mental health care facility in New Zealand. Although there was a negligible association between total moderate-vigorous physical activity and all indicators of motivation to be physically active, volitional physical activity (i.e., exercise and sport) was weakly associated with both intrinsic motivation and identified regulation. Despite several limitations, our findings have important implications for the development and delivery of physical activity interventions for people experiencing SMIs and are admitted to mental health care facilities.

The levels of physical activity reported in our sample far exceeded that in the general population in New Zealand (Ministry of Health - Manatū Hauora, 2020; Sport New Zealand - Ihi Aotearoa, 2020). This contrasts with the existing international evidence for people experiencing SMI, who typically fall below general population norms (Schuch et al., 2017; Stubbs et al., 2016). Indeed, even compared to previous research within the same population (Huthwaite et al., 2017), physical activity levels were significantly elevated. Although this is almost certainly partly due to selection bias in our sample from voluntary recruitment, it is important to note that previous meta-analyses did not include data from New Zealand where clinical care norms are rapidly evolving to be more inclusive of physical activity ‘prescription’ (Schuch et al., 2017; Stubbs et al., 2016). Indeed, in the region from which our sample was taken there has been an increasing focus on embedding physical activity in the usual care provided by mental health care practitioners (Capital and Coast District Health, 2015).

Another potential reason that our results differed to previous research in this population lies in the data capture method. The SIMPAQ, being delivered via an interview and designed to provide increased hourly accountability, was more sensitive to smaller incidental physical activities as compared to the self-report measure used previously (Huthwaite et al., 2017). Further, specific changes in the context since the previous study were reported by staff working at the facilities, including new programmes facilitated by on-site cultural support groups and compulsory morning ‘outside’ time in some units that were not in place during the previous study.

Research assistants reported that some participants were also walking outside while using electronic cigarettes (i.e., to ‘vape’), an activity that was not permitted during Huthwaite et al.’s (2017) study. Staff also anecdotally reported that participants ‘pacing’ inside the unit was a common form of physical activity, which might have been missed by less sensitive self-report physical activity measures. It is highly likely that our results reflect a mixture of these recent institutional and regulatory changes. Finally, we note that self-report methods for PA are subject potential reliability issues (Firth et al., 2018) regardless of the population being studied.

The high levels of physical activity participation in our sample may partially explain the limited associations we found with motivation to be active. Despite the ongoing conjecture in the international literature, most studies report a much stronger cross-sectional association between physical activity and motivation to be active when compared to our study (Owen et al., 2014; Teixeira et al., 2012). However, all prior studies comprised fewer active participants. The geographical context of the facilities – located on a large campus one kilometre distance from the nearest shops – may have resulted in patients with appropriate leave status accumulating physical activity opportunistically through walking as a means of getting somewhere rather than as a deliberate exercise strategy. It is also possible that participants in our study had a substantial volume of physical activity embedded in their daily mental health management plan, and that direct supervision of this within an inpatient setting increased their participation irrespective of their motivation. A case in point is the compulsory daily outdoors time - characteristic of controlled motivation - which existed at the time of data collection in some of the units.

Table 3: Spearman’s rho correlations between physical activity and motivation to be active.

<table>
<thead>
<tr>
<th>Motivation subscale (BREQ-3-PA version)</th>
<th>Self-reported physical activity (hrs/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Walking</td>
</tr>
<tr>
<td>Intrinsic motivation</td>
<td>0.034</td>
</tr>
<tr>
<td>Integrated regulation</td>
<td>0.257</td>
</tr>
<tr>
<td>Identified regulation</td>
<td>0.171</td>
</tr>
<tr>
<td>Introjected regulation</td>
<td>0.038</td>
</tr>
<tr>
<td>External regulation</td>
<td>0.001</td>
</tr>
<tr>
<td>Amotivation</td>
<td>-0.293</td>
</tr>
<tr>
<td>Relative Autonomy Index</td>
<td>0.244</td>
</tr>
</tbody>
</table>

Note: *Denotes a low correlation according to established thresholds for effect size (Hinkle et al., 2003).
This may partly explain why physical activity was not strongly associated with autonomous motivation in this study. Of note, previous studies of physical activity motivation in the SMI population have not been conducted specifically within forensic inpatients with limited leave.

Thus, structured physical activity offered to our participants as part of usual care combined with more limited autonomy than the general population could have increased physical activity via mandated participation. Although this potentially has physical health benefits for individuals with SMI (Correll et al., 2017; Olsson et al., 2015; Swaraj et al., 2019; Vancampfort et al., 2017), if autonomy is compromised, it may also have a negative impact on their immediate mental health and their sustained participation in physical activity. It is now well established that positive experiences of physical activity are critical for improving mental health and facilitating ongoing participation in people experiencing SMI (Bull et al., 2020; Firth et al., 2016). An important part of this is providing participants with the opportunity to initially choose physical activity options that they find appealing (Collado-Mateo et al., 2021). Added to this, of course, is the fact that participants’ recently increased use of electronic cigarettes might have contributed to increased physical activity, this balance of different health behaviours is clearly a delicate one.

Despite the evidence for the mental health benefits of walking (Kelly et al., 2018), its overwhelming contribution to total physical activity and underwhelming association with motivation in our results suggests that it may not have been the activity of choice for our sample. In contrast, it appears that the intrinsic motivation our study participants had to engage in physical activity did contribute to their participation in exercise and sport. Similarly, our results for identified regulation indicate that the participants attached personal importance to being physically active and this was also a determinant of their engagement in physical activity. These findings highlight the importance of focusing on enjoyment and personal values, particularly via environmental and/or experiential interventions, when attempting to motivate people with SMIs to be physically active (Rhodes et al., 2009). Our results also add support for the qualitative findings from previous research with regards to high levels of autonomous motivation in this population (Every-Palmer et al., 2018).

