

Effects of Adaptive Outdoor Recreation on Sense of Community

within Individuals with Disabilities

By

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Abstract

A sense of community (SOC) can be defined as a sense of belonging, commitment, and trust within group membership (McMillan & Chavis, 1986), which is often fulfilled in many contexts, such as geographic (Zhang et al., 2022), online (Uçar et al., 2024), among individuals with disabilities (Ville et al., 2003), and surrounding specific recreation activities (Legg et al., 2017). While some studies have assessed how populations with disabilities experience SOC (Gur & Bina, 2022; Townley & Kloos, 2009; Ville et al., 2003), few have assessed possible connections and barriers to a sense of belonging in those with disabilities. One possible bridge to this sense of community is adaptive recreation, which modifies activities to accommodate participation by those with disabilities (Rogers et al., 2016; Tow et al., 2020; Williams et al., 2004). Perceived SOC may affect social inclusion, mental well-being, and belonging in the general population (McMillan & Chavis, 1986). However, these essential indicators are often lacking among individuals with disabilities, thus limiting opportunities for meaningful social connections and engagement in recreational settings (Bedini, 2000). Limited opportunities for

recreational engagement can often lead to social isolation, lack of inclusion, and detriments to mental health among those with disabilities (Townley & Kloos, 2009). Examining the perceived sense of community in this population in a recreation context, specifically outdoor recreation (Rogers et al., 2016), and the communities that form around the activity, can help better understand the experience of individuals with disabilities. Therefore, this study aimed to examine adaptive outdoor recreation and SOC to better understand the social connections that empower people with disabilities. The applied implications will also be provided to extend the results for researchers and outdoor recreation practitioners. While this study did not find any support for a positive relationship between participation in adaptive outdoor recreation and total SOC, there was support for various relationships between specific activities and the SOC components. Research and practitioner recommendations are provided.

Effects of Adaptive Outdoor Recreation on Sense of Community

within Individuals with Disabilities

A Thesis

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SECTION I: MANUSCRIPT

INTRODUCTION

Psychological sense of community (SOC) was first proposed by Sarason (1974) as a phenomenological conceptualization of individuals interacting among themselves, providing everyone with a sense of belonging and purpose while also fostering a sense of responsibility for individuals within a community. Sarason emphasized the importance of SOC as a driver of social reform and a means of identifying social issues. McMillan and Chavis (1986) further developed the Sense of Community framework to include four subcategories (reinforcement of needs, membership, influence, and shared emotional connection). This advancement in SOC measurement allowed communities to be measured in various contexts, such as geographic (Zhang et al., 2022), cultural (Papapicco et al., 2023), and online communities (Uçar et al., 2024). Considering the diversity of communities, people with disabilities (PWD) may experience SOC differently based on barriers faced in community-based activities (Gur & Bina, 2022; Townley & Kloos, 2011; Ville et al., 2003). More specifically, individuals with disabilities often face accessibility barriers that limit outdoor recreation participation (Williams et al., 2004), which in turn limits positive physical and psychological (Tow et al., 2020) outcomes in the general population. The purpose of this study was to provide insight into the relationship between the time PWD spend engaging in adaptive outdoor recreation and their perceived SOC.

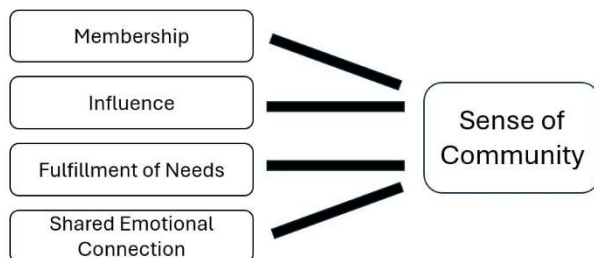
LITERATURE REVIEW

Sense of Community

There have been many variations of sense of community (SOC) since Sarason's (1974) original conceptualization, which incorporated similarity to other members, group interdependence, willingness to maintain one's interdependence, and feelings associated with being a part of something larger than oneself. This conceptual evolution contributed to a more *relational* perspective, relying on others as the foundation for one's sense of community (McMillan & Chavis, 1986). McMillan and Chavis (1986) further defined SOC through their involvement of four main components: membership, influence, reinforcement of need, and shared emotional connection, which opened the possibility of measurement and evaluation through these subscales (see Figure 1). McMillan and Chavis' definition is often the most widely used and informs the Sense of Community Index 2 ([SCI-2]; Chavis et al., 2008).

Figure 1

McMillan and Chavis' (1986) Sense of Community



Perkins and Long (2002) further enhanced the idea of SOC and community development when they defined SOC as an emotional and cognitive attachment an individual can feel towards a community, social relationships, and attachment to place. This definition includes the aspect of place attachment, creating a defined relationship between how particular locations can influence one's SOC. Furthermore, Warner et al. (2013) redefined SOC in the specific context of a sport community. To do this, Warner et al. involved seven key aspects of administrative consideration: common interest, competition, equity in administrative decisions, leadership opportunities, social spaces, and voluntary actions. Although specific to sport studies, this study defined SOC specific to the community in question. Together, these conceptualizations demonstrate how SOC is a flexible, multidimensional construct that helps researchers understand belonging across multiple contexts, including recreation contexts.

