Intervention Mapping: Using Theory and Evidence to Inform the Ocean Mind Surf Therapy Program for Improving Youth Mental Health

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Abstract

Surf therapy is a novel intervention that has been shown to have positive effects on youth mental health and associated downstream negative effects on social, physical and occupational functioning. While the evidence-base on the effectiveness of surf therapy to improve youth mental health is emerging, to date there is little published evidence outlining program development or potential mechanisms and pathways to positive change. Intervention mapping is a method often used in program development in other health fields. The intervention mapping protocol outlined by Bartholomew Eldredge and colleagues (2016) describes an iterative process that allows program developers to identify and then solve complex problems, leading to program development. The protocol involves six steps: 1) Needs assessment, 2) Formulation of change objectives, 3) Selection of theory-based methods and practical strategies, 4) Development of the intervention, 5) Adoption and implementation plan, and 6) Evaluation planning. This study aims to describe the intervention mapping protocol and apply it to the development and refinement of a novel surf therapy intervention, Ocean Mind. The Ocean Mind program combines psychoeducation, water safety and learn-to-surf activities with the overall program objective to improve mental health among child and adolescent participants. Based on the steps of intervention mapping, theory-based methods and strategies were selected that informed the activities of the intervention and these were applied at the level of the individual and environment. This process led to a theory and evidence informed surf therapy program adapted to the local Australian context. While intervention mapping has been criticized for being time-consuming and burdensome, the resulting outcome may lead to increased effectiveness. It is hoped that the matrices of change objectives presented in the current work will assist future surf therapy program developers to design, implement and evaluate surf therapy interventions using a similar systematic approach.

Introduction

Childhood is generally perceived as a time of health, yet 5-20% of children and adolescents in any given year experience a mental health problem, most commonly depression or anxiety (Kessler et al., 2005; Lawrence et al., 2015). Mental health is fundamental to good quality of life. Mentally healthy youth are most likely to grow into emotionally healthy adults, who in turn contribute to the health and well-being of their community (Rao, 2001). Young people with good mental health tend to experience improved self-esteem, as well as increased rates of school attendance, educational achievement, social cohesion and future health and life success (Olweus, 1991). They also tend to possess problem-solving skills, social competence and a sense of purpose. However, there are many factors that can affect a young persons' ability to achieve and sustain a state of mental well-being. Such factors can operate at the level of the individual, family, school or community and at a broader societal level (Morgan et al., 2008).

Risk factors for mental disorders include, but are not limited to, poverty, social exclusion, peer rejection, isolation and lack of family support (Curtis et al., 2013; Patel et al., 2007). Protective factors for mental wellbeing are linked to cohesion at community level, family well-being, individual behaviors and skills, and access to youth-friendly social services (WHO, 2004). The more risks young people experience, the worse their developmental outcomes are likely to be and the higher the probability of experiencing psychological distress or mental health disorders (Sawyer et al., 2008). In contrast, the more opportunities young people have in childhood and adolescence to experience and accumulate the positive effects of protective factors that outweigh negative risk factors, the more likely they are to sustain mental health and wellbeing in later life (Sameroff et al., 2008). Accumulated evidence shows that strengthening protective factors in schools, homes and local communities can make important contributions to improving developmental outcomes of vulnerable young people (Resnick, 1993; Rutter, 1985; Vanderbilt-Adriance & Shaw, 2008).

Surf therapy programs for youth at risk of mental health problems present a unique opportunity to positively affect child and adolescent mental health by combining the benefits of the practice of surfing, together with psychoeducational and mentoring activities (Snelling, 2016). There is a small but promising evidence base that demonstrates the positive effect of surf therapy programs for vulnerable populations (e.g., Godfrey et al., 2015; Taylor, 2013; Matos et al., 2017). However, to date, there is limited published evidence demonstrating the systematic planning and development process that led to the development of the surf therapy programs that may produce these positive outcomes. Greater transparency and detailed reporting on how programs are developed would benefit the surf therapy literature, specifically, linking program objectives and strategies to prior evidenced-based interventions and theory (i.e., which program component is predicted to lead to which outcome, based on what theoretical reasoning?). Interventions which make extensive use of theory tend to have larger effects on behavior (Taylor et al., 2012; Webb et al., 2010) and more explicit efforts in this respect in future literature in the field may lead to improved outcomes for participants. The intervention mapping protocol (Bartholomew et al., 2011; Bartholomew Eldredge et al., 2016) provides a structured approach to intervention development, incorporating theory and evidence into intervention design, implementation and evaluation.