However, our results also contextualise and bring into question the relative importance of motivational approaches for effective promotion of physical activity in SMI inpatient settings. Specifically, as we have surmised above, our findings indicate that the high levels of physical activity participation in our sample were not particularly driven by individuals’ motivation to be active. Furthermore, implementing an intensive strategy to improve motivation at an intrapersonal level, such as motivational interviewing, in isolation is likely to have limited scalability and cost-effectiveness in this population group (O’Halloran et al., 2014). Rather, it is more likely that concurrently addressing multiple factors across the socio-ecological model will directly improve physical activity levels and indirectly influence motivation levels (e.g., changing socio-cultural norms to enable safe access for inpatients with SMI to a broad range of community sports) (O’Halloran et al., 2014; Solar & Irwin, 2010). This does not preclude individualised approaches to address motivation, but there is a clear need for further research to understand its role in SMI inpatient settings.

Further research should include longitudinal and intervention studies to overcome the cross-sectional limitations of our study and establish the temporal relationship between motivation and physical activity participation in SMI inpatients. Based on our findings, this may be particularly pertinent when considering the transition that occurs when an inpatient with SMI is discharged into the community. Although motivation did not appear to be a critical factor for engaging in a large amount of physical activity in a highly structured inpatient setting, it may become more important as an individual moves to an environment that is likely to be inherently less supportive. For example, the social and built environment within which individuals will live is fundamentally different upon discharge, meaning many habits formed during an inpatient stay may not transfer unless individuals are appropriately prepared and supported to make this transition. Despite this, our results indicate that even people without a large amount of leave from the facility were engaged in physical activity levels well above national norms (Ministry of Health - Matatū Hauora, 2020; Sport New Zealand - Ihi Aotearoa, 2020). How well this is sustained after discharge is yet to be ascertained and warrants further investigation. Importantly, as is the case in other areas of health within Aotearoa and previous research in this population, Māori were overrepresented in our sample. As such, any interventions that are developed should at least be culturally responsive or ideally based on cultural knowledge that reflects the target population (e.g., Mātauranga Māori).

There were several other limitations to our study that should be addressed in future research. As previously mentioned, one limitation is the small sample size. Participants represented only 26% of the total number of patients in these forensic and rehabilitation services. Recruitment for such research is historically challenging within forensic and rehabilitation services, and our participation rates were similar to previous research in the same population (e.g., Huthwaite et al., 2017). Therefore, even though our participants were highly active, they were not representative of the larger population of patients within these services. It is possible that those who chose not to participate did so in part because they were not active, or participation precluded by failing to meet inclusion criteria at the time of recruitment. The small sample size prevented more nuanced and adjusted analyses.

Additionally, the small sample size is attributable to the exploratory nature of our study, the uniqueness of the target population, and challenges in obtaining complete measurement responses (e.g., due to participant recall). The use of objective measurement devices would address the widely recognised concerns about the validity of self-report physical activity measures, particularly in this population group whose recall capacity is often compromised (Sallis & Saelens, 2000). Although the SIMPAQ was specifically developed for people with SMI with these limitations in mind and has been validated internationally across multiple settings (Rosenbaum et al., 2020), our sample had particularly high attrition. Future research should ensure that measures are in place to improve data completion rates. For example, participants could be asked about a specific day (as opposed to a ‘over the last seven days’) or alternative measurement methods could be used (e.g., physical activity diary). Subjective reports can be triangulated with objective with objective recording through the use of activity trackers.
Furthermore, sampling from numerous inpatient facilities would help to increase sample size, as well as allow for comparisons between facilities to identify areas of apparent strength and/or weakness. Finally, assessing only motivation limited the ability to draw firm conclusions on other determinants of physical activity participation in the target population group. Assessing other psychological constructs, such as barriers/facilitators to physical activity may help identify what intrapersonal, interpersonal, and environmental factors need to be addressed.

In summary, our sample was a highly active group, but we found limited evidence of an association between physical activity participation and autonomous motivation to be physically active. However, the patient management methods in place in this context are likely to have impacted participants’ autonomy, which would have influenced this association. We believe that autonomy-supportive motivational interventions based on motivational theory do have a place in forensic and rehabilitation services, but considering the restrictions in place in such settings, these are likely to look different in design as compared to those used in the general population. Regardless, any motivational work should leverage the perceived enjoyment and value of being physically active to engage people in exercise and sports of their choice. We also acknowledge that physical activity and exercise, while crucial to the improving the physical health of people with serious mental illness, other factors also significantly contribute to health and well-being, including nutrition and smoking abstinence. As such, any efforts to improve the health of this population should consider multiple health behaviours besides physical activity. Future research involving larger samples, exploring changes over time, assessing other constructs, and/or involving comparisons between facilities or individuals in the general population is warranted.

Conflict of Interest

The authors declare no conflict of interests.

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Does a combined swimming pool and open water education programme for children develop adaptable water safety competencies?

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ABSTRACT
Most learn-to-swim programmes are undertaken in one location (often a swimming pool), which is potentially less effective than learning across a range of aquatic places and contexts. Water safety education delivered in multiple environments may improve skill development and transfer. We investigated whether a combined pool and open water programme improves children’s knowledge and skills. Sixty-six children (7 – 11 years old, 34 males, 32 females) participated, of which 40 undertook a 5-day education intervention (two days in a pool, one day each at a harbour, beach, river) and 26 were controls. The skills taught and assessed were: continuous 5-minute swimming, floating and treading water, underwater swimming, and a water safety quiz. Skill competency was assessed in a harbour before, immediately after, and approximately one month after the education programme. The number of children in the education group demonstrating high competency increased after the intervention (i.e., quiz = +20%, swim = +22%, floating/treading water = +37%, underwater swim = +29%) Furthermore, performance of the skills was generally improved when combined and adapted in a self-rescue transfer activity. The control group also improved in 3 out of 4 of the tasks, however their knowledge (quiz) performance decreased. Our findings indicate that teaching children water safety in several aquatic environments improved skill competency and transfer. Water safety education should be undertaken in a range of representative environments to promote skill transfer and thereby reduce the risk of drowning in open water. Education providers should consider opportunities to extend pool-based programmes to include exposure to open water environments.