Recreation is a context that provides various factors that play a role in a person's interactions and membership within their community (Tow et al., 2020). However, many of these essential factors are often lacking among individuals with disabilities, limiting their opportunities for meaningful social connections and engagement in recreational settings (Lundberg et al., 2011). Limited opportunities for engagement can also lead to social isolation, lack of inclusion, and detriments to mental health (Tow et al., 2020). There have been many critiques of SOC, with the most pertinent to this study being that, through group cohesion and the creation of a sense of belonging, individuals who do not fit the group norms are excluded (Hill, 1996). These critiques are particularly relevant for persons with disabilities (PWD) because of the frequency of social barriers, improper labelling, and inaccessible environments (Aubry & Myner, 1996; Badia et al.,

2011). Understanding the perceived sense of community in a recreation context, specifically an outdoor and nature-based recreation context, can help researchers and professionals better understand the recreation experiences of PWD.

Sense of Community and People with Disabilities

The Centers for Disease Control and Prevention (2018) reported that 28.7% of American adults have a disability. This was also reaffirmed by the World Health Organization (n.d.), which reported that 16% of the global population has significant disability. Despite the widespread recognition of the importance of community connectedness, PWD regularly face the unique challenge of maintaining SOC (Gur & Bina, 2022; Townley & Kloos, 2011; Ville et al., 2003). While numerous studies have assessed how special populations experience SOC, such as people with serious mental illness (Townley & Kloos, 2011), intellectual and developmental disabilities (Gur & Bina, 2022), and tetraplegic spinal cord injuries (Ville et al., 2003), few have assessed possible bridges to cross this barrier to belonging. Within disability, there is a wide range of perceptions of community existence and, for those who believe, whether a PWD feels involved in the community (Ville et al., 2003). While PWD face considerable barriers to participating in recreational pursuits (Badia et al., 2010; Gur & Bina, 2022), interpersonal stigma remains unchanged. PWDs have been subject to negative perceptions from people without disabilities, ostracizing them from communities they wish to be a part of (Bedini, 2000). This perpetuates the concept of membership between the “ingroup” and “outgroup” as proposed by McMillan and Chavis (1986). This division separates PWD from the underlying elements of SOC, such as membership and emotional connection. Disability is often misperceived as a deviation from

social norms through the adaptation of community activities (Badia et al., 2011; Bedini, 2000). Given this large population and the significant drawbacks of a lack of sense of community, such as impacts on well-being and loneliness (Pretty et al., 1996), there continues to be a lack of inclusivity among recreational providers (Lundberg et al., 2011; Williams et al., 2004). The exclusionary process of labeling PWD as an “outgroup” fails to provide a SOC or shared meaning for PWD. Considering the potential of leisure spaces to provide social connections, identity formation, and community building (Rogers et al., 2016), there appears to be a significant need to understand the relationship between recreation participation and SOC in PWD.

Outdoor Recreation and Sense of Community Solutions

Recreation has been strongly associated with a range of psychological and social benefits, including stress reduction, improved mood, resilience, and heightened perceptions of autonomy and competence (Iwasaki & Mannell, 2000). For individuals with disabilities, participation in adaptive recreation provides opportunities to reclaim autonomy and explore their capabilities within a supportive environment created by peers or allies (Lundberg et al., 2011). Adaptive recreation participation fosters social connections through shared challenges, which, in turn, supports the Shared emotional connection subscale of the SOC. Given this understanding of the benefits of adaptive recreation, there is evidence that group-based activities can support this effect (Choi et al., 2013). One possible bridge crossing the disability barrier may be the implementation of adaptive outdoor recreation as a psychosocial intervention, creating a sense of belonging and cohesion within a community of PWD (Rogers et al., 2016). Adaptive outdoor

recreation is especially suited for this community development, providing a relaxing outdoor space to gather and a mutual activity for group participation (Tow et al., 2020). Rogers et al. (2016) exemplified this when they discovered that veterans with disabilities developed group cohesion and belonging through shared outdoor recreation experiences.

In the literature on recreation for PWD, three major areas of constraints to participation have been identified: intrapersonal, interpersonal, and structural (Crawford et al., 1991). Interpersonal constraints are related to psychological factors such as fear of judgment, internalized social stigma, and self-efficacy. Interpersonal constraints involve social networks, a lack of sufficient peers, and untrained staff in the context of adaptive recreation. Structural constraints are those surrounding the physical, such as inaccessible facilities, lack of funds to support participation, transportation issues, and insufficient adaptive equipment (Crawford et al., 1991). These barriers are ever-present for PWD and can often diminish their opportunities to engage in recreation, limiting the development of social bonding and shared emotional connections that can develop into a sense of community (Tarantino et al., 2024). It remains critical to understand these barriers and bridge them to allow PWD to meet peers and provide ample opportunities to develop a strong SOC.

Needs Statement

People with disabilities represent a large portion of not only the U.S population but also the global population; however, there remain constant barriers for people with disabilities in maintaining a SOC (Ville et al., 2003). Considering the numerous benefits that outdoor recreation can provide PWD (physical health, psychological health, social well-being, and a SOC), these individuals face challenges in participating in recreational activities, such as structural limitations, social stigmas, lack of affordable equipment, and lack of trained professionals to provide appropriate programming. Current research corroborates that outdoor recreation is uniquely positioned to provide a SOC to participants (Breunig et al., 2010) and that adaptive recreation can remove some barriers when implemented appropriately (Pearsall, 2019). Despite these connections to perceived benefits and outdoor recreation participation, there is a considerable lack of research on the relationship between time spent in adaptive outdoor recreation and a person with a disability's perceived sense of community. This study addresses this gap and aims to provide a better understanding of the relationship between them.