Intervention mapping describes a protocol for the development of a theory and evidence-based intervention in six steps: 1) Needs assessment, 2) Identification of outcomes and change objectives, 3) Selection of theory-based methods and practical applications to change health related behavior, 4) Designing and/or adapting an intervention, and 5) Creation of an adoption and implementation plan and 6) Evaluation planning. This approach has previously been used to develop a range of health behavior change interventions, such as increasing physical activity and improving mental health education (e.g., McEachan et al., 2008; Wheeler & Fowler, 2013). More specifically, the process follows the development of an intervention, mapping the path from recognition of a need or problem to the identification of a solution (Bartholomew et al., 2011). This approach goes beyond simply describing what was done in an intervention, which has been the common approach to reporting in the surf therapy literature, but comprehensively identifies a logic model that can explain the path from the identified problem (e.g., the objective of the program) to providing a theory and evidence-informed solution (e.g., program strategies and outputs).

In this paper, the authors describe the use of the systematic planning process that makes up the intervention mapping protocol, to develop a surf therapy program aimed at improving indicators of youth mental health within the Australian context. The authors provide a brief introduction to intervention mapping, followed by a description of how the framework was applied in the development of the current surf therapy program. Finally, the authors will discuss the strengths and limitations of this approach to help surf therapy program planners of future interventions.

Method

The intervention mapping protocol was designed to guide the development of effective behavior change interventions and involves six steps: 1) Needs assessment, 2) Formulation of change objectives, 3) Selection of theory-based methods and practical strategies, 4) Intervention development, 5) Adoption and implementation plan, and 6) Evaluation planning (see Figure 1 for a summary of these steps). For the surf therapy program, the authors engaged in the intervention mapping process, which involved the completion of all steps, over a period of 10 months.

Step 1: Needs Assessment

In the first step of the intervention mapping protocol, a needs assessment was conducted to determine the following: a) the prevalence of youth mental health problems (both symptoms and disorders), b) to identify the characteristics of young people who are at risk, as well as those with the greatest burden of risk, c) to identify community members and assess the strengths and resources common to this community, and d) to gain information on how to reach young people at risk of mental health problems. The needs assessment involved literature searches and consultation with key stakeholders. Community members and stakeholders

provided information on the issue of youth mental health; strategies to improve youth mental health; individual and environmental factors effecting this health problem; and barriers, facilitators, and recommendations for the development of the surf therapy intervention for the Australian context. The program goals and objectives were identified at the completion of the needs assessment.

Step 2: Formulation of change objectives

In step two, the overall program objective was broken down into performance objectives. The aim of performance objectives is to specify the expected targets that need to be achieved by each group involved in the intervention in order to meet the overarching program objective. In the case of Ocean Mind, these groups were youth aged 7-18 years, surf mentors, and the surf program coordinator. Evidence from literature searches, as well as consultations with community members and stakeholders resulted in the identification of important determinants of youth mental health, both behavioral and at the level of the environment (e.g., interpersonal, parental, organizational and community influences). From these identified determinants, those judged as most relevant, and also easily changeable within the context of the intervention, were selected as targets for change. Following on from this process, specific intervention objectives, labelled 'change objectives' in the intervention mapping protocol, were created by cross examining the determinants with the performance objectives. Thus, the resulting list of change objectives specifies what needs to change in the determinants (e.g. what the resulting behavioral and environmental level outcomes will be) in order to accomplish the performance objectives.

Step 3: Selection of theory-based methods and practical strategies

In step three, the authors identified the relevant theoretical methods underpinning

the means to which change in determinants were likely to occur. The authors then considered each identified determinant and mapped them with the corresponding change objectives (created in Step 2), which was then followed by linking matching theoretical methods for each determinant. This process was undertaken at both the level of the individual and environment, with a focus on the interpersonal environment. Finally, the practical strategies or delivery methods were then developed, which could put the theoretical methods into practice.