1. Introduction

Aotearoa, New Zealand is home to a plethora of different aquatic environments, many of which offer attractive recreational opportunities. However, it is important that people are properly educated to access and utilise these resources safely. Historically, it has been assumed that learn-to-swim education conducted within swimming pools is sufficient to develop aquatic competencies that prevent drowning (Brenner et al., 2006; Guignard et al., 2020; Stallman et al., 2017). However, despite this widely-held belief, a large number of drownings continue to occur in open water environments (World Health Organization, 2021).
It is possible that just learning foundational swimming strokes in a pool is insufficient to safeguard people from drowning (Hindmarsh & Melbye, 2011; Carey, 1993). Perhaps surprisingly, the influence of practice environment on the learning of water safety knowledge and skills has received very little attention to date (van Duijn et al., 2021). We need to understand how best to expose learners to different aquatic environments as they navigate this journey to water safety competency (Button, 2016).

In most developed nations, the education of swimming and water safety skills is typically undertaken in swimming pools (Chan et al., 2020; Di Paola, 2019; Stevens, 2016). Swimming pools provide a seemingly ‘ideal’ setting for education and competency assessments as the environmental conditions are relatively comfortable, stable, and reproducible (i.e., water temperature, currents, waves, depth, etc.). However, Brenner et al. (2006) argue that traditional measures of pool swimming ability are not the same as evaluating the skills needed to prevent drowning. In practical terms, a child may believe that if they can swim 25 metres in a pool then they can swim that distance to a pontoon at a lake. Or, perhaps because they can dive into a pool safely, then they can also dive safely from a jetty into the ocean. Unfortunately, such comparisons are made invalid and potentially dangerous by numerous environmental factors that can make tasks in open water much more challenging.

Motor learning is not just about reproduction and retention of certain movement patterns. Instead learning requires skills to be transferable which demands sensitivity to one’s own action boundaries – the limits of our movement capabilities – as well as knowledge of the environment (Button et al., 2021; Seifert et al., 2018). Pertinent to the issue of where water safety education should be undertaken, knowledge of the environment refers to a learner’s ability to identify specifying and non-specifying information (Seifert & Smeeton, 2020). Specifying information (e.g., propulsive or resistive force, etc.) is directly related to the task goal and can help the learner to calibrate their movements well. Whereas non-specifying information (e.g., temperature, depth, etc.) is still important but more ambiguous in that it does not directly inform how the learner should move. Affordances are opportunities for action offered by the environment (such as ‘catching a wave’) that are relative to the individual’s abilities. Exposure to such affordances during practice empowers learners to exploit them optimally (Oppici & Panchuk, 2022). Skill transfer is the capacity of motor behaviours to be adapted to another task or novel situation (Button et al., 2021). Transfer is multifactorial and nested within different continua (i.e., near/far; horizontal/vertical; and specific/general transfer). The specific-general transfer continuum was neatly illustrated by Oppici and Panchuk (2022) within a pertinent example. They suggested that specific transfer from a pool to open water may be observed as an experienced pool-swimmer typically adopts a streamlined position in open water to minimise drag and propel themselves forcefully in a desired direction. As the swimmer practices in open water, they may also learn to utilise non-specifying information invoking a more general form of transfer (or ‘attunement to surrounding affordances’). Hence specific and general forms of skill transfer interact which helps us to understand why some water safety skills (like floating or swimming) in open water can be challenging for pool-trained learners.

Hence, robust assessments of water safety competency should account not only for skill improvements and retention, but also for skill transfer (van Duijn et al., 2022). Knowing that a child can swim in a pool has limited relevance if they cannot adapt this skill to be performed in open water. This is because introducing more variability in the water conditions (such as waves) of a swimming pool demands transferable swimming skills. Indeed, Kjendlie et al. (2013) showed that when open water-like conditions (i.e., waves) are simulated in a pool, the levels of skill competency are markedly lower. In their study, 66 children (11-years old) performed identical tests in two different environments: a calm swimming pool and a simulated wavy environment. The tests performed in the waves clearly showed a performance decrement (between 9 and 14% longer time to complete the swimming test and 21%, 16%, and 24% lower scores for rolling entry, diving, and floating tests, respectively). The authors cautioned that “[children] should not be expected to reproduce swimming skills they have performed in calm water with the same proficiency in unsteady conditions during an emergency” (Kjendlie et al., 2013, p. 303). To our knowledge there is currently no data published about children’s competencies when tested in open water nor how different practice environments can facilitate skill transfer.

New Zealand’s ‘Water Skills for Life’ (WSFL) initiative was launched following a nationwide review which exposed large variation in water safety education programmes across the country (Stevens, 2016). WSFL lists a range of 15 water competencies that children are expected to have learnt by year 8 of high school (see Figure 1). For example, 13-years-old children should be able to float and tread water independently for up to 5 minutes, to swim underwater for up to 5 seconds, and to be able to swim for up to 100 m (up 5 minutes) using whichever stroke/s they prefer. Importantly, WSFL also emphasises the need for children to develop knowledge and skills associated with open water environments and local hazards (Figure 1).