Research Questions

There is a substantial lack of research or understanding of how adaptive outdoor recreation can provide a person with a disability with an opportunity to develop a sense of community among peers. Existing research on people with disabilities demonstrates that PWD are underserved and require intentional programming and planning to provide a SOC and its benefits (Williams et al., 2004). There is also a lack of understanding of how adaptive outdoor

recreation can benefit communities with disabilities, as most research focuses on physical and psychological benefits. This study provides a better understanding of these concepts.

With this understanding, this study aims to bridge this limited understanding with the following three research questions:

RQ1: Is there a significant relationship between the time spent engaging in adaptive outdoor recreation and the perceived sense of community among people with disabilities?

RQ2: Are there significant relationships between the types of outdoor recreation activities and the perceived sense of community among people with disabilities?

METHODOLOGY

This study was a non-experimental comparative study designed to obtain information regarding the relationship between perceived sense of community and participation in adaptive outdoor recreation by individuals with disabilities. After approval by the University and Medical Center Institutional Review Board (UMCIRB) from East Carolina University, an online Qualtrics survey (see Appendix A) was distributed among multiple adaptive outdoor recreation providers to reach the target population. Individual outdoor recreation agencies serving individuals with disabilities were contacted to advertise and solicit participant response. These agencies included, but were not limited to, state parks, private adventure programmers, adventure camps and therapeutic camps. To extend the potential scope of the population, the survey provided an opportunity for respondents to share with peers who had similar participation in adaptive recreational activities, so that the researcher could send the survey link to more participants. The survey link did not collect any personal information, nor provide an opportunity to match a respondent's email with their actual response.

Data were collected to assess people with disabilities who engaged in adaptive outdoor recreation. Through a partnership with outdoor recreation providers, 100 people with disabilities were targeted for this study. Data were collected through an online survey using Qualtrics (see Appendix A). Using a paperless QR-code-available survey allowed for a larger potential sample size (Tarantino et al., 2024). The researcher partnered with adaptive outdoor recreation programs and shared the QR code with the staff at the outdoor recreation programs for distribution as the best fit for their program. A second email was sent to all partnered organizations with an update

on the survey and to serve as a reminder for the survey distribution. To increase response rates and survey distribution, a single \$50 e-gift card was offered to a random program that agreed to distribute the survey and to individual participants who completed their email through a separate link from the survey. Ten participants were randomly chosen to receive a \$10 gift card. The survey was distributed and available for responses for four weeks.

Research Variables

This study assessed the engagement of people with disabilities in adaptive outdoor recreation using three measures collected in a response survey (see Appendix A). The following section provides detailed information on the research variables.

Individual Demographics

Data were collected to assess respondents' ethnicity, classified into seven different categories: White, Black/African American, American Indian/Alaska Native, Asian, Native Hawaiian/Pacific Islander, Middle Eastern/North African, Hispanic/Latino/a/x/e, and other. Gender data were also collected in three categories: male, female, and nonbinary/third gender. This data collection allowed the researcher to report demographic information about the collected sample population and potentially control for the influence on the dependent variable.

Disability-Related Demographics

The type of disability (nominal) was assessed through a multiple-choice response listing the following options: (a) physical, (b) learning/developmental, (c) sensory, and (d) mental health. An open response to “other” was also included to ensure that those who did not fall under the traditional categorization were included in the study. Acquisition of disability (nominal/interval) was assessed using a two-item multiple-choice response between congenital (i.e., disability acquired at birth) and acquired (i.e., disability acquired after birth) disabilities. If “Acquired,” respondents were prompted to specify how long they had a disability. Demographic variables were examined to potentially control for any extraneous influence they may have had on SOC.

Adaptive Outdoor Recreation

For this study, outdoor recreation is defined as an activity engaged in for one's own leisure that requires the setting to be outdoors for proper activity engagement, and as a leisurely activity that is pursued for enjoyment and modified to allow individuals with disabilities or limitations to participate in the activity. These dual components helped explain the context in which the survey collected data and allowed the researcher to present the findings comprehensively. Capturing participation in recreation has consistently challenged researchers because of the limited scope and breadth of available recreation opportunities (Tarantino et al., 2024), and measuring outdoor recreation participation is not immune to this challenge (Williams et al., 2004). Therefore, participation in outdoor recreation was captured in terms of six categories: (a) trail activities, (b) wheel recreation, (c) camping, (d) fishing/hunting, (e) water

recreation, and (f) observational recreation. Participants were asked to recall their estimated frequency (e.g., “Times Participated in a Year”) and duration (e.g., “Time Spent in Activity Each Time”). Respondents were asked to recall their participation over the past 12 months using an open quantitative response to incorporate potential seasonal participation patterns.

