



Surf Therapy: A Scoping Review of the Qualitative and Quantitative Research Evidence

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instructor and more recently as the Director of Research and Evaluation for JMMF to better understand the benefits of surf therapy for youth at-promise and U.S. veterans. Since 2018, Dr. Sarkisian has been a member of the International Surf Therapy Organization (ISTO) and he is actively engaged in coalition building, the dissemination of research on surf therapy and serves as a technical consultant to programs interested in developing surf therapy program evaluations. *Carly M. Rogers*, is a clinical occupational therapist and independent researcher. She received her BA in Psychology from the University of California at Santa Barbara and her masters and clinical doctorate in Occupational Therapy from the University of Southern California. During her master's coursework, Dr. Rogers created a therapeutic surfing program titled Ocean Therapy, aimed at enhancing self-efficacy in participants from diverse backgrounds. She later became the Director of Programs for the Jimmy Miller Memorial Foundation, where she implemented Ocean Therapy with underprivileged youth and military populations until 2015. She has since presented at the regional, national and international level both on the topics of surf therapy and occupational therapy's role with veterans diagnosed with combat PTSD. Dr. Rogers is the primary author of "High-Intensity Sports for Posttraumatic Stress Disorder and Depression: Feasibility Study of Ocean Therapy with Veterans of Operation Enduring Freedom and Operation Iraqi Freedom". *Kailey Bender*, is a pediatric occupational therapist. She received her BS in Kinesiology from CSU Long Beach, and her Masters of Science in Occupational Therapy from CSU Dominguez Hills. Kailey discovered surf therapy through the Jimmy Miller Memorial Foundation, where she volunteered as a surf instructor with veterans and at-risk youth. During her Master's program, Kailey and her colleagues had the unique opportunity to research the effects of ocean therapy on veterans with PTSD, and heard first-hand accounts of the profound benefits it had upon their well-being. Since graduating, Kailey has volunteered with multiple other surfing therapy organizations throughout Southern California. *Meg Comer*, is an occupational therapist who specializes in pediatrics with children under the age of three. She additionally works in acute care and inpatient rehabilitation with adults of all different needs and backgrounds. She received her MS in Occupational Therapy from Thomas Jefferson. She is additionally Aquatic Therapy and Rehabilitation Institute Certified.

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Abstract

Over the past 15 years, surf therapy has emerged as a growing therapeutic intervention in diverse communities around the world. Although the programs operate on the premise that surf therapy provides a range of benefits for both physical and psychological health, there is limited research evidence available to support these claims. There additionally remains a need to further develop evidence-based practices around surf therapy that support the global impact of existing and future surf therapy interventions. This research provides a scoping review of academic literature focused on surf therapy. The objectives of the research are; (1) to gain a better understanding of the global use of surf therapy and its physical, psychological and social benefits, (2) to identify intervention and research gaps related to surf therapy, (3) to provide recommendations for future surf therapy research, (4) to use the evidence to inform best practices in the field. A systematic article search of the meta-databases Google Scholar, EbscoHost, and Wiley yielded 18 studies that met the inclusion criteria. An additional search for Master's Theses, Doctoral Dissertations, and expert search yielded 11 studies. A total of 29 studies were found to meet criteria. The data from the studies were analyzed using metasynthesis. As a result, the review provides an overview of the current scientific evidence related to surf therapy, including its physical, psychological, and social benefits. It additionally provides a detailed description of existing research methods and measures used to evaluate the impact of surfing as a therapeutic intervention that could inform further research designs. The study supports surf therapy as a means of improving both physical and psychosocial health outcomes and includes recommendations for improving surf therapy research and practice.

Research Evidence

In December 2019, surf therapy was defined by the International Surf Therapy Organization (ISTO) as a method of intervention that combines surf instruction/surfing and structured individual and/or group activities to promote psychological, physical and psychosocial well-being (International Surf Therapy Organization, 2019). Surf therapy interventions have been utilized across various disciplines including occupational therapy, physical therapy and psychology. In the clinical setting, mental and/or physical health clinicians integrate their clinical expertise with the activity of surfing in order

to achieve therapeutic outcomes for their clients. Other surf therapy interventions, however, are structured through a health promotion perspective. These programs may or may not be run by clinicians and aim to improve psychological, psychosocial and/or physical health outcomes.

Unlike traditional treatments that often use a symptom reduction approach through talk therapy and/or medication, surf therapy programs utilize the physical activity of surfing as an anchor to the healing process. In addition to surf-instruction/surfing, these programs often include individual mentoring, social skills development, psychoeducation and/or group discussions to promote healing, strengths, resilience and personal growth in

an inclusive social environment. Surf therapy is used as both a stand-alone intervention and as an augment to other approaches (e.g., traditional psychotherapy and medication management).