Figure 1: Fifteen water safety competencies that form the foundation of the Water Skills for Life Programme. To be reproduced with permission of Drowning Prevention Auckland.
Recent studies by Button and colleagues (2017; 2020) have provided initial data about some of the WSFL competencies of New Zealand children. Button et al. (2017) tested 48 children (7 – 11 years old) in swimming pools. The percentage of children achieving a high competency rating at pre-test was typically low. The children’s knowledge about risk in different environments was particularly poor with only 15% performing well at a pre-test quiz. Furthermore, 62% of children could not swim 100 m (or up to 5 minutes) continuously in a pool. In Button et al.’s (2020) follow-up study the water safety competencies of 98 children (7 – 11 years old) were tested in a swimming pool before, immediately after, and three months after receiving a three-day intensive education programme (delivered in a river, at a beach and in the harbour). At pre-test, once more a typically low confidence level was found with less than 50% of children achieving a high level of water safety competence. However, after the 3-day intensive program, competency in each of the six tasks assessed had increased with up to 80% of participants completing the tasks unassisted. The three-month retention of these skills was also generally high (i.e., competency levels were either maintained or improved). Whilst these studies are informative it is important to acknowledge that the children were assessed in swimming pools, it needs to be established how robust these skills are when performed in an open water environment.

In summary, a swimming pool is a relatively safe aquatic environment to begin educating children about water safety. Skill transfer is sensitive to surrounding conditions at the time of transfer and is highly dependent on activities undertaken during training. However, there is a lack of evidence to show how best to develop transferable competencies into open water environments. Theoretically, practicing in a range of aquatic environments exposes learners to a rich ‘aquascapes of affordances’ promoting specific and general skill transfer. Hence, we examined whether education undertaken in various environments improves water safety competency and the capacity to adapt such skills in a simulated survival scenario. We expected a combined pool and open water education programme to improve children’s water safety competencies, as well as to develop transferable skills that might be adapted to an emergency scenario.

2. Methods

2.1. Participants

The target sample size was 96 participants, based upon a conservative population estimate of approx. 500,000 (New Zealand children aged 7 – 11 years), confidence level of 95%, and confidence interval of 0.1. Exclusion criteria included any recognised learning difficulties, or existing health conditions (e.g., injuries, severe asthma) that may put the participant at risk during testing. A two-week period of advertising (i.e., website, social media, posters) resulted in 116 registrations of interest. All registered children were invited to the competency screening test (see Procedure) at a public swimming pool. The screening test was necessary to exclude potential participants who would require one-on-one supervision (i.e., non-swimmers or very anxious children) and any participants that were unable to complete all scheduled tests (n = 36). Eighty children successfully passed the screening test and were eligible to participate. These children and at least one parent or guardian provided written informed consent to participate in the study.

The 80 registered participants were allocated into two groups that were scheduled to receive the same water safety education programme. Group 1 consisted of 40 children (20 males, 20 females). Group 2 initially had 40 children, however, due to increased restrictions imposed by an unanticipated change in Covid-19 alert levels, Group 2 were unable to complete the education programme and this group took no further part in the study. However, 26 children from Group 2 did complete two baseline assessments to contrast with Group 1. Hence, data from 66 children (Education Group: n = 40, Control Group: n = 26) were collected and presented in the results (Table 1).

Table 1: Descriptive statistics by group.

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Age (years)</th>
<th>Height (cm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>20</td>
<td>9.17</td>
<td>1.3</td>
<td>140</td>
</tr>
<tr>
<td>Male</td>
<td>20</td>
<td>9.87</td>
<td>1.3</td>
<td>141</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>12</td>
<td>9.48</td>
<td>1.5</td>
<td>143</td>
</tr>
<tr>
<td>Male</td>
<td>14</td>
<td>9.89</td>
<td>1.1</td>
<td>143</td>
</tr>
</tbody>
</table>

2.2. Procedure

Ethical approval was obtained from the host institution’s Human Ethics Committee prior to the study commencing (Ref: 21/138). A competency screening test was included for safety and logistical reasons. The screening test required participants to complete a basic physical activity questionnaire for children and a basic water-skills assessment conducted in an indoor swimming pool. The water skills included: entry into deep water from side of pool, float on back for 30 seconds, submerge 1 m to retrieve an object, swim back to poolside and safely exit the pool. Each child’s performance in the screening test was visually assessed by a qualified aquatic educator who was in the water within arm’s reach of participants. The children were permitted to wear a lifejacket at any time in the screening test if they wished to.

Participants were required to visit the testing location (a public beach beside a harbour channel) for competency assessments on three separate occasions, each 5 – 7 days apart. During each visit of approximately 60 minutes duration, participants were asked to perform a water safety skills test battery (see Table 2). The tasks required the participants to perform several physical tests of water safety skills unaided as well as assessments of risk perception and knowledge in the form of a quiz. Tasks 1 – 4 were undertaken separately in the first and second testing session. For the third session,
Table 2: Series of tasks presented independently to participants before and after the education programme, and in combination as part of a Transfer test.