Sense of Community (SOC)

The Sense of Community Index 2 (SCI-2), a 25-question Likert survey (Chavis et al., 2008), was used to measure SOC (see appendix A). The first question, relating directly to one’s overall perception of SOC, had six possible responses: Prefer Not to be Part of This Community, Not Important at All, Not Very Important, Somewhat Important, Important, and Very Important. The other 24 questions across the four main SOC categories (reinforcement of needs, membership, influence, and shared emotional connection) were evaluated on a 4-point Likert scale with the following prompts: Not at All, Somewhat, Mostly, and Completely. The SCI-2 has extensive psychometric evidence supporting its use. Abfalter, Zaglia, and Mueller (2012) used structural equation modeling to test the psychometrics of the SCI-2 and, by extension, McMillan and Chavis’s (1986) four-factor theoretical framework that demonstrated an acceptable overall model fit ($\chi^2(df = 84) = 259.805, p < .001, CFI = .94, TLI = .92, RMSEA = .08, SRMR = .04$), providing empirical evidence to support the scale’s validity and reliability (Abfalter et al., 2012). Abfalter et al. summarized the responses for each category to provide a quantitative representation of all four categories.

Survey Sampling Procedures and Pilot Testing

To test the survey, a small pilot study was conducted through various online disability support groups to evaluate and seek feedback on the survey's readability and structure. The survey was provided to 10 individuals with and without disabilities through personal connections with the researcher. This pilot study intentionally did not use any of the planned organizations to collect data from the full data collection to avoid bias, repeat respondents, and other ethical dilemmas. Pilot study feedback suggested minor corrections concerning the flow of the study and Qualtrics data coding errors prior to the survey distribution.

Sample Size Estimation

Power analysis was conducted using IBM SPSS to determine the appropriate sample size. The power analysis found that with a goal power of 0.80, an effect size of 0.30, and a significance level of .05, an N of 84 would be required to reliably detect a true effect size. Although all attempts were made to collect more than 84 responses to reach the appropriate target sample size required for statistical analysis and interpretation of the results, a final sample size of 36 was obtained.

RESULTS

Description of Sample

Table 1 presents the sample demographics. The majority of respondents (83.3%) reported “mobility/physical” as their disability type. Approximately two-thirds (67.7%) of respondents indicated that their disability onset occurred after birth. Participants in the study were primarily female (61.3%) and White (80.6%), with the largest age cohort being the 31-44 age group (29%) ($M = 46.10$, $SD = 15.969$, $Median = 44.00$). Pearson correlation analyses were conducted to examine the relationships between the study independent variables and dependent variables. The results indicated that no statistically significant correlations (using $p < .05$) were found among the variables included in the analysis. This suggests that there were no meaningful linear relationships between the measured constructs within this sample (see Table 1).

Table 1*Sample Demographics*

Variable	Category	<i>n</i>	valid
Disability Type	Mobility/Physical	25	83.3
Disability Type	Developmental/Intellectual	1	3.3
Disability Type	Sensory/Audio/Visual	1	3.3
Disability Type	Other	3	10.0
Disability Onset	From Birth	10	32.3
Disability Onset	After Birth	21	67.7
Gender	Male	12	38.7
Gender	Female	19	61.3
Race/Ethnicity	White	25	80.6
Race/Ethnicity	American Indian/Alaska	1	3.2
Race/Ethnicity	Asian	1	3.2
Race/Ethnicity	Hispanic/Latino/a/x/e	1	3.2
Race/Ethnicity	Other/Multiracial	3	9.7
Age Category	30 or less	7	22.6
Age Category	31-44	9	29.0
Age Category	45-59	8	25.8
Age Category	60 or more	7	22.6

Unique Contexts of Recreation Categories and SOC

Upon the conclusion of the survey data collection, the data were reviewed and cleaned to remove errors. Once the data had been cleaned, the survey yielded 36 valid responses. These responses were then further vetted for missing data. All missing data within the SCI-2 were imputed to provide a complete dataset for the analysis of the other variables in the study until a fifth imputation was accepted as determined by the minimal amount of missing data acceptable criterion (<5%) (White et al., 2011). An alpha level of .05 was used for all the statistical analyses.

SCI-2 as a Measurement Tool

An exploratory factor analysis (EFA) supported the appropriateness of the SCI-2 for this sample. The data met assumptions for factor analysis (KMO = .754; Bartlett's test $p < .001$) (See Table 2), and results indicated a clear and interpretable factor structure. All items met acceptable loading thresholds ($\geq .40$) (Stevens, 2002), with subscales demonstrating moderate to strong loadings across reinforcement of needs (NEED), membership (MEMB), influence (INFL), and shared emotional connection (CONN). Internal consistency was also strong, with total SOC ($\alpha = .921$) and all subscales ($\alpha = .792-.874$) exceeding recommended reliability thresholds. Together, these findings provide evidence that the SCI-2 is a reliable and valid measure of sense of community within this sample.