Although surf therapy programs emerged in the 1990's as non-profit organizations, research on surf therapy programs is relatively new with the first peer-reviewed publication appearing in 2010 (Morgan, 2010). In the same year, a systematic literature review of randomized control trials on sports for post-traumatic stress disorder (PTSD) concluded that none existed (Lawrence et al., 2010). More recently, the formation of the International Surf Therapy Organization (ISTO) in 2017 has provided more opportunities for surf therapy program personnel and researchers to collaborate and share best practices and research strategies (ISTO, 2017). Globally, over 50 surf therapy programs serve a wide range of populations from youth with disabilities to veterans with PTSD. Although randomized control trials have recently begun in some programs, many programs struggle with limited funding or research expertise to conduct surf therapy research. A number of studies have captured the physical, psychological, and social benefits of combining physical activity and being in nature, however, there is a further need for evidence that supports the potentially unique benefits of utilizing the sport of surfing as a key element of a novel therapeutic intervention (Eigenschenk et al., 2019). The focus of this study was to gain an understanding of the current scientific evidence of surf therapy in order to inform further research and practice in the field.

Research Aims and Objectives

This research aims to provide a scoping review of academic literature focused on surf therapy. The objectives of the research are; (1) to gain a better understanding of the global use of surf therapy and its physical, psychological and social benefits, (2) to

identify intervention and research gaps related to surf therapy, (3) to provide recommendations for future surf therapy research, (4) to use the evidence to inform best practice in the field.

Methods

Due to the scarcity of empirical evidence related to surf therapy, along with the variability in which surf therapy is defined, utilized, and measured, it was decided that a scoping review was an ideal methodology to identify the current scope of evidence related to surf therapy and to clarify how surf therapy is utilized and defined across multiple therapeutic sectors (Munn et al., 2018). The evidence presented in this scoping review is intended to be a useful precursor for defining more specific research questions related to surf therapy and for conducting a more concentrated systematic review. This review was conducted by a team of five researchers and supervised by the lead author who is a trained research psychologist with prior experience and training related to conducting systematic and scoping reviews. The review questions included: What interventions exist related to surf therapy? What are the physical and psychological benefits of these interventions? Who do these interventions serve? What research is available to support surf therapy interventions? What are the gaps in research? And, how can this research inform best practices in the field?

Included Databases

EbscoHost, GoogleScholar, and Wiley meta-databases were searched for relevant studies. These metadatabases were selected due to their inclusion of hundreds of relevant full-text research articles and databases. Utilizing these three meta-databases helped to guarantee adequate and efficient coverage of relevant research studies. Studies with titles and abstracts that met the inclusion criteria were obtained and reference lists of the

identified studies scanned to identify additional relevant studies. Personal contact was also made with research and practitioner experts in the field of surf therapy who directed the researchers to additional relevant studies.

Time Period/Inclusion/ Exclusion Criteria

(1) The time period considered was the last 10 years (2008-2019) (2) The study examined or measured benefits related to surf therapy (3) Study published in a peer-reviewed journal, book or book chapter, or was a Master's thesis or Doctoral Dissertation that resulted in the award of a degree. Studies that did not meet criteria were excluded.

Key Words

The preliminary keywords used within the search were *surfing, therapy, treatment, intervention, and program*. During the initial search, the searches yielded over 100,000 studies, with the majority of the studies related to web surfing or interventions and treatments other than those that included the sport of surfing. It was then decided to narrow the search procedure to include the keywords *"surf therapy" OR "surfing" AND "treatment" OR "surfing" AND "therapy"* and to limit the dates from 2008-2019. Although the preliminary article searches and consultations with experts in the field identified the first surf therapy article to be published in 2010 (Morgan, 2010), it was decided to conduct a systematic search to include the last 10 years to ensure the inclusion of articles that may have been missed during the preliminary search.

For the Google Scholar database, the researchers were able to set it to include the studies without the word *internet* in order to exclude the studies based on "surfing the internet". After the initial search stage of peer-reviewed academic journal articles, the researchers decided that it would be

beneficial to conduct an additional search for Master's theses and Doctoral dissertations to gain a more comprehensive understanding of the scope of research available on the topic. During this phase the research team reached out to professionals in the field of surf therapy, searched the bibliographies of the studies acquired through the initial systematic search procedure, and additionally searched CINAHL, OVID, and Google Scholar by using key search phrases including: "surf therapy" "surfing therapy", "masters theses", "doctoral dissertations", "therapeutic surfing", "surfing", "therapy" in combination with one another.

Data Extraction

The researchers independently extracted the data from the studies identified, all of which were reviewed by a second researcher. Data were extracted following the procedures of metasynthesis, a form of data analysis commonly utilized within scoping and systematic reviews that include both quantitative and qualitative studies (see Bennion et al. 2012; Dolman et al. 2013; Wells et al. 2013) and formatted into a table commonly utilized for data extraction. The table was formatted to extract data specifically relevant to the research question, that included the study authors, aim, sample size, population and subpopulation, types of therapy/intervention, region, research design, measures, length of intervention, outcomes, and themes.

Data Analysis

Data from the studies were analyzed using the procedures of metasynthesis. The analysis included a process of reading, rereading, and taking notes of the key aims, methods, and findings of each article (Bennion et al. 2012). This was followed by data extraction, characterized by the charting and thematic coding of the data to provide a logical and descriptive summary.