<table>
<thead>
<tr>
<th>Task</th>
<th>Task description</th>
<th>Assessment (grades 0 – 5)</th>
</tr>
</thead>
</table>
| Quiz*                       | A series of multi-part questions prompted by pictures of various aquatic environments (e.g., ocean, river, lake, harbour). The knowledge tested included:  
   1. Understands how various open water conditions influence risk  
   2. Knowledge, understanding and attitude towards water safety rules, hazards, and risks  
   3. Recognise an emergency for yourself or others  
   4. Know how/who to call for help                                                                                                                                   | 0 = 0-2 correct  
   1 = 3-6  
   2 = 7-10  
   3 = 11-13  
   4 = 14-17  
   5 = 18-20 |
| Floating                    | The floating task took place in deep water where the children could not reach the ground to support themselves. Participants were required to enter the water safely and then to float on their back for one minute. If they accomplished this, they then had to tread water for four further minutes. Once five minutes was completed, the participants had to call for help with one hand in the air before exiting the water. | 0: No attempt or enters water unsafely (i.e., jumps without checking)  
   1: Cannot complete back float (<30 s), no treading water  
   2: Cannot complete back float (<60 s) or treading water (<60 s)  
   3: Completes back float, partial completion of treading water (<120 s)  
   4: Completes back float, partial completion of treading water (>120 s), or no help signal  
   5: Completes back float, treading water (240 s), signals for help, and exits safely |
| Underwater swim             | The submersion task took place in semi-deep water (about 1.5 m deep) approximately 5 m from shore. Participants were asked to hold their breath and to submerge completely and then swim through three large, submerged hoops to retrieve a bright diving ring situated 1 m, 2 m, and 5 m away. The diving ring was held by a lifeguard under the water. Once participants had retrieved the ring, they gave it back to the lifeguard and then got out of the water. The use of swimming goggles was optional for this task. | 0: No attempt, or does not submerge face  
   1: Swims through 1 m ring in +1 attempt  
   2: Swims through 1 m ring in one attempt (without surfacing for breath)  
   3: Swims through 2 m ring in +1 attempt  
   4: Swims through 2 m ring in one attempt (without resurfacing)  
   5: Swims through 5 m ring in one attempt (without resurfacing) |
| Swim                        | Several floating buoys were attached by a 12.5 m long rope in water of approximately 2 m depth (about 15 m from the beach). Ten kg anchors were attached to the rope at each end to secure its position in the water. The rope and buoys created a temporary swimming ‘channel’ in the water. The children were transported by kayak to one of the buoys. They then got in the water unsupported and were asked to swim continuously beside the rope on their right for whichever came first of up to 5 minutes or for 8 lengths (100 m). They were instructed not to touch the rope or ground if possible and that they could use whichever stroke they preferred. The use of swimming goggles was optional. When the child wanted to finish the task or completed it successfully, they swam to a nearby kayak. | 0: No attempt  
   1: 0 – 25 m aided  
   2: 0 – 25 m unaided  
   3: 25 – 50 m unaided  
   4: 50 – 75 m unaided or up to 5 mins  
   5: Able to swim continuously for 100 m without assistance (<5 mins) |
| Transfer/ self-rescue       | Simulated survival scenario in which a combination of task elements described above were performed in sequence (i.e., quiz, floating/treading, underwater swim, swim.). First participants had to choose the furthest distance they felt that they could swim from 5 brightly-coloured buoys positioned 15 m, 30 m, 50 m, 100 m, 150 m from the jetty. The researcher then paddled the participant to the chosen buoy in a two-person kayak. A hypothetical scenario was described to participants that their kayak was about to be overturned by a wave and they had to act to rescue themselves. A lifeguard also remained at arms-reach of participants during the scenario with a buoyancy aid if required. Upon their return to the jetty, participants then completed the knowledge quiz with questions about the activity they had just undertaken. During this scenario participants wore a wetsuit under some light clothing (i.e., old jumper, trackpants, and trainers). | For the transfer activity, each of the 4 tasks described above (Floating, Submersion, Swim, Quiz) was embedded within the simulated survival scenario. The same criteria used above was applied to rate the participants performance at each task (out of 5). |

*Participants could provide up to 20 correct answers.

Note: Comprehensive risk management and analysis of the feasibility of undertaking these assessments in open water was undertaken in advance (van Duijn et al., 2022).
all four tasks were undertaken in series as part of a mock self-rescue scenario. All sessions were video recorded from the shore (distance of between 5 – 20 m away depending upon the task) to enable retrospective cross-checking of the assessor’s ratings.

Thorough risk assessments for all activities were undertaken in advance, and the health and safety of researchers, volunteers and participants was prioritised at all times. The weather and water conditions were monitored closely, and strict criteria were applied in order for outdoor sessions to proceed (i.e., ambient temperature no less than 10°C, within 2 hours of high tide, wind strength no greater than 50 k/hr). Close supervision was provided at all times during testing by experienced staff with valid lifesaving and first aid qualifications. No fewer than six supervisory staff (four in the water, two at water-edge) closely monitored the participants’ behaviours. Also, no more than eight participants were allowed in the water at the same time (i.e., supervisor to participant ratio of 1:1.3). Participants were required to wear a wetsuit at all testing sessions for their own comfort.

In the week between the first two competency assessments, the education programme was conducted (see details in Table 3). The first two pool-based education days were run by swimming school educators at a private pool. Days 3 – 5 were run in different open water locations by outdoor education providers who were experienced at delivering such programmes for children. An important feature of the education programme that was developed for this research project was the focus on transferable skills and how to adapt them to different aquatic environments (Guignard et al., 2020). For example, a key emphasis for the swimming pool education sessions was on contrasting differences between the pool and open water. Children also practiced skills in the pool that would be helpful for immersion in different environments such as safe entry and exit, floating, treading water, and self-rescue techniques. When the children progressed to the open water sessions, they were reminded of the knowledge and practical skills they had acquired in the swimming pool.

At the completion of the competency testing, the education group participants were asked to complete a feedback questionnaire together with a parent or caregiver. The questionnaire contained 10 items with a mix of short, open answer questions, and closed, Likert-scale type responses.

2.3. Data analysis

Each participant was allocated a unique identifying code for the purposes of organising data and protecting anonymity. For the pre-test, post-test, and transfer tests each participant’s water safety competencies were visually assessed and recorded manually by one of four researchers. The competency demonstrated for each skill was rated on a 6-point Likert scale, based on a previously validated toolset (Button et al., 2020). The assessors observed participants in small groups of up to four at a time. Cross-checking of ratings occurred regularly between assessors.

Table 3: Summary details of combined pool and open water environment safety lessons.