Step 4. Development of the surf therapy intervention

In step 4, the products and materials that make up the intervention were selected, based on information gathered in the first three steps of the intervention mapping protocol. In this step, the intervention materials were designed and developed, informed by consultations with community members, stakeholders and implementers, with the aim of achieving the program objective.
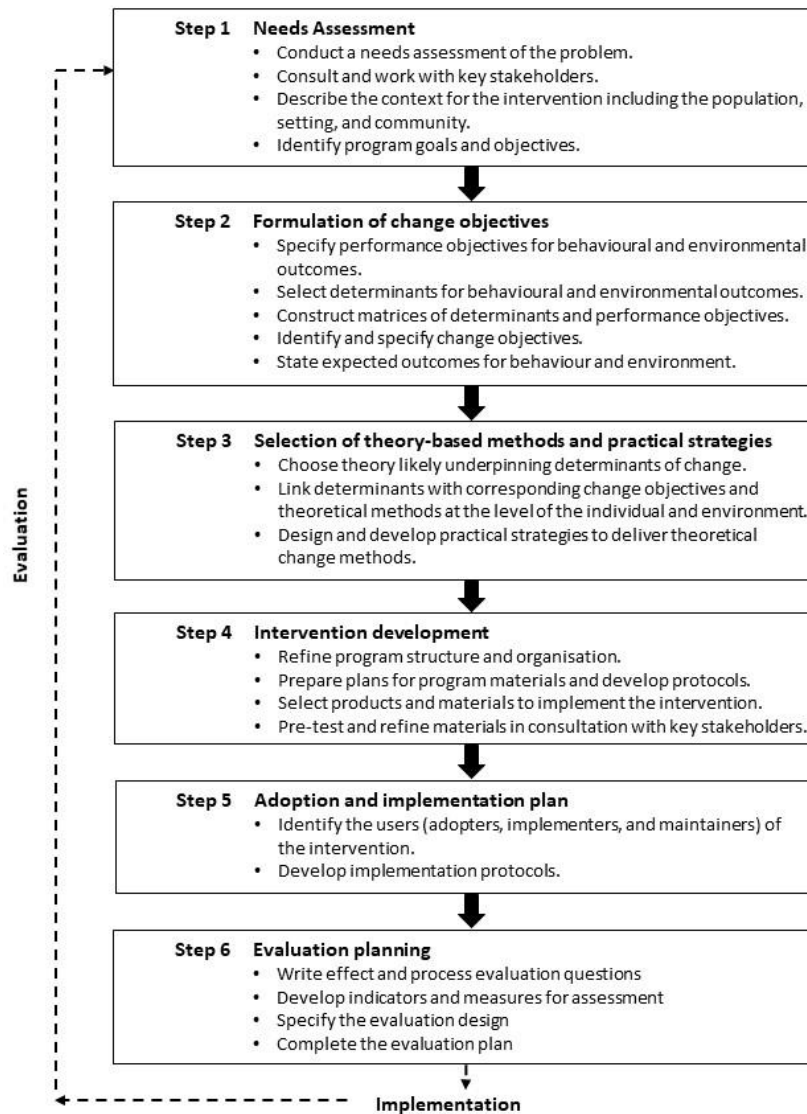

Figure 1. Intervention mapping protocol (Adapted from Bartholomew Eldredge (2016))

Step 5. Adoption and implementation plan

The adoption and implementation plan of the surf therapy intervention was developed during step 5 of the intervention mapping protocol. Firstly, intervention adopters and implementers were identified and this was informed by information gathered during the first four steps of the intervention mapping protocol. The program director, program coordinator and the surf mentors were identified as key intervention adopters and implementers. In this step, program developers assessed recruitment strategies specifically, to recruit the target population (i.e., youth with or at risk of mental health disorder and their parent/guardian), and ways to maximise their participation in the Ocean Mind program. During this step, the program developers also developed strategies for recruiting and engaging surf mentors, who in part, would facilitate the implementation and maintenance of the program. An advisory board was also formed, along with the appointment of an administrator to further assist with the maintenance of the program. A strategy for dissemination of the program was also devised, which involved developing a network of referrers from a number of social and community systems.

Step 6. Evaluation planning

In step 6 of the intervention mapping protocol, a plan to evaluate the effectiveness of the surf therapy program was developed, including a process evaluation to determine the impact of the surf therapy program and to gain an understanding of the influence of planning decisions made at each step on the intervention mapping protocol.