Results

The article search procedure resulted in 29 studies that met criteria. Ebscohost search yielded a total of 63 hits, eight of which met criteria through the abstract search and article review, an additional five studies met criteria through reference mining. GoogleScholar yielded a total of 42 hits, seven of which met criteria through the abstract search and article review, and an additional 13 studies met criteria through reference mining. Wiley search yielded a total of 1,141 hits, one of which met criteria through the abstract search and article review, and no additional studies met criteria through reference mining. Sixteen duplicates were removed from the three database searches leaving a total of 18 studies. The search for Master's theses and Doctoral dissertations yielded an additional five studies. An expert search, that included reaching out to an international network of surf therapy researchers and practitioners, yielded 6 additional studies that were not already included in the systematic search procedure (See Figure 1).

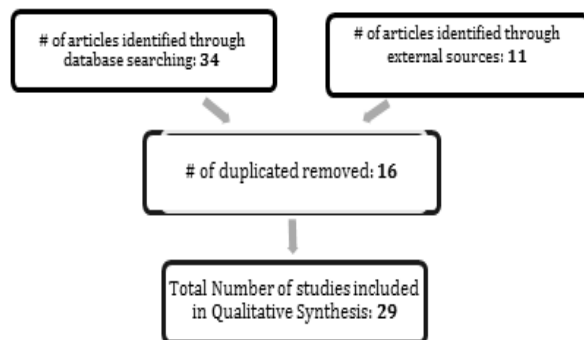


Figure 1. Article Search Procedure

Summary of Findings

The Appedix includes the 29 references identified through the scoping review. Table

1 is located after the references and includes characteristics of the studies included in the scoping review.

Geographical region. Studies came from a variety of countries from various regions of the world, including Australia (Morgan, 2010), New Zealand (Wheaton et al., 2017), Portugal (Matos et al., 2017; Lopes, 2015), South Africa (Rolfe, 2015; Snelling, 2015), the United Kingdom (Caddick, 2014; Caddick et al., 2015a; Caddick et al., 2015b; Colpus & Taylor, 2014; Godfrey et al., 2015; Hignett et al., 2018; Marshall et al., 2019), and the United States of America (Armitano et al., 2015; Cavanaugh & Rademacher, 2014; Clapham et al., 2014; Clapham et al., 2019; Crawford 2016; Fleischmann et al., 2011; Harris, 2015; Moore et al., 2018; Mueller, 2017; Rogers, 2014; Rosenberg, 2014; Walter et al., 2019a; Walter et al., 2019b).

Populations. The sample size ranged from 1 to 492 participants. Most explored the potential benefits of surf therapy for child and youth participants (16). However, this was closely followed by a focus on various adult populations (13). Populations served include children and youth with a range of disabilities, children and youth with Autism Spectrum Disorder, children and youth in need of social and emotional support, military service veterans, active duty service members, adults with various addictions and co-occurring psychological disorders, adults with disabilities, and young adult cancer survivors (See Table 1).

Focus of therapy. All studies aimed to provide evidence of positive changes in well-being through surfing. Focus areas included physical strength and fitness (6), general health and well-being (4), psychological and mental health (9), and psychosocial well-being (13) with many programs aiming to improve some combination of multiple areas for a specific population (See Table 1). Most programs included supportive surf instruction with some component of group

processing and/or mental health support. The duration of programs ranged from one day to six months in length, with most lasting between 5-8 weeks at one session per week. (See Table 1).

Research design and measures. The most commonly utilized research designs were observational pretest-posttest (N=10) and case study (N= 9). Eleven studies used standardized measures, however there was significant variability in the measures utilized, and inconsistency in the way the same constructs (i.e. trauma, physical fitness) were measured across studies. Ten of the studies included qualitative interviews. Other qualitative data collection methods included semi-structured life history interview, focus group discussion, participant observation, field notes, and program data. There were additionally three literature reviews and three program evaluations (See Table 1).

Therapeutic Outcomes by Population

Children and youth in need of social and emotional support. Seven of the studies focused on surf therapy interventions with children and youth who were in need of additional social and emotional support. The way this population was referred to varied between studies, however the majority of the programs touched on the idea that for these “challenge averse” populations – foster youth, youth at-risk of isolation, youth with a history of abuse and neglect, youth exposed to violence– surf therapy provided a manageable challenge in a fun and supportive context. The results from these studies included increases in self-concept, emotional regulation and social competencies; re-engagement with school, and decreases in behavioral problems reported post-intervention. However, the strength of evidence related to these changes varied. For example, the studies by Snelling (2015) and Matos et al. (2017) used the strength and difficulties questionnaire to measure behavioral changes in participants ages nine

to sixteen. Although the results of Snelling (2015) showed no statistically significant changes in behavior, Matos found significant improvements in interpersonal relationships and emotional regulation. The absence of significant findings in Snelling’s study could be due to a variety of factors that impacted program delivery, including inadequate completion of program tasks by coaches and incomplete attendance by participants, or factors related to the research design, such as literacy levels of the participants who completed the surveys (Snelling, 2015).