Table 2*Exploratory Factor Analysis on Sense of Community*

Number and Wording on Sense of Community Index-2	Item Name	FL
Reinforcement of Met Needs ($\alpha = .855$, KMO = .754, BTS = 80.859)		
1. I get important needs of mine met because I am part of this community.	NEED1	0.829
2. Community members and I value the same things.	NEED2	0.736
3. This community has been successful in getting needs of its members met.	NEED3	0.719
4. Being a member of the community makes me feel good.	NEED4	0.672
5. When I have a problem, I can talk about it with members of this community.	NEED5	0.654
6. People in this community have similar needs, priorities, and goals	NEED6	0.624
Membership ($\alpha = .874$, KMO = .829, BTS = 84.072)		
7. I can trust people in this community.	MEMB1	0.887
8. I can recognize most of the members of this community.	MEMB2	0.843
9. Most community members know me.	MEMB3	0.717
10. This community has symbols and expressions of membership ...	MEMB4	0.711
11. I put a lot of time and effort into being part of this community.	MEMB5	0.689
12. Being a member of this community is a part of my identity.	MEMB6	0.567
Influence ($\alpha = .832$, KMO = .769, BTS = 65.329)		
13. Fitting into this community is important to me.	INFL1	0.874
14. This community can influence other communities.	INFL2	0.756
15. I care about what other community members think of me.	INFL3	0.698
16. I have influence over what his community is like.	INFL4	0.604
17. If there is a problem in this community, members can get it solved.	INFL5	0.564
18. This community has good leaders.	INFL6	0.514
Shared Emotional Connection ($\alpha = .792$, KMO = .719, BTS = 58.291)		
19. It is very important to me to be a part of this community.	CONN1	0.773
20. I am with other community members a lot and enjoy being with them.	CONN2	0.700
21. I expect to be a part of this community for a long time.	CONN3	0.695
22. Members of this community have shared important events together ...	CONN4	0.616
23. I feel hopeful about the future of this community.	CONN5	0.542
24. Members of this community care about each other.	CONN6	0.479
SOC ($\alpha = .921$, KMO = .846, BTS = 84.106)		
1. Reinforcement of Met Needs	NEED	0.874
2. Membership	MEMB	0.821
3. Influence	INFL	0.900
4. Shared Emotional Connection	CONN	0.864

* - p-value < .05, ** - p-value < .01, *** - p-value < .001. **** - p-value < .0001

^a - FL: Factor Loading

^b - KMO: Kaiser-Meyer-Olkin Measure

^c - BTS: Bartlett's Test of Sphericity

Table 3*Correlations between Recreation Categories and Sense of Community Subscales*

N-36	TRAIL	WHEEL	CAMP	HUNT	WATER	OBSERVE	TOTALrec	NEED	MEMB	INFL	CONN	SOCtotal
TRAIL	1											
WHEEL	-.239	1										
CAMP	-.071	-.294	1									
HUNT	-.730	.994	-.790	1								
WATER	.095	.512	.175	.196	1							
OBSERVE	.528	.695	-.496	.972	-.459	1						
TOTALrec	-.041	.522	.930*	.322	.265	.991	1					
NEED	.547*	.208	-.082	.567	.417	.368	.146	1				
MEMB	.020	.309	-.513	.656	.423	.595	.120	.727*	1			
INFL	.287	.385	-.266	.888*	.110	.432	.221	.770*	.755*	1		
CONN	.264	.332	.017	.417	.251	.659*	.271	.770*	.676*	.783*	1	
SOCtotal	.324	.342	-.256	-.256	.355	.612*	.220	.906*	.884*	.918*	.892*	1

* = $p < .05$

Correlation Analyses

An initial Pearson r was conducted to assess the relationship between the total score reported from the SCI-2 (SOCtotal) and total participation in adaptive outdoor recreation (TOTALrec). No significant r was observed between TOTALrec and SOCtotal (Table 3).

To further test this relationship, correlations were conducted (Table 3) to assess the relationship between SOCtotal, and each specific *type* of outdoor recreation activity (i.e., trail, wheeled, camping, hunting/fishing, water sport, and observational). Within this assessment, observational recreation was found to be significantly related to total SOC ($r = 0.612, p = 0.045$).

Regression Analyses

When comparing the six categories of outdoor recreation and the four subcategories of SOC (needs reinforcement, membership, influence, and emotional connection), a positive significant relationship was found between needs reinforcement and trail activities ($r = .547, p = .013$). A simple linear bivariate regression was conducted to examine whether trail activities significantly predicted reinforcement of needs [$F(1, 18) = 8.816, p = .008$] with an explained adjusted $R^2 = .260$. Trail activities were a significant predictor of needs reinforcement [$\beta = .547, t(18) = 2.770, p = .013$].

Shared emotional connection and observational recreation also shared a significant positive relationship. The model was significant, $F(1, 9) = 6.892, p = .028$, and explained $R^2 = .371$, and observational recreation was a significant predictor of shared emotional connection, $\beta = .659, t(9) = 2.625, p = .028$. observational recreation was also regressed with total SOC with the model being found to be significant, $F(1, 9) = 5.394, p = .045$, and explained $R^2 = .305$.

observational recreation was a significant predictor of total SOC, $\beta = .612$, $t(9) = 2.322$, $p = .045$. Influence and hunting and fishing were found to have a significant and positive relationship. The model was significant, $F(1, 3) = 11.230$, $p = .044$, and explained $R^2 = .719$. hunting and fishing were a significant predictor of influence, $\beta = .888$, $t(3) = 3.351$, $p = .044$. Finally, no significant relationships ($p > .05$) were found between demographics (age, race/ethnicity, gender, disability, disability acquisition, and time since acquisition) and the four SOC subscales.