<table>
<thead>
<tr>
<th>Day</th>
<th>Duration (hours)</th>
<th>Activities</th>
<th>Staff-participant ratio</th>
<th>Equipment</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pool</td>
<td>3</td>
<td>Safe entries/exits, floating, submersion, swim – calm water</td>
<td>1:6</td>
<td>Wetsuits, lifejackets, pool noodles, dive rings, fake seaweed</td>
<td>Actual size of group in pool 18 – 20 with 3 educators</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WSFL theory: different aquatic environments, identifying risks</td>
<td>1:20</td>
<td>Overhead projector, quizzes, paper, pens</td>
<td>Lesson provided by qualified WSFL educator</td>
</tr>
<tr>
<td>Pool</td>
<td>3</td>
<td>Treading water, lifejackets, boat capsize and rope rescues; swim - turbulent water</td>
<td>1:6</td>
<td>Wetsuits, lifejackets, ropes (5 m), pool boards, inflatable rescue boat</td>
<td>Actual size of group in pool 18 – 20 with 3 educators</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WSFL theory: what to do in emergencies, who to ask for help</td>
<td>1:20</td>
<td>Overhead projector, quizzes, A0 paper, pens</td>
<td>Lesson provided by qualified WSFL</td>
</tr>
<tr>
<td>River</td>
<td>4</td>
<td>Survival swim position / floating, river crossings, rope rescues, navigating strainers, understanding current and other dangers</td>
<td>1:6</td>
<td>Wetsuits, lifejackets, ropes (10 m), inflatable tube, pool boards, first aid kit, emergency blankets</td>
<td>Groups of 6, overall group size of 40.5 rotating stations set up for each activity</td>
</tr>
<tr>
<td>Beach</td>
<td>3</td>
<td>Identifying risks at the beach, signalling for help, flags, rips, sand sculptures, navigating waves, floating, treading water, submersion</td>
<td>1:10 (theory)</td>
<td>Wetsuits, radio, dummy flare, rescue tubes, whiteboard, paper, marker pens</td>
<td>60 min theory session followed by 120 min practical. Groups of 20 children supervised by 3 lifeguards and a parent/caregiver</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1:6 (practical)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harbour</td>
<td>3</td>
<td>Boats, weather, equipment and tell someone, fitting lifejackets, safe jump entry, capsize from boat, floating, treading water</td>
<td>1:20 (theory)</td>
<td>Wetsuits, rescue boat, personal locator beacon, flare, rescue tubes, whiteboard, paper, marker pens</td>
<td>90 min theory session followed by 90 min practical. Groups of 20 children supervised by 3 lifeguards and a parent/caregiver</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1:6 (practical)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Furthermore, one assessor viewed video footage of all trials to ensure consistency and accuracy of observations. The inter-rater (Light’s Kappa = 0.81) and intra-rater (ICC = 0.83) reliability of 10% of the assessments was confirmed to be ‘good’ and ‘almost perfect agreement’ respectively (Hallgren, 2012). Changes in skill competency were based on comparisons between the pre-test and post-test, whereas skill transfer was assessed in terms of whether participants were able to maintain their post-test performance in the transfer task. The post-study questionnaire data was collected in a spreadsheet and descriptive statistics such as means, standard deviations, percentages, and ranges were used to summarise data trends. As the data were ordinal, non-parametric comparisons were run to detect changes over test session (i.e., Kendall’s W) or between groups (i.e., Mann-Whitney U). All statistical analyses were undertaken with SPSS for Windows (IBM, SPSS Statistics v. 27.0).

3. Results

The main competency data from the education group for each task they were assessed on is summarized in Figure 2. From baseline to post-test, the number of children in the education group demonstrating high competency (rating of ≥ 4) in each task increased (Quiz = +20%, Floating = +37%, Underwater swim = +29%, Swim = +22%) Furthermore, performance in the floating and swimming elements of the transfer task were generally improved from baseline (Figure 2). The statistical comparisons broken down by task are provided in the following sub-sections.

3.1. Quiz

Quiz ratings for the education group were not significantly different over test sessions (W(2) = 0.60, p = .089). The post-test ratings (mean = 3.53) did trend higher than both the baseline (mean = 3.27) and the transfer test (mean = 3.23), but these comparisons were not significant (p’s > .05) (Figure 2).

In terms of the group comparisons, there was no difference between the groups at the first baseline test (Edu = 3.28, Control = 3.42; U = 474.50, p = 0.53) (Figure 3). The education group performed significantly better than the control group in the post (second baseline) test (U = 266.50, p < .001, η² = .17). It was noted that whilst the education group improved their Quiz ratings from baseline by 8% (mean = 3.53), the control group decreased by 25% (mean = 2.58).

Figure 2: Column chart (means and error bars) of education group competencies for each task. Education group (Edu); Underwater task (UW); Baseline assessment (Base); Post education assessment (Post); Transfer assessment (Tran). **p < .01 between groups.

Figure 3: Column (means) and scatter dot plot of Quiz competency for education group (left side/unbordered columns) and the control group (right side/bordered columns). Second baseline test (Base2), which was in essence the ‘post-test’ for the control group. ***p < .001 between groups; °individual datapoints.
3.2. Floating

Floating competency assessments were significantly different over time for the education group (W(2) = 0.19,  p < .001). As shown in Figure 2 the post-test ratings (mean = 4.47) were higher than baseline (mean = 3.28). The transfer test (mean = 4.10) also trended higher than baseline, but this comparison was not significant (p = .09).

There were no significant differences between groups for Floating at the first baseline test (U = 452.00,  p = .33), nor at the second baseline test (U = 440.50,  p = .17). Figure 4 shows that both groups showed better Floating competency by their second test (wave 1 increased by 36%, wave 2 increased by 14%).

3.3. Underwater swim

The Underwater swim ratings were not significantly different over time for the education group (W(2) = 0.06,  p = .077). The post-test ratings (mean = 3.90) did trend a little higher than both the pre-test (mean = 3.18) and the transfer test (mean = 3.03), but these comparisons were not significant (p’s > .05).

There were no significant differences between groups at the first baseline (U = 403.00) nor at the second baseline (U = 508.50) for the Underwater swimming task (Figure 5).