Results

Step 1: Needs Assessment

In the first step of the intervention mapping protocol, a needs assessment was conducted to determine the prevalence of youth mental health problems (both symptoms and disorders), to identify the characteristics of young people at risk, as well as those with the greatest burden of risk, to assess the strengths and resources common to this community, and to gain information on how to reach young people at risk of mental health problems. In the first instance, literature searches were undertaken to: 1) determine the prevalence of mental health problems in youth aged 7-18 years, 2) identify the characteristics of those most at risk; and 3) produce a list of determinants that influence the complex problem of youth mental health. Findings from these searches revealed that 1 in 7 children (aged 4-17 years) in Australia experienced a mental health problem in the preceding 12 months and that only half of families accessed professional help (Johnson et al., 2016). In Victoria (the state in which the Ocean Mind program is delivered), for those children and young persons who did receive help, most received clinical treatment in the community. There were also indicators of a limited workforce of child mental health clinicians who were able to service those in need (Department of Health and Human Services, 2019), adding further weight to the need for community programs like Ocean Mind that can complement clinical and acute care services. Some of the major risk factors for mental illness included age (older youth were more at risk), identifying as Aboriginal and Torres Strait Islander, gender (females were at greater risk), inconsistent care-giving, family conflict, weak social ties, being bullied, academic failure, trauma (abuse and neglect), maladaptive personality traits, difficult temperament, and learning disorders (Patel et al.,2007; Steinhausen, & Metzke, 2001).

In addition to searching the literature, consultations took place with community members and stakeholders, including schools (e.g. teachers, principals and school

counsellors), staff members from community mental health organizations, the surf industry, other surf therapy program developers, and local government, as well as parents and children (n ≈ 50). These consultations were particularly helpful in contextualizing the strengths and resources that were common in the Victorian Surf Coast community, and for producing ideas and strategies on how to reach young people at risk of mental health problems. Two major barriers were identified relating to financial and geographic access. Specifically, these included the need for a low cost program and increasing safe access to the coast for families who had a limited history of engaging with coastal environments or beach activities. These barriers were overcome by ensuring the program was delivered free of cost to participants and by providing transportation

for children whose parents/guardians may not have otherwise been available or able to transport the child each week to the program.

Based on findings from both searches of the literature and consultations with community members and stakeholders, the following program objective was devised – *children between 7 and 18 years will improve on indicators of mental health by the end of the intervention.* Program objectives at both the individual and interpersonal level were formulated and these are summarized in Table 1. The identified program objective at the level of the individual was - *improvement in indicators of youth mental health* (e.g. social connection, self-efficacy, depression/anxiety symptomology); and at the interpersonal level - *program coordinator and mentors support children to experience improved mental health*

Table 1

Summary of the surf therapy program and performance objectives for indicators of mental health at each level of the intervention

Level of the Intervention	Target group	Program Objective	Performance Objective
Individual level	Youth	Improvement in indicators of youth mental health (e.g. social connection, self-efficacy, Symptoms of depression/ anxiety)	P1. Youth participate in 6 sessions of OM group psychoeducation P2. Youth participate in 6 mentor-led learn to surf sessions (mastery experience) P3. Youth develop and maintain secure relationships with mentor across 6 sessions
Interpersonal level	PC and surf mentors	PC and mentors support children to experience improved mental health	P1. PC facilitates and mentor participates in 6 sessions of psychoeducation relevant to child P2. PC and Mentors provide children with a mastery experience (6 sessions of learning to surf) P3. Mentors provide children with supportive mentoring experience that can build stable, secure relationship

Note. PC = program coordinator; OM = Ocean Mind; P1-3 = performance objective 1-3.

Step 2: Formulation of change objectives

In step 2, specific performance objectives relating to the program objective were formulated at each level of the intervention, including the individual level (children/adolescents) and the interpersonal level (surf mentors, program coordinator). This was followed by identifying the important and changeable determinants related to the program objective of improving youth mental health. This was informed by the investigations undertaken at step 1 in the needs assessment. Matrices of change objectives were then developed at both the individual level and interpersonal level, by crossing the performance objectives with the list of personal determinants (summarized in Table 2 and Table 3, respectively). This resulted in a statement of what was expected to change as a result of the intervention, which could influence the performance objectives in order to achieve the program outcome of improved mental health in youth. The personal determinants selected for both the individual and interpersonal level were knowledge, self-efficacy, attitude and capability.

Step 3: Selection of theory-based methods and practical strategies

In step 3 of the intervention mapping protocol, theory-based approaches that informed changes in determinants were identified and linked to intervention strategies that were appropriate to achieving the performance objectives. This step was achieved by listing all determinants that were presented in the matrices of change objectives at both the individual and interpersonal level, and then pairing these to relevant theory. A summary of the theory-based methods and practical strategies to achieve the change objectives at each level of the surf therapy intervention is outlined in Table 4.