DISCUSSION

Understanding Community in Adaptive Outdoor Recreation

While no major relationship was discovered as a whole, this finding allowed for a better understanding of the nature of the sense of community in adaptive outdoor recreation. As outdoor recreation activity categories are so distinct from each other, this lack of a statistical relationship confirms the notion that SOC should be assessed at the level of activity as opposed to the overall level of outdoor recreation participation. Through the completed statistical analysis, it was found that there was a non-significant relationship ($p = .291$) between the total SOC score collected from the SCI-2 and total time participated in adaptive outdoor recreation.

While there is limited research related to sense of community in disabled communities, results of this study somewhat contradict previous research indicating nature-based recreation does have an association with sense of community in general populations without disabilities (Breunig et al., 2010). Soria et al. (2022) conducted a study on instructor-led recreation activities, including outdoor recreation, and assessed the effects of participation on sense of belonging. It was found that outdoor recreation was one of the strongest predictors of a sense of belonging for college students. While previous research indicates there may be some associations in total outdoor recreation engagement and sense of community within non-disabled communities (Breunig et al., 2010), this study focused on social connections within disabled communities due to the vast differences in participation challenges faced by those with disabilities (Bedini, 2000).

Specific to disability, there is limited research suggesting that total nature-based recreation does have an association with sense of community in disabled populations (Bedini, 2000; Rogers et al., 2016). Bedini et al. suggested that individuals with disabilities face many challenges to recreation participation that often promote social exclusion, limit meaningful participation in recreational activities, have fewer opportunities to develop social belonging. It was also found that non-participants in community recreation exhibited feelings of helplessness, which was not present with respondents who reported active participation in recreational activities. These findings supported the notion that specific social elements of the recreational activity may have been an important factor in the participation and social implications of the activity.

More specific to outdoor recreation programming, Rogers et al. (2016) examined how a specific outdoor recreation program provided a “brotherhood” connection among injured military veterans and how the nature of these activities provided similar participatory associations previously experienced by veterans during active duty. While the small sample size in this current study most likely influenced the lack of a meaningful relationship between the total amount of outdoor recreation participation and total sense of community, it is logical to further examine the relationships of individual outdoor recreation activities with the specific attributes of sense of community due to our understanding that participation within recreation activities is contextualized so much to each individual experience (Williams et al., 2004).

The Individual Context of Outdoor Recreation in Sense of Community

Another focus of this research study was examining the relationships of specific outdoor recreation activities with sense of community attributes. While a relationship between total participation in adaptive outdoor recreation and sense of community was not found, this current study suggested that the experiences, outcomes, and even enjoyed attributes of outdoor recreation can be contextualized to each individual and their specific experience. Recreation experience and the perceived sense of community is perceived and interpreted through an individual lens by each participant (Legg et al., 2017). That noted, it does seem important to understand how specific outdoor activities are associated with the components of a sense of community. The following provides a discussion of some of those individual relationships.

Reinforcement of Needs in Outdoor Recreation

A significant relationship was found in this study between reinforcement of needs and trail activities ($p = .013$). Much of this relationship may be related to a community that has shared and similar needs. One such need may be related to physical challenges experienced in outdoor recreation participation. Considering 69% of the sample in this study had a physical disability, it is logical to assume that the majority of the group did have shared physical challenges that impacted the outdoor recreation experience. While this study was not designed to ascertain the extent of these disabilities, it is well documented that people with physical and mobility disabilities have greater difficulties and barriers to outdoor recreation such as trail activities (Darcy & Dickson, 2009; Williams et al., 2004). Furthermore, many public trails are not accessible to wheelchairs and alternatively, the equipment necessary for traversing

inaccessible trails is costly and often out of reach for many aspiring recreationists with disabilities (Williams et al., 2004). Therefore, participating in adaptive outdoor recreation programs may provide specialized equipment, training, and even staff that can assist in facilitating the outdoor trail activity experience (Gossett & Tingstrom, 2017). Because data was collected through existing adaptive outdoor recreation programs, many of the respondents participated in group trail programs that brought individuals together to meet many of these shared physical needs (Choi et al., 2013). Choi et al. found that when people of similar ability levels participate together, individuals are provided with opportunities to enhance their experience and emotional connections.

This relationship of needs reinforcement and trail activities also demonstrated a deeper relationship and dynamic between the individual and the specific outdoor recreation community. As an individual, the recreationist may be unable to acquire the resources to engage in trail activities, but as a larger group, the resources and costs may be lessened for the individual, providing more opportunities for recreation. This finding that reinforcement of needs and trail activities speak to the importance of accessible infrastructure and adaptive resources for people with disabilities (Crawford & Godbey, 1987; Williams et al., 2004). Trail-based recreation may help individuals and the group fulfill their needs when structural barriers can be eliminated or reduced. Crawford and Godbey (1987) suggested that barriers can help to contextualize the limitations to participation in recreation allowing programmers and recreation providers an opportunity to develop a better understanding of the barriers their population is experiencing. Only after this understanding can the recreation provider overcome these barriers.

Shared Emotional Connections in Outdoor Recreation

Next, a relationship was found between observational recreation activities and shared emotional connection and Total SOC that require the participant to observe and connect to nature (e.g., bird watching, nature photography). This relationship can best be understood through the lens of transformative experiences in nature (Clayton et al., 2017). It is well documented that the emotional impacts of experiences in nature can be significant, and it can be assumed that these experiences are even more valuable for individuals with disabilities due to limited opportunities to engage in nature-based and outdoor recreation (Williams et al., 2004). Shared experiences in outdoor environments serve as powerful catalysts for emotional connections through mechanisms of emotional synchrony and convergence (Cheong et al., 2020).