Figure 4: Column (means) and scatter dot plot of Floating competency for education group (left side/bordered columns) and the control group (right side/shaded columns). ***p < .001 between groups; *p < .05 between groups; °individual datapoints.

Figure 5: Column (means) and scatter dot plot of Underwater (UW) competency for education group (left side/unbordered columns) and the control group (right side/bordered columns). °individual datapoints.
3.4. Swim

Swim ratings were significantly improved over test sessions for the education group ($W(2) = 0.25, p < .001$). The post-test score (mean = 3.40) and transfer test (mean = 3.23) were both higher than the pre-test (mean = 2.45) as shown in Figure 2. There were no significant differences between groups at the first baseline ($U = 439.50$) nor at the second baseline ($U = 489.00$) for the Swim task (Figure 6).

In terms of qualitative data (i.e., free-text responses) the feedback generally supported the quantitative data presented in Table 5. Several of the free-text responses also provided some valuable suggestions to consider. Example quotes are provided below:

1. “My child learned many things from the water safety [study] that are not being taught at school.”
2. “The increase in confidence and ability to gauge the safety of her swim environment has been significant.”
3. “My daughter felt challenged yet supported. She was reassured by the accessible and thorough explanations.”
4. “Thank you, it has made [anonymous] more confident in trying new experiences.”
5. “Real life simulations ensure kids appropriately judge their abilities in non-pool scenarios.”
6. “This should be an essential part of what we teach our children – alongside swimming lessons.”
7. “I do wonder if a Te Reo Māori approach could be layered/added to each context and have a Māori perspective too here in Aotearoa?”

4. Discussion

The aim was to better understand how education can improve the water safety competency of children. Specifically, we investigated whether education undertaken in various environments improves water safety competency and the capacity to adapt such skills in a simulated survival scenario. Before discussing the key results, it is important to acknowledge that the study faced several logistical challenges due to an unanticipated change in Covid-19 restriction levels that occurred in the middle of testing. Due to the increase in restrictions concerning social distancing, mask-wearing, and gathering of groups, it was not possible to provide the planned education programme for group 2.

Table 5: Descriptive statistics for closed-item responses from post-study questionnaire (1 strongly agree – 5 strongly disagree).

<table>
<thead>
<tr>
<th>Statement</th>
<th>$M$</th>
<th>$SD$</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall, I am pleased with my experiences in the study</td>
<td>1.1</td>
<td>0.31</td>
<td>1–2</td>
</tr>
<tr>
<td>I am likely to recommend a program like this to others</td>
<td>1.1</td>
<td>0.65</td>
<td>1–4</td>
</tr>
<tr>
<td>I am more aware of dangers around natural water environments</td>
<td>1.1</td>
<td>0.36</td>
<td>1–2</td>
</tr>
<tr>
<td>I know how to respond should an emergency occur</td>
<td>1.4</td>
<td>0.60</td>
<td>1–3</td>
</tr>
<tr>
<td>I have developed important water safety skills</td>
<td>1.4</td>
<td>0.36</td>
<td>1–2</td>
</tr>
<tr>
<td>I have more adaptable water safety skills</td>
<td>1.2</td>
<td>0.44</td>
<td>1–2</td>
</tr>
<tr>
<td>I have improved my open water swimming ability</td>
<td>1.3</td>
<td>0.66</td>
<td>1–3</td>
</tr>
</tbody>
</table>

3.5. Participant and caregiver’s questionnaire

Twenty responses to the questionnaire were received overall. For 11 of the returned questionnaires there were multiple children in the family taking part in the study, hence the responses actually represented 35 of 40 children from the education group (87.5%). Summary data are presented in Table 5 for the quantitative statements that required closed-scale responses. There was uniformly strong agreement for each positive statement that described various aspects of the water safety programme.

Figure 6. Column (means) and scatter dot plot of Swim competency for education group (left side/bordered columns) and the control group (right side/shaded columns). ***$p < .001$ between conditions; ° individual datapoints.
(that became the Control Group). Hence the data reported here represents just under half the sample size that we aimed to recruit. Whilst the small sample size is an acknowledged limitation, we still believe the data that was collected provides valuable information that contributes to the general aim of the study.

To answer whether the combined swimming pool and open water education programme improved children’s water safety competency it is necessary to compare baseline performance to the post-test data. We found significant improvements for two of the tasks (i.e., Floating and Swim) and small, but non-significant, improvements for the other two tasks (i.e., Quiz and Underwater swim). It is possible that the small size of the education group (n = 40) meant that the improvements in the Quiz and Underwater swim did not reach statistical significance. Future research with a larger number of participants will be required to determine if that interpretation is correct. It may also be the case that the Quiz and Underwater swim tasks received insufficient focus in the education programme to prompt similar improvements to those seen in the Floating and Swim tasks. For the Quiz task, perhaps providing supplemental learning resources may enable learners to improve their knowledge within the short timeframe that the programme was offered (Tipton et al., 2021). In terms of the Underwater swimming task many children were able/willing to submerge their head (i.e., swim through at least one hoop 1 m away which was sufficient to achieve grade 3) but they then struggled to hold their breath and to navigate their swim underwater for up to 5 m (i.e., necessary to achieve grade 5). It seems that greater emphasis on breath-holding and underwater navigation during the education programme may be required. Our previous water safety studies have shown improvements in knowledge and underwater swimming with a similar education study (e.g., Button et al., 2020) but the scale of measurement used in this study was adapted from a 4-point to a 6-point scale of competency. On the basis that there were significant improvements shown in two of the four skills tested, we conclude that the education programme was at least partially successful in improving children’s water safety competency.