In addition to theory-based methods, practical strategies informed by the prior evidence base in surf therapy were also considered. In particular, many of the adopted practical strategies in the Ocean Mind program were largely informed by the Wave project (https://www.waveproject.co.uk), with permission and consultation from their program developers. The UK-based Wave Project is a National Health Service (NHS) funded surf therapy program developed to help young people improve their emotional and physical wellbeing. Engagement and early collaboration with the already established Wave Project was an important element in the development of the Ocean Mind program and this process highlights the value and benefit that can be gained from such generous and open collaboration within the field of surf therapy.

To provide an example of what was undertaken during Step 3 of the intervention mapping protocol, the steps taken when looking at the first individual level performance objective, 'Youth participate in 6 mentor-led learn to surf sessions' are presented here. Firstly, this performance objective was crossed with the determinant 'self-efficacy', which then resulted in the change objective 'Children express confidence in their ability to learn to surf'. Relevant theory was then identified that could support and inform program strategies that were targeted at achieving this change objective. In this instance, theory relating to change in self-efficacy can be explained by Bandura's social cognitive theory (1991), which emphasizes how cognitive, behavioral, personal, and environmental factors interact to determine motivation and behavior (Crothers et al., 2008). The theory of self-efficacy lies at the center of social cognitive theory. When applied to the current example, unless children believe that their actions can produce the outcomes they desire (i.e. success in implementing the skills involved in learning to surf), they have little incentive to act or to persevere in the face of difficulties (i.e. poor surfing conditions, poor

performance on a particular wave). Based on social cognitive theory and specifically, self-efficacy theory, characteristics of the interaction between child and mentor and between the child and the larger group (interpersonal level) are therefore important. Interactions between child and mentor should involve verbal persuasion (e.g. encouragement related to the child's performance or ability to perform). Additionally, interaction with the larger group can provide opportunities for vicarious experiences, where a child may watch another child achieve a goal, such as standing up successfully on a wave, which may motivate them to keep going or hold the belief that the skill of standing up is achievable (e.g. increase their self-efficacy).

Similarly, setting surfing challenges at a level that is suitable for the individual child, where they are likely to achieve success, is another important aspect in achieving the change objective of 'Children express confidence in their ability to learn to surf'. Another individual characteristic is the child's ability to receive physiological feedback when participating in learn to surf sessions. Children are likely to experience sensations in their body, such as those relating to the release of adrenalin (e.g., increased heart rate, surge in energy, feelings of excitement or fear). How a child perceives these physical sensations and the associated emotional arousal will influence their beliefs of self-efficacy (Bandura, 1977). A child's ability to receive emotional and physiological feedback also ties in with another performance objective, 'Youth participate in 6 sessions of OM group psychoeducation', which when crossed with the determinant 'self-efficacy' resulted in the change objective 'Youth express confidence to participate in psychoeducation activities'. By providing children with psychoeducation aimed at increasing their awareness and ability to label feelings (both emotional and physical), as well as their ability to identify the link between thoughts, feelings and behaviors,

their self-efficacy beliefs around the physiological reactions experienced when learning to surf may be improved. These strategies are again informed by social cognitive theory.

Step 4. Development of the surf therapy intervention

In step 4, the strategies and activities that make up the intervention were selected, based on information gathered in the first three steps of the intervention mapping protocol. This included designing communication that conveyed the intent of the surf therapy program to parents and children, as well as a pre-program training workshop for surf mentors to increase their program knowledge and mental health literacy. During this mentor training, information was provided on: a) symptom presentations for a range of mental health disorders (e.g. anxiety, depression, neurodevelopmental disorder); b) mentoring skills, including what it means to be a mentor, how to develop a safe, non-judgmental space for youth and how to communicate effectively with youth; c) how to develop a growth mindset in youth; and d) building supportive relationships with youth. For the intervention, a series of six sessions combining land-based psychoeducation plus water-based skills activities of learning to surf were developed. Combined, these activities form the six week surf therapy intervention and were designed to target the change objectives outlined in Table 2-4, with the aim of achieving the overall program objective of improving indicators of youth mental health.