Research demonstrates that experiencing intense emotions with others, even without requiring precise emotional convergence, can even reinforce social bonds through physiological arousal indexed by cardiac and respiratory activity (Chung et al., 2024). The key mechanism involves joint attention, where participants' shared focus on the same environmental elements creates opportunities for emotional alignment that strengthens prosocial attitudes within groups. The significant relationship between observational recreation and both shared emotional connection and total SOC demonstrated the importance of nature-based experiences that can still have impact while maintaining low-barriers to participation. Activities such as bird watching, scenic observation, and nature photography allows individuals to share their connection to nature in a manner that does not require a high amount of physical exertion that is often impractical due to functional limitations faced by people with disabilities. These opportunities to observe nature seem to provide multiple pathways to create shared emotional bonds between (Chung et al., 2024).

Influence in Outdoor Recreation

Lastly, the relationship between SOC influence and hunting and fishing was significant and can be assessed and understood when providing additional context to these activities. hunting and fishing are typically engaged in with smaller groups, as a larger community may be present for participants to maintain membership. Given these small group sizes and the skill and knowledge base that must be acquired and shared between members for this activity to be conducted, there is a greater opportunity for members to share thoughts and knowledge to influence group decisions (Mueller et al., 2008). This dependency on skill sharing may create a relationship between mentors and novices in an informal format and that could ultimately provide feelings of competence and belonging while also elevating feelings of influence within the social group (Lave & Wenger, 1991). Continued interaction between community members has been shown to strengthen SOC aspects such as influence (Pretty et al., 2006). The relationship between hunting/fishing and influence within SOC suggests that knowledge sharing and collaboration, along with participation in decision making, can often foster a sense of influence within a community. With the smaller groups necessary for hunting and fishing, it often creates increased opportunities for individual voices to be heard. By mentoring and sharing skills and knowledge, this community can grow while also not diminishing the influence of a single voice.

Limitations

The major limitation of this study was a smaller sample size (N=36) due to the practical and realistic constraints involved with surveying such a specific population (i.e., individuals with

disabilities who participate in outdoor recreation). Given the nature of outdoor recreation and its barriers to participation in PWD, it can be assumed that accessing this population can be difficult. This survey was sent to specific organizations and programs that provided these opportunities, the convenience sample may have prevented a broader generalization of results. While this may be somewhat alleviated via respondent referrals, the limitation remained. Another limitation to consider is the potential for a Type I error, as multiple statistical tests were conducted, increasing the likelihood of identifying a statistically significant relationship where none actually exists (Sawilowsky & Markman, 2017). Another limitation to consider was the 12-month recall required for the survey. While many outdoor recreational activities are seasonal and require a 12-month recall period to incorporate a variety of outdoor recreation opportunities, respondents may have experienced memory decay potentially impacting the validity of the participation measurement (Tourangeau, 2000). Finally, during the collection of this data, there was a bot attack on the incentive survey causing data collection to be paused, and an IRB amendment to be made before collection could continue and protocols administered to ensure the validity and reliability of the data set (N=36).

Future Research

While this study has provided additional insight into recreational communities, this study lacked a large enough sample to justify many of these findings. Therefore, one recommendation is for future research to include a larger collective sample to better facilitate statistical associations. In addition, this larger sample size would be more likely to obtain a more diverse sample to provide a better understanding of how different demographic variables *can* influence SOC. Expanding recruitment efforts with a wider range of organizations and geographic

locations can alleviate these limitations. A longitudinal study assessing how longevity of participation in recreational activities influences perceived SOC would allow for a better understanding in the causality of SOC and how SOC changes over time.

Considering the different types of disability that someone might experience and the level it may affect an individual, we can assume many recreation participants with disabilities have caretakers who often accompany them to their activities of choice. While many of these individuals are volunteer or professional caretakers, there is still a strong social bond between the caretaker and PWD (Lundberg et al., 2011; Townley & Kloos, 2011). Creating a better understanding of the caretaker's role in the community and their perceptions could help frame the larger SOC that a person with disability experiences.

Implications for Practice

The suggested association between reinforcement of needs and the participation in trail activities support continued, and if not increased, the needed investment in adaptive trail designs, accessible facilities, and specialized equipment to promote participation and perceived community support (Lundberg et al., 2011; Tow et al., 2020). Furthermore, practitioners should consider group-based trail programming to promote an easier distribution of specialized resources like trail capable wheelchairs to those who may have previously been unable to participate without those resources. Results in this study also suggested that observational nature based activities were associated with shared emotional connections among participants. Many adventure based programs use these shared social group connections as therapeutic modalities to positively impact individuals with emotional and behavioral challenges (Gabarda-Blasko et al.,

2024). The emotional connections within nature continue to be a powerful tool for therapists and outdoor programmer alike. These nature-based observational activities are also something that practitioners should consider within their programming as they can provide regular low barrier opportunities for nature observance in its many forms can allow for people with disabilities who are not looking for physically exhausting activities to share emotionally connections with others in nature. These results also suggest that practitioners should consider incorporating participant-led recreational activities and mentorship opportunities that provide opportunities to enhance SOC (Choi et al., 2013; Rogers et al., 2016).