Godfrey et al. (2015) used the Stirling Children’s Well-being Scale, that measures social and psychological wellbeing with two subscales: ‘positive outlook’ and ‘positive affect’; and reported statistically significant improvements on both subscales as well as the total. In qualitative interviews, participants also self-reported feeling better (96%), happier (98%), had fun (99%), made friends (89%) and felt fitter (87%). Marshall et al. (2019) also used qualitative interviews and found that participants reported feeling a sense of mastery at learning a new skill, reported a feeling of respite and escape while at the beach, and developed social connections with other peers who participated in the program. These authors were able to use these “consequent categories,” defined as themes that arose from the research that affect the outcomes, in addition to “antecedent categories,” the themes that emerged from environmental inputs that include social and physical environmental factors as well as the surfing therapy group design, to establish “core categories” that attempt to explain how surf therapy works through program design. The authors determined that self-selected pacing and progression, as well as the creation of both an emotional and physical safe space within the surf therapy group, contributed to the success of the surf therapy group participants.

Colpus & Taylor (2014) measured changes in well-being with an unstandardized scale, and their participants reported a mean increase in confidence by 45.7%, with the mean score rising approximately 2.5 points on a 10-point scale (Taylor, 2013). Hignett, et al.'s (2018) study found a statistically significant increase in satisfaction with appearance, using a relevant portion of the British Panel Household Survey (BPHS-Y) for measurement. The same study also reported a significant decrease in resting heart rate, which indicates an increased level of aerobic fitness among participants (Hignett, et al., 2017).

Youth with disabilities. For youth with disabilities, results included improvements in physical fitness, self-confidence, social development, behavior and sleep, and reduced levels of anxiety. Children with disabilities tend to have lower fitness levels than their able-bodied peers, as well as fewer opportunities to participate in group activities – which only compounds their difficulties with confidence and social interaction (Moore et al. 2018; Mueller, 2017). Armitano et al. (2015) used the Brockport Physical Fitness Test to measure upper body strength, core strength, and endurance pre and post intervention, with improvements in all areas (Armitano et al, 2015). Four of the studies focused on youth with disabilities included qualitative interviews with the parents of participants with various disabilities, all of which reported increases in confidence and social skills as well as improvements in behavior (Armitano et al., 2015; Clapham et al.; Moore et al., 2018; Mueller, 2017). Some parents described surf therapy as a “normalizing” opportunity for their children who are typically excluded from social events, and others noted that surf therapy provided a rare opportunity for family bonding (Moore et al., 2018). Those studies that focused specifically on populations with Autism Spectrum Disorder reported that the ocean served as a unique therapeutic environment with just enough

sensory input for participants with ASD (Cavanaugh, 2014; Moore et al., 2018; Mueller, 2017). One parent of two children with ASD who participated in an eight-week summer program described, “The tightness of the wetsuit is a good thing for both my children. They are both deep-pressure seekers. So, between the wetsuit, the crashing of the waves, just the water on the wetsuit, it’s all sensory” (Moore et al., 2017). Congruently, most parents reported the same sensory inputs to have a calming effect on their children with ASD, that seemed to lead to reduced anxiety and better sleep (Cavanaugh & Rademacher, 2014; Clapham et al, 2014.; Moore et al., 2018; Mueller, 2017).

Active duty military service members. For active duty military service members, Walters (2019a) showed that following six weeks of surf therapy among 74 participants, negative affect and symptoms of depression, anxiety, and PTSD (among those with probable PTSD) significantly decreased and positive affect significantly improved; however, 75% of participants were receiving some other type of treatment (e.g., psychotherapy, medication management, physical therapy) in addition to surf therapy. The study also looked at the immediate effects of a surf session, measured before and after each session, and found significant improvements in depression, anxiety, and positive affect. In one case study involving an active duty military service member, surfing was found to have the ability to provide an alternative form of pain management (Fleischmann, 2011). These findings, combined with the larger body of evidence supporting the effects of surf therapy for military veterans and others, have led to the development of the sector’s first randomized control trial (Walters, 2019b). The RCT will compare surf and hike therapy as complementary interventions for active duty service members with major depressive disorder, to understand whether changes in depressive symptoms over time vary between the two interventions. Among other factors, it is hypothesized that surf therapy

may have even greater benefits than other outdoor activities, because the intervention requires participants to be immersed in the water or 'blue space'.

Veterans. For veteran populations, surf therapy reportedly provided respite from the symptoms of PTSD, in addition to decreased stress levels, depressive symptoms and use of narcotics, and an increase in feelings of self-efficacy (Caddick, 2014; Caddick et al., 2015a; Caddick et al., 2015b; Crawford, 2016; Rogers et al., 2014). Furthermore, Rogers et al. (2014) found that surf therapy acted as a means for veterans to improve feelings of self-efficacy through success in goal-directed activities. As a result, this increase in feelings of self-efficacy may be linked to a statistically significant reduction in depressive symptoms. A study by Caddick et al. (2015ab) discussed the impact of surf therapy on providing respite from depressive and PTSD symptoms. By engaging in surfing, veterans reported feeling a brief break from the symptoms of PTSD, as surfing demands focusing on the present, providing periods of respite (Caddick, 2015ab). Through stringing together periods of surfing, veterans reported feeling better able to manage their symptoms of PTSD.