Step 5. Adoption and implementation plan

The adoption and implementation plan of the surf therapy intervention was developed during step 5 of the intervention mapping protocol. In this step, program developers addressed strategies aiming to increase the likelihood that the target population (e.g.,

child with or at risk of mental health disorder) would take up the program. This included providing transport for children to and from the program and ensuring the program was offered at no cost to participants. Strategies aimed at recruiting and maintaining surf mentors in the Ocean Mind program were also devised and included ensuring mentors and child participants were well matched on skills, experience and personal characteristics to increase the likelihood of a successful and fulfilling mentor relationship. Further strategies included ensuring surf mentors received adequate training prior to the program commencing, both in terms of mental health literacy and surf coaching skills but also to ensure surf mentors had a clear understanding of expectations and the ethos and overarching aims of the program. It was hypothesized that this would aid adoption of the program while maintaining fidelity to the components identified as necessary to achieve the change objectives and in turn, the overall program objective. A strategy for dissemination of the program was also devised, which involved developing a network of referrers from a number of social and community systems. In order to increase the reach of the program, it was a key principle that the intervention be provided in the community free of charge.

Table 2

Matrices of change objectives for youth at the individual level of the surf therapy intervention

Performance objectives	Personal determinants			
	Knowledge	Self-efficacy	Attitudes	Capability
P1. Youth participate in 6 sessions of OM group psych-education	C1.1.1 Children identify symptoms of mental health C1.1.2 Children label emotions C1.1.3 Children describe link between thoughts, feelings and behaviors C1.1.4 Children identify the relationship between physical activity and mental health	C1.2.1 Children express confidence to participate in psychoeducation activities	C1.3.1 Children express positive attitude about the helpfulness of group psychoeducation activities C1.3.2 Children express an attitude of acceptance of mental health symptoms for self and others	C1.4.1 Children have cognitive capability to participate in psychoeducation activities
P2. Youth participate in 6 mentor-led learn to surf sessions (mastery experience)	C2.1.1 Children recall the sequence of skills required to learn to surf C2.1.2 Children describe basic water safety principles	C2.2.1 Children express confidence in their ability to learn to surf	C2.3.1 Children express positive attitudes about the experience of learning to surf	C2.4.1 Children have the physical capability to participate in learn-to-surf activities
P3. Youth develop and maintain secure relationships with mentor across 6 sessions	C3.1.1 Children express knowledge on how to communicate with adults C3.1.2 Children describe developing social skills and building stable, secure relationships C3.1.3 Children describe learning about thoughts, feelings and behaviors C3.1.4 Children describe the importance of their relationship with their mentor	C3.2.1 Children express confidence in their ability to talk with mentor C3.2.2 Children express confidence in their ability to make friends	C3.3.1 Children express positive attitudes about their relationship with their mentor	C3.4.1 Children have the communication and social skills to engage with mentor

Note. C1.1.1=change objective 1.1.1

Table 3

Matrices of change objectives for program coordinator and surf mentor at the interpersonal level of the surf therapy intervention

Performance objectives	Personal determinants			
	Knowledge	Self-efficacy	Attitudes/Beliefs	Capability
P1. PC delivers 6 sessions of psychoeducation relevant to child	C1.1.1 PC can describe child models of mental health and identify individual symptoms of mental health problems C1.1.2 PC describes the relationship between thoughts, feelings & behaviors C1.1.3 PC can list benefits of physical activity on mental health C1.1.4 PC recognizes the principles of vicarious experience (modelling) and its effect on mental health	C1.2.1 PC expresses confidence that they can provide psychoeducation to children that may lead to improvements in mental health	C1.3.1 PC holds positive attitude of the benefits of psychoeducation activities on child mental health	C1.4.1 PC have the skills to facilitate psychoeducation activities
P2. PC and Mentors provide children with a mastery experience (6 sessions of learning to surf)	C2.1.1 PC and Mentors state the skill components required to learn to surf (e.g., paddling for a wave, catching a wave, standing up, turning) C2.1.2 PC and Mentors explain tenets of water safety C2.1.3 PC and Mentors recognize the principles of vicarious experience (modelling) and verbal persuasion and state their effect on learning a new skill	C2.2.1 PC and Mentors express confidence in their ability to teach children to surf C2.2.2 PC and Mentors express confidence that they are able to use verbal persuasion and vicarious experience (modelling) to encourage children in learning to surf	C2.3.1 PC and Mentors express positive attitudes about surfing as an agency to improve self-efficacy and mental health	C2.4.1 PC and Mentors have the skills required to instruct children to learn to surf