Another interpretation of the competency improvements we found between baseline and post-test (for the Floating and Swim tasks) is that the children simply benefitted from performing the task a second time (i.e., an order effect). Admittedly, there was some support for this interpretation in that the control group also generally performed better in their second baseline test. However, it was noted that the control group’s performance in the Quiz dropped markedly (by about 25%) in the second baseline test. Different questions were asked each time the Quiz was administered so it is possible that the second baseline quiz was more difficult than the first, whereas for the other three tasks the same activities were repeated by the children. As such we should not rule out the possibility that the improvements in competency shown following the programme were not simply due to repeating the same task rather than the education that was delivered. Future research could remedy this issue by having participants complete multiple baseline tests before competency assessments take place.

The other part of the research question concerned whether the education programme would allow children to adapt (transfer) their skills successfully into a simulated survival scenario. To identify whether the combined pool and open water programme developed transferable skills it is necessary to compare the post-test to the transfer test data. Only for the Swim task did children maintain their improved post-test ratings (mean rating = 3.4, 38% increase from baseline) in the transfer test (mean = 3.2, 31% increase from baseline). For the other three tasks, the transfer performance was not significantly different from baseline. Although, transfer performance in each element of the simulated survival task was not markedly different from baseline it was notable that all 40 children completed the scenario successfully and independently. They were able to judge appropriately how far they could swim from a capsized boat in deep water and then able to demonstrate that they could actually swim that distance. They were also typically able to perform other required elements of the scenario such as Floating (n = 37, 93%) and Underwater swimming (n = 27, 67%) as demanded within the scenario they were presented with. Indeed, none of the 40 participants required rescuing or asked to stop the transfer test prematurely. Our interpretation of these apparently conflicting results is that generally the participants did develop transferable skills to stay safe. By allowing participants to choose the level of challenge in each element of the transfer test (i.e., how far to swim, how to float, whether to swim underwater, etc.) they set themselves achievable and sensible targets that they knew they could satisfy. Arguably these results demonstrate strong practical relevance in that the children were able to judge their abilities and the conditions well, thereby showing improved knowledge of the environment (Seifert & Smeeton, 2020). However, by allowing participants to self-regulate the level of challenge in the transfer test the competency data arguably do not provide a clear/comparable indication of specific skill transfer from the education programme. Instead, our interpretation is that there is evidence of reasoned decision-making and hence general learning transfer has resulted from the programme. Careful design of transfer tasks in future work is needed to account for the interaction of different types of skill transfer that have emerged (Oppici & Panchuk, 2022).

As well as providing quantitative information about water safety competencies, the post-study questionnaire was a valuable source of information about how the study was perceived by participants, parents and caregivers. The data (e.g., Table 5) indicate that the children generally felt more confident in their knowledge and abilities after the study had concluded. For example, most children agreed with statements that they had improved their open water swimming and knowledge thereby showing better awareness of affordances and when it was safe to use them (Seifert & Smeeton, 2020). Unfortunately, the questionnaire did not require participants to report on specific elements of the study, so it is not clear if it was either the assessments and/or the education programme that boosted their confidence. In future research we intend to explore more thoroughly how the children’s emotional engagement (i.e., confidence, anxiety, motivation, etc.) was influenced by the programme. Importantly, participants reported that they enjoyed the study and the various challenges and environments it exposed them to. Free text comments offered by several of the parents/caregivers aligned well with their children’s perceptions in that they too valued the opportunity for their children to be educated in this way. Several comments indicated that this programme offered much more than just learning to swim in a pool and that they would like to see such a programme freely available to all New Zealand children.
5. Limitations

As well as the limited sample size there are several other limitations that were encountered with this study. We did not collect comparison data from a pool-trained control group which would have allowed us to quantify the influence of educating water safety in different environments. It is also possible that an order effect explains some of the competency improvements found amongst the children in the post-test and transfer task. Additionally, the ratings that assessors made were at least partly subjective and therefore potentially biased towards the education programme. We are investigating means to address such limitations in planned research in the future.

6. Conclusions and practical implications

The statistical power of the study was affected by an unanticipated change in Covid restriction levels that meant we were unable to achieve the target sample size. Despite this limitation, 40 children aged 7 – 11 years old received a 5-day water safety education delivered in a pool and several open water locations. The children’s water safety competency increased after the programme particularly for the Floating and Swimming tasks. The Quiz and Underwater swimming tasks demonstrated smaller but non-significant improvements. In terms of adaptable skills, all children were able to independently complete a self-rescue task that combined the 4 assessed tasks. The feedback received from participants and parents/caregivers about the programme was very positive. Whilst further investigation is required into the different skills that were assessed in the programme this was a valuable step demonstrating that a combined pool and open water education model is feasible and successful in developing competency. An intensive education programme conducted in a swimming pool and multiple open water locations can effectively develop adaptable water safety competency. Water safety education should be undertaken in representative environments to optimise skill transfer (van Duijn et al., 2022) and thereby reduce the risk of water related injury or drowning.

The following practical implications are recommended for consideration:

1. Water safety competency amongst NZ children is quite variable. Some children are very competent, but others show worryingly low competency levels.
2. Developing collective responsibility across multiple sectors (i.e., water safety organisations, schools, outdoor education providers, parents/caregivers, etc.) is required to improve the water safety competency of Aotearoa’s children/tamariki.
3. Parents and caregivers highly valued the opportunity to have their children educated in open water environments.
4. Summer holiday programmes and school camps present important opportunities in which children can develop water safety competency in short, intense learning blocks.
5. Distributed learning over longer periods would also add value to the education as weather patterns and water conditions fluctuate annually – which are not captured well in short-duration programmes.

6. Education providers that operate solely within swimming pools should consider opportunities to extend pool-based programmes to include exposure to open water environments. However, open water education should only be undertaken by trained and knowledgeable education providers: Local knowledge of the environment is crucial, as are appropriate supervision and risk management strategies.

Conflict of Interest

The authors declare no conflict of interests.

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References