Young adult cancer survivors. In a study by Rosenberg (2014), a young adult population of cancer survivors was investigated to explore the impact surfing has on the participants' body image, self-esteem, and self-compassion. Results included decreases in self-reported depressive symptoms/depression as well as decreased feelings of alienation (Rosenberg, 2014). In addition, participants reported increased feelings of positive body image, self-esteem and self-compassion following the conclusion of their engagement in surfing (Rosenberg, 2014).

Adults recovering from addiction. One study focused on an adult population recovering from addiction (Harris, 2015). Results from

this phenomenological study found five main themes including mindful embodiment, developing secure attachment, self-empowerment, differentiation, and surfing as a ritual and spiritual experience in relation to the investigated healing phenomenon of surfing (Harris, 2015). Of particular emphasis is the relationship between mindful embodiment and supporting the repair of the mind-body connection following the experience of a trauma, such as addiction and societal influences (Harris, 2015). An implication from this study is the potential for surfing to provide a new way to incorporate the body into treatment in a contextually relevant way.

Studies focused on adult populations acknowledged the lack of generalizability of the results obtained due to small sample size, lack of a control group, biases potentially skewing data collection, confounding factors, and significant variability in surf conditions (Caddick, 2015b; Fleischmann, 2011; Harris, 2015; Rogers, et al., 2014; & Rosenberg et al., 2014). Among the results, only three reported statistically significant results. Rogers, et al. (2014) reported decreases in depressive symptom severity in the veteran population studied. Rosenberg, et al. (2014) reported a reduction in depression/depressive feelings, anxious feelings, and an improvement in self-esteem in individuals with cancer along with increases in positive affect. Walter et al. (2019a) reported significant changes with active duty military service members; total scores for symptoms of depression, anxiety, PTSD, and negative affect significantly decreased, and positive affect significantly improved. The studies that did not find statistically significant quantitative results, also utilized qualitative methods to interpret interview and self-report questionnaire data to better understand their overall findings (Caddick, 2015; Fleischmann, 2011; Harris, 2015).

Discussion

The Global Use of Surf Therapy and its Physical, Psychological and Social Benefits

This scoping review provided a comprehensive overview of the range of existing surf therapy interventions from various regions of the world and their potential impact on physical and psychological health and well-being amongst a diverse range of populations. Populations served include children and youth with a range of disabilities, children and youth in need of social and emotional support, children and youth with autism spectrum disorder (ASD), veterans, active duty military service members, adults with various addictions and co-occurring psychological disorders, adults with disabilities, and young adult cancer survivors. Although the results of the quantitative research designs varied from studies showing weak correlations or no statistically significant improvements to significant improvements in health outcomes as a result of surf therapy interventions, the qualitative measures helped to contextualize these results and further understand the benefits and short-comings of surf therapy interventions.

All studies aimed to provide evidence of positive changes in well-being through surfing. Focus areas included physical strength and fitness, general health and well-being, psychological and mental health, and psychosocial well-being, with many programs targeting multiple health outcomes. Most programs included supportive surf instruction with some component of group processing and/or mental health support. For youth in need of social and emotional support, results included increases in self-concept, emotional regulation and social competencies, re-engagement with school, decreases in behavioral problems reported post-intervention, and increased social connections with surfing peers (Colpus, 2014; Matos et al., 2017; Godfrey et al., 2015;

Hignett et al., 2018; Morgan, 2010; Rolfe, 2015; Snelling, 2015; Marshall, 2019). For youth with disabilities, results included improvements in physical fitness, self-confidence, social development, behavior and sleep, and reduced levels of anxiety (Armitano et al., 2015; Cavanaugh & Rademacher, 2014; Clapham et al., 2014; Lopes, 2015; Moore et al., 2018; Mueller, 2017). For veteran and active duty service member populations, surf therapy reportedly provided respite from the symptoms of PTSD, decreased levels of stress, anxiety, depressive symptoms and use of narcotics, increased affect, and improvements in pain management (Caddick, 2014; Caddick et al., 2015a; Caddick et al., 2015b; Fleischmann et al., 2011; Rogers et al., 2014; Walters, 2019a). For adults recovering from addiction, surfing has the potential to support mindful embodiment, developing secure attachment, and self-empowerment (Harris, 2015).