P3. Mentors provide children with supporting mentoring experience to build secure relationship	C3.1.1 Mentors describe the features of a stable and secure relationship C3.1.2 Mentors describe the importance of a stable and secure relationship on child mental health	C3.2.1 Mentors have confidence in their ability to form a stable and secure relationship with child	C3.3.1 Mentors make clear the meaningfulness and importance of forming a relationship with the child C3.3.2 Mentor makes clear the importance of the child's wellbeing C3.3.3 Mentors appraise that a stable, secure relationship with child is feasible and effective	C3.4.1 Mentor possess the skills to form stable, secure relationships

Note: PC = program coordinator; C1.1.1 = change objective 1.1.1

Table 4

Theory-based methods and practical strategies to achieve the change objectives at each level of the surf therapy intervention

Level of the Intervention	Determinant	Change Objective	Theory-based Method	Theory	Practical Strategy
Individual (Youth)	Knowledge	C1.1.1, C1.1.2, C1.1.3, C1.1.4, C2.1.1, C2.1.2, C3.1.1, C3.1.2, C3.1.3	Group discussion, elaboration, rehearsal, using cues	Theories of information processing (Smith, 2008), elaboration likelihood model (Petty et. al., 2009)	Psychoeducation activities; learn to surf activities
	Self-efficacy	C1.2.1, C2.2.1, C3.2.1, C3.2.2	Modelling, feedback, persuasive communication, facilitation, reinforcement	Social cognitive theory, learning theories Communication-persuasion matrix (McGuire, 2001)	Psychoeducation activities; learn to surf activities

Attitude/Beliefs	C1.3.1, C1.3.2, C2.3.1, C3.3.1	Persuasive communication, framing, feedback, self-monitoring, active participation, group discussion	Communication persuasion matrix; learning theories; self-regulation theory	Psychoeducation activities; learn to surf activities
Capability	C1.4.1, C2.4.1, C3.4.1	Active learning, individualization, goal setting	Social cognitive theory, trans-theoretical model; theories of goal directed behavior	Psychoeducation activities; learn to surf activities

Note. OM = Ocean Mind; C1.1.1 = change objective 1.1.

Step 6. Evaluation planning

A plan to evaluate the effectiveness of the surf therapy program was developed in step six, the final step of the intervention mapping protocol. The program is currently being implemented and effectiveness of the intervention for improving indicators of youth mental health is being evaluated in a pilot cluster waitlist randomized controlled trial. The program is being evaluated at the individual level of the child, but also at the interpersonal level of the surf mentor and program coordinator. Individual and interpersonal level assessments include measures of both internalizing and externalizing symptoms, depression, anxiety, self-efficacy beliefs, quality of the child-mentor relationship, as well as changes in behavior related to the specific change objectives. These assessments are mixed methods, involving both questionnaires, direct observation and interviews and are being completed by a number of informants, including children, parents, surf mentors and referring professionals to corroborate reports. Semi-structured interviews and focus group are focusing on answering three main questions, (1) what are the benefits and limitations of the program, (2) what are the potential mechanisms of action, and (3) how well was the program implemented? Process–evaluation questionnaires for both parents, referrers and surf mentors were developed to record and assess the implementation of the intervention.

Discussion

In this paper, the authors aimed to describe how a systematic planning process, based on an intervention mapping protocol (Bartholomew et al., 2016) could be used to develop a surf therapy program. The overall objective of the Ocean Mind surf therapy intervention was to improve indicators of youth mental health within the Australian context. The intervention mapping protocol provided a multistep planning process, which

included a needs assessment, the application of theory, program design, program development, adoption and implementation, and evaluation. This process involved a number of stakeholders, including program developers, mental health practitioners, school principals, teachers and school counsellors, children, parents, and researchers in order to capture a wide range of experiences, as well as practical and theoretical contributions to inform the intervention.

The Ocean Mind surf therapy intervention was designed to improve indicators of youth mental health. In the first instance, this program was largely informed by the Wave project (https://www.waveproject.co.uk), with permission and consultation from their program developers. However, given the Wave project was developed in the United Kingdom and originally delivered in Cornwall, England, it was important that the Ocean Mind program was developed specifically for the Australian context, with local adaptions relevant to the Victorian Surf Coast region, where the program is delivered. This consideration was important as the region has its own set of unique social, cultural and environmental circumstances that may not be comparable to other coastal areas of Australia (Olive, 2015). For example, the Victorian Surf Coast climate is much cooler, with cooler water temperatures than the majority of coastal regions within Australia. This had important bearings on the 1) timing of program delivery, meaning the program could not be delivered all-year-round, 2) the type of equipment that would be required to ensure participants were comfortable, and 3) the way in which potential participants engaged, or in the case of the current population, has a lack of or minimal prior engagement with the beach/ocean environment. Other considerations included the way in which surf permits were distributed in this area. Compared to some more populated surf breaks in Australia, sufficient access to beaches was not a major

barrier in the development of the Ocean Mind program.