Research Gaps and Recommendations

Studies from six countries were included in the literature, however the authors of this review are aware of surf therapy programs occurring in a number of additional countries and regions that were not represented in the research literature (International Surf Therapy Organization, 2019). Overall, there is a lack of generalizability of the research results, due to small sample sizes, lack of control groups, biases potentially skewing data collection, confounding factors, lack of validated standardized measures, and significant variability in surf conditions (Caddick, 2015; Fleischmann, 2011; Harris, 2015; Rogers, et al., 2014; & Rosenberg, et al., 2014). Further research exploring the impact of surf therapy among additional populations, cultures, and socioeconomic groups would contribute towards our understanding of the effectiveness of surf therapy across a diverse range of populations. A range of therapeutic measures and benefits were included in the literature, especially related to occupational and psychological therapies. It would be

beneficial to compare how surf therapy outcomes differed across mental health diagnoses and its utility for the treatment of additional psychological disorders beyond addiction, PTSD, depression and stress-related disorders.

Furthermore, there is a need for critical outcomes to be identified within each surf therapy focus area and measures established to evaluate these outcomes across studies. Currently, there are a myriad of measures used across studies, however there is not a way to compare across findings given so much variability in the measures used. The use of validated or established measures would be important to include in assessment. In the cases in which measures do not exist to evaluate a certain construct, care should be used in developing and validating new measures. However, given the diversity of surf therapy programs operating in culturally and linguistically diverse groups, researchers should use caution when utilizing surveys designed to measure constructs within a particular culture with other cultural groups. The field of surf therapy could benefit from a deliberate design of a survey constructed specifically for comparative research purposes.

There is an additional gap in the literature understanding both the immediate and long-term effects of surf therapy programs and interventions. Although several studies included a follow-up from between two weeks to three months (see Cavanaugh, 2014; Godfrey et al, 2015; Walters et al., 2019a), none of the studies included a follow-up for a time-period beyond one year. This highlights the need for longitudinal research designs to better understand the long-term impact of the programs and outcomes for participants, especially after the termination of the surf therapy program. It also poses additional questions around the appropriate time frame, quantity, and quality of interventions for sustaining long-term improvements in physical and psychological health and well-

being. The field additionally needs studies that at least use control groups, if not randomization, so that we can better understand if surf therapy is producing the outcomes we are measuring or if they are attributable to other factors (i.e., time, other treatment). A limitation of the literature is that it is likely that many surf therapy participants are receiving other forms of treatment or care, but that most studies fail to assess or to statistically account for other treatment use.

From a health promotion perspective, individual health outcomes, such as those measured through surf therapy interventions, are recognized to be interconnected to other social determinants of health, defined as “the conditions in which people are born, grow, live, work and age” (WHO, 2008). These conditions are inclusive of societal structures, institutions, policies, and distributions of power and resources and mediated by social interactions. Further research on surf therapy within a social determinants of health framework is needed to better understand how surf therapy can be utilized as a social mechanism contributing to community health outcomes within specific socio-cultural contexts and amongst diverse participants. This would additionally allow for investigation of how other social determinants (i.e. schools, parents, policymakers) can be leveraged within surf therapy to improve and sustain health outcomes.

Recommendations for Surf Therapy Practice

Many of the surf therapy interventions were facilitated by licensed clinicians such as psychotherapists, behavioral therapists, clinical psychologists, and physical and occupational therapists who integrated their clinical training and techniques into the surfing environment. Other surf therapy interventions, however, were structured within a health promotion design. This type of design focused on improving mental

and/or physical health outcomes by strengthening well-being, more broadly defined as feeling good and functioning well (Wahlbeck, 2017). Within both of these frameworks, it is important to consider whether surf therapy is a stand-alone intervention or an adjunctive intervention and if this differs by population and contributes towards different outcomes.

The existing studies are focused on establishing outcomes of surf therapy, but the mechanisms of how surf therapy works are not well understood. There has been some work on social support by Caddick (Caddick, 2014; Caddick, 2015ab), Marshall et al. (2019), and Rolfe (2015) that address this aspect. For example, Marshall et al. (2019) attempted to identify the *core categories* of surf therapy using program theory in order to understand how *antecedent categories* including the challenges presented by the ocean waves, removing perceptions of failure, as well as the support provided by the surf instructors result in improved mental health outcomes. These core categories can be used by surf therapy instructors and researchers to better understand the process by which surf therapy improves the self-confidence and self-esteem of participants. Rolfe (2015) evaluated the quality of the surf coach training in relation to its impact on surf therapy program outcomes. She identified a number of areas such as the quality of coach recruitment criteria along with adequate surfing equipment as posing threats to the successful implementation and outcomes of surf therapy programs.

Several the surf therapy programs aimed to improve outcomes related to self-concept, self-efficacy, and self-esteem (Cavanaugh & Rademacher, 2014; Godfrey, 2015; Fleischmann et al., 2017; Rolfe, 2015; Rosenberg et al., 2014 Snelling, 2015). Self-concept has been linked to a number of adverse social and emotional health outcomes such as aggression, depression, eating disorders, adjustment problems,

suicide, and shame, and is therefore considered a critical component of therapeutic programs (Demaray et al., 2009; Margolin & Gordis, 2007; McLean et al., 2010; Neff, 2007; Parkes, 2007). Within the research literature, the majority of these programs focused on measuring individual-level changes in self-concept through the use of various standardized measures.