During the needs assessment and with the identification of determinants, it became evident that children would benefit from more than just learning to surf, which did not appear to target all of the important and changeable determinants of youth mental health that were identified. This lead to the idea of the land-based psychoeducation session to accompany the water-based 'learn-to-surf' component in the program design and development stage. The resulting intervention was a 6-week surf therapy program, delivered across consecutive weekends, lasting two hours in duration, which is broken down into a psychoeducation session, a brief water safety session and learn-to-surf session.

To the authors knowledge, this is the first study to use intervention mapping methods to develop and refine a program of surf therapy for youth at risk of, or experiencing mental health problems. The intervention mapping protocol outlined by Bartholomew Eldredge et al. (2016) provided a useful framework to assist the group in the planning stages of program development, while also prompting developers to consider implementation and evaluation from the beginning, during the planning process. From the authors experience, we believe that the intervention mapping protocol ensures that input is provided from a variety of sources, which may lead to more coherent, integrated and meaningful implementation and evaluation plans from the outset. While the authors valued the intervention mapping process of developing a program logic that clearly identifies what needs to happen within the program to increase the likelihood of achieving the program objectives, there were some limitations to the process. For example, the intervention mapping process requires an investment of time and resources, particularly when developing new programs rather than adapting existing programs. Even

so, the authors argue that to progress the field of surf therapy, there is a strong need for evidence-based practice. The steps undertaken in the intervention mapping process will not only assist future program developers to identify clear program objectives, but will also allow them to identify potential agents of change through the identification and evaluation of key determinants and change objectives.

Limitations and future directions

A lack of resources was a limiting factor in the current study, which limited the scope of program development. With greater resources, both time and financial, the Ocean Mind program may have benefited from a more multilevel approach to intervention that went beyond the individual and interpersonal levels. In future iterations, it will be beneficial to expand on the logic models developed for the current intervention to meaningfully incorporate determinants at other environmental levels beyond just the interpersonal. For example, program design might benefit from targeting organization and community factors that could not be addressed in the current iteration due to limited resources. Additionally, it is well established that parents/guardians play an important role in a young person's mental health. This could be another focus, at the interpersonal level, of the Ocean Mind intervention in future iterations.

Given that program developers are often juggling competing priorities, and limited in time, resources and means to engage in such a resource-intense process, undertaking the full intervention mapping protocol may not always be feasible. To address this barrier, partnering with local universities or research institutes that do have the capacity for such work may prove to be a beneficial way to address this barrier. Given the emerging nature of the field of surf therapy and the methodological limitations in much of the published literature, there is a need for

program developers and researchers to articulate the theory, scientific evidence-base and systematic planning that often informs surf therapy program development but is less often adequately reported in the published literature. Intervention mapping presents a comprehensive approach to program development that can produce these detailed outputs but there are a variety of methods that can be considered (see O'Cathain et al., 2019 for a review of approaches). The benefit of undertaking and documenting such systematic approaches to program development as those outlined by O'Cathain et al. (2019) and others, relates to the clear identification of change objectives and predicted outcomes. This detailed information can clearly inform evaluation, such as the selection of applicable outcome measures, as well as process assessments that can identify possible pathways and mechanisms of change. A systematic approach to program development also assists with implementation evaluation, which can inform revisions to program delivery. There is evidence to show that interventions which make extensive use of theory and prior evidence in their systematic planning tend to have larger effects on behavior (Taylor, Conner, & Lawton, 2012; Webb, Joseph, Yardley, & Michie, 2010). With such systematic planning, it is perhaps then that the ethical investment in to more rigorous and resource intensive randomized controlled trials are justified, which can serve to improve the quality of the evidence base in the field of surf therapy.

Conclusion

The current study has demonstrated that the intervention mapping protocol can provide a systematic and rigorous approach to program development and planning for implementation and evaluation. The authors have provided a case example of how intervention mapping was used in the development of a surf therapy program aimed at improving youth mental health. The

intervention mapping process outlined in the current work may assist future program developers in assessing whether intervention mapping is feasible approach to program development in context of their available resources.

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