Understanding and improving aspects of an individual's self-concept additionally encompasses components beyond the individual's thoughts and behavior as captured within the current measures, such as the social, cultural, and historical environment (Egan & Perry, 1998; Rogers et al., 2014).

Taking this into consideration within the design of surf therapy programs is especially important given the social and historical context of surfing, which in many regions has been considered a 'white' and 'male' dominated sport and a marker of exclusivity and privilege (See Thompson, 2011). Many of the studies acknowledge female program directors, staff members and participants from a spectrum of socioeconomic backgrounds and racial and cultural groups. Further research is needed within the context of surf therapy to examine the diversity or lack thereof in this sector and its impact on the participants' outcomes. Surf therapy interventions, especially those that prioritize 'marginalized' or 'underserved' populations, should account for structural features that perpetuate physical and psychological health disparities and social exclusion, and be inclusive of strategies for addressing these within the intervention designs. The way surf therapy interventions are designed could have a broader impact on social transformation that supports health or could perpetuate existing power structures that continue to marginalize the health of the populations (i.e. underserved youth) they are intended to serve.

Finally, the literature provides important implications regarding the appropriate time frame and quantity of the intervention programs. Due to the variability of the surf therapy interventions and the lack of strong-evidence base, it is not possible to generalize the results to confidently make specifications regarding the appropriate dose required to achieve therapeutic outcomes. Additionally, there remains little evidence supporting the sustainability of these outcomes over time. However, surf therapy appears to have a wide range of benefits within programs ranging from a couple of hours to six months. Considering the timeframe of an intervention should align with the program's ultimate goals and aims. For example, for a program that seeks to improve the affective experience of an individual and their sense of self-efficacy, a one-day surf session might be appropriate to achieve such outcomes. On the other hand, a program that is seeking to improve sustained mental health outcomes for individuals with mental illness or a program aiming to see significant changes in physical capabilities for children with disabilities, may require long-term engagement and sustained contact with the participants. The appropriate time frame and dosage may also be dependent on whether the surf therapy intervention is a standalone program or in conjunction with an additional program or treatment plan.

In terms of supporting sustained health outcomes, interventions that include participants and supporting individuals such as parents, siblings, and significant others could enhance the likelihood that the surfing will continue once participants have completed the program. It is also important to consider the socio-economic background of the participants, that could pose additional barriers to the continuity of surfing even when both the child and the parent have been provided with the skillset to continue after completing the surf therapy program (e.g. resources such as transportation, disposable income to purchase surfing equipment).

Creating a surf club for participants to sustain the surfing and social support aspects of a program could be an additional way of addressing the issue of sustained outcomes for health and well-being. This is consistent with the findings of Godfrey et al. (2015).

Conclusion

This scoping review provided an overview of the current scientific evidence related to surf therapy. This included a description of surf therapy's physical, psychological, and social benefits. It additionally provided a detailed description of existing research methods and measures used to evaluate the impact of surfing as a therapeutic intervention that could inform further research designs. It also provided support for surf therapy as a means of improving both physical and psychosocial health outcomes, and included recommendations for improving surf therapy research and practice. Further research is needed to explore context-specific aspects of surf therapy that should be taken into consideration when working within various cultures and subpopulations. There is a need for critical outcomes to be identified within each surf therapy focus area and measures established to evaluate these outcomes across studies. Research is also needed to analyze the long-term impact and sustainability of surf therapy programs and to gain a better understanding of the appropriate time frame, quantity, and quality of interventions for sustaining long-term improvements in physical and psychosocial health and well-being.

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Table 1

Characteristics of Studies on Surf Therapy Included in the Scoping Review

Author(s)	Population(s)	Focus of Therapy	Research Design	Sample Size	Measures
Armitano et al., (2015)	Youth with Disabilities	Physical strength/fitness, Physiological health	Observational Pretest-Posttest	16	Brockport Physical Fitness Test Manual
Britton et al., (2018)	Children, Youth & Adults with Mental Health Conditions/ in need of social & emotional support	General health/well-being	Systematic Review	33 Studies	Literature review
Caddick (2014)	Veterans with PTSD	Psychological/Mental Health	Narrative*	16	Participant observation Semi-structured life-history interviews Follow-up interviews
Caddick et al., (2015a)	Veterans with PTSD	Psychological/Mental Health	Narrative	16	Interviews Participant observation
Caddick et al., (2015b)	Veterans with PTSD	General health/well-being	Narrative	15	Interviews
Cavanaugh & Rademacher (2014)	Youth with ASD	Psychosocial well-being	Observational Pretest-Posttest, Case Study	11	Social Skills Improvement System Piers-Harris Children's Self Concept the SURF Skills Checklist the SURF Camp Curriculum Activity Observation Checklist
Clapham et al., (2014)	Youth with Disabilities	Psychological/Mental Health	Narrative*	16	Participant observation Semi-structured life-history interviews Follow-up interviews
Clapham, et al., (2019)	Youth with Disabilities	Physical Fitness	Observational Pretest-Posttest	91	Brockport Physical Fitness Test Manual
Colpus & Taylor (2014)	Youth in need of social & emotional support	Psychological/Mental Health	Observational Pretest-	72	Attendance sheets Pre and post course rating scale

			Posttest, Case Study		Client, Parent/Caretaker feedback forms Focus Groups General Self Efficacy (GSE) assessment Beck Depression Inventory (BDI-II) Posttraumatic checklist (PCL 5)
Crawford (2016)	Veterans with PTSD	Psychological/Mental Health	Observational Pretest- Posttest- Follow-up *	95	
Fleischmann et al., (2011)	Active Duty Service Member with Physical and Psychological Health Conditions	Physical Health/Psychological/Mental Health/Psychosocial well-being	Case Study	1	Patient Report/Chart Review
Godfrey et al., (2015)	Youth in need of social & emotional support	Psychosocial well-being	Observational Pretest- Posttest, Case Study	84	Stirling Children's Wellbeing Scale (SCWBS) Rosenberg Self Esteem Scale Qualitative Interviews Participant Observation
Harris (2015)	Adults with addiction, mental health issues & co-occurring disorders	Psychological/Mental Health	Phenomenology	Not Stated	
Hignett et al., (2018)	Youth in need of social & emotional support	Physical strength/fitness, Physiological health Psychosocial well-being	Observational Pretest-Posttest	58	Parent-Child Interaction System (PARCHISY) Physiological measures (heart rate, blood pressure) Inclusion of Nature in the Self Scare (INS) Youth version of the British Panel Household Survey (BPHS-Y) section on participants well-being
Lopes (2015)	Youth & Adults with disabilities	Physical strength/fitness, Physiological health	Case Study	321	Demographic Records & Program Information

Lopes et al., (2018)	Youth & Adults with Disabilities	Psychological/Mental Health Psychosocial well-being Physical strength/fitness, Physiological health General health/well-being	Case Study	187	Literature review Observational & Program Data
Marshall et al., (2019)	Youth with mental health conditions	Psychological/Mental Health Psychosocial well-being	Grounded Theory	22	Interviews
Matos et al., (2017)	Institutionalized Youth	Psychological/Mental Health	Observational Pretest-Posttest	48	Strengths and Difficulties Questionnaire Youth Experiences Survey
Moore et al., (2018)	Youth with Disabilities	Physical strength/fitness, Physiological health Psychosocial well-being	Case Study	15 Children 10 Parents	Parent & Child interviews
Morgan (2010)	Children in need of social & emotional support	General health/well-being	Qualitative Evaluation	8 Children 7 Parents	Parent & Child Interviews Focus Groups
Moroney (2017)	Children, Youth & Adults with Mental Health Conditions/ in need of social & emotional support	Psychological/Mental Health	Literature Review*	Not Stated	Systematic Literature Search
Mueller (2017)	Children & Youth with ASD	Psychosocial well-being	Ethnography/ Case Study	8	Field notes, informal interviews with subjects' parents, instructors and follow-up email with parents
Rogers et al., (2014)	Veterans with PTSD & Depressive Symptoms	Psychological/Mental Health	Observational Pretest-Posttest	11	PTSD Checklist-Military Version (PCL-M); Major Depression Inventory (MDI)

Rolfe (2015)	Youth/ Surf Therapy Coaches	Psychosocial well-being	Formative Evaluation/ Case Study	17	Interviews, Focus Groups
Rosenberg et al, (2014)	Young Adult Cancer Survivors	Psychosocial well-being	Experimental Pre-Test/Post-Test	492	Body Image Scale Self-Compassion Scale Psychological Screening Inventory
Snelling (2015)	Youth in need of social & emotional support	Psychosocial well-being	Experimental Randomized Control Trial; Program Evaluation*	115	Children's Hope Scale Strengths and Difficulties Questionnaire The Social and Health Assessments Scales (SAHA)
Wheaton et al., (2017)	Adults with disabilities	Psychosocial well-being	Grounded Theory	8	Interviews
Walter et al., (2019a)	Active Duty Service Members with Psychological or Physical Conditions	Psychological/Mental Health	Observational Single-group, longitudinal design	74	Patient Health Questionnaire (PHQ-8) Generalized Anxiety Disorder 7-Item Scale PTSD Checklist for DSM-5 (LEC-5) Positive and Negative Affect Schedule (PANAS) Numeric Pain Rating Scale (NPRS) Insomnia Severity Index (ISI) Client Satisfaction Questionnaire (CSQ-8)
Walter et al., (2019b)	Active Duty Service Members with Major Depressive Disorder	Psychological/Mental Health Physical strength/fitness, Physiological health	Experimental Randomized Control Trial	110	Checklist for DSM-5 TBI Identification Method (OSU TBI-ID-SF) Insomnia Severity Index Positive and Negative Affect Schedule

4-item Response to
Stressful Events Scale
Short Form Health
Survey (SF-36v2)
Treatment Utilization
Questionnaire
Borg Rating of Perceived
Exertion Scale
the Athletic Identity
Measurement Scale
(AIMS)
International Physical
Activity Questionnaire-SF
Fitbit physiological
measures

*Dissertation or Thesis

Appendix

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