Finally, adaptive recreation practitioners often struggle to provide evidence of the value of their programs to promote SOC due to an inability to collect and measure SOC. This study suggests that the SCI-2 is a valid and practical instrument worthy of using not only as a research tool but as a means to examine if programs are promoting sense of community. Warner et al. (2013) suggested that survey instruments (e.g., Sense of Community in Sport Scale [SCS], 2013) can be used to evaluate how specific program elements with recreation and sport are perceived by participants to promote SOC. Practitioners are encouraged to consider using survey methodologies like the SCI-2 to evaluate the effectiveness of their outdoor programs to promote SOC.

Conclusion

This study was designed to examine the relationship between participation in adaptive outdoor recreation and SOC among those with disabilities. While results indicated no significant relationship between total outdoor recreation participation and the total SOC score as provided

by the SCI-2, other findings revealed that specific types of recreation activities *are* associated with distinct attributes of SOC. Trail activities were related to reinforcement of needs, observational recreation was associated with shared emotional connection, and hunting and fishing were strongly linked to influence. These relationships suggest that total participation in adaptive recreation may not be a key indicator for SOC, but rather the context and structure of the activities themselves play a much more critical role in the fostering of a sense of community. Programs that offer adaptive opportunities that also emphasize accessibility, shared experiences, and participant agency and engagement may be more effective at promoting community connections. Despite limitations related to sample size and a lack of diverse responses, this study contributes a better understanding of the importance for intentional outdoor adaptive programming and the underpinnings of how communities in these recreation contexts are formed for people with disabilities. This study also provides a foundation for future research exploring the role of outdoor recreation in providing social inclusion and belonging within disabled communities.

SECTION I: REFERENCES

- Abfalter, D., Zaglia, M. E., & Mueller, J. (2012). Sense of virtual community: A follow up on its measurement. *Computers in Human Behavior*, 28(2), 400–404.
[https://doi.org/10.1016/j.chb.2011.10.010\](https://doi.org/10.1016/j.chb.2011.10.010)
- Aubry, T., & Myner, J. (1996). Community integration and quality of life: A comparison of persons with psychiatric disabilities in housing programs and community residents who are neighbours. *Canadian Journal of Community Mental Health*, 15(1), 5–20.
<https://doi.org/10.7870/cjcmh-1996-0001>
- Badia, M., Orgaz, B. M., Verdugo, M. A., Ullán, A. M., & Martínez, M. M. (2011). Personal factors and perceived barriers to participation in leisure activities for young and adults with developmental disabilities. *Research in Developmental Disabilities*, 32(6), 2055–2063. <https://doi.org/10.1016/j.ridd.2011.08.007>
- Bedini, L. (2000). “Just sit down so we can talk:” Perceived stigma and community recreation pursuits of people with disabilities. *Therapeutic Recreation Journal*, 34, 55-68
https://www.researchgate.net/publication/268441154_Just_sit_down_so_we_can_talk_Pe_rceived_stigma_and_community_recreation_pursuits_of_people_with_disabilities
- Breunig, M. C., O’Connell, T. S., Todd, S., Anderson, L., & Young, A. (2010). The Impact of Outdoor Pursuits on College Students’ Perceived Sense of Community. *Journal of Leisure Research*, 42(4), 551–572. <https://doi.org/10.1080/00222216.2010.11950218>

- CDC. (2018, March 28). *Disability and Health Data System*. Centers for Disease Control and Prevention. <https://www.cdc.gov/index.htm>
- Chavis, D. M., Lee, K. S., & Acosta, J. D. (2008). *Sense of Community Index 2* [Dataset]. <https://doi.org/10.1037/t33090-000>
- Chavis, D. M., & Wandersman, A. (1990). Sense of community in the urban environment: A catalyst for participation and community development. *American Journal of Community Psychology*, 18(1), 55–81. <https://doi.org/10.1007/BF00922689>
- Cheong, J. H., Molani, Z., Sadhukha, S., & Chang, L. J. (2020). *Synchronized affect in shared experiences strengthens social connection*. PsyArXiv. <https://doi.org/10.31234/osf.io/bd9wn>
- Choi, H. S., Johnson, B., & Kriewitz, K. (2013). Benefits of inclusion and segregation for individuals with disabilities in leisure. *International Journal on Disability and Human Development*, 12(1), 15–23. <https://doi.org/10.1515/ijdhhd-2012-0120>
- Chung, V., Mennella, R., Pacherie, E., & Grezes, J. (2024). Social bonding through shared experiences: The role of emotional intensity. *Royal Society Open Science*, 11(10), 240048. <https://doi.org/10.1098/rsos.240048>
- Clayton, S., Colléony, A., Conversy, P., Maclouf, E., Martin, L., Torres, A.-C., Truong, M.-X., & Prévot, A.-C. (2017). Transformation of experience: Toward a new relationship with nature. *Conservation Letters*, 10(5), 645–651.

- Crawford, D. W., Jackson, E. L., & Godbey, G. (1991). A hierarchical model of leisure constraints. *Leisure Sciences*, 13(4), 309–320.
<https://doi.org/10.1080/01490409109513147>
- Darcy, S., & Dickson, T. (2009). A Whole-of-Life Approach to tourism: The case for accessible tourism experiences. *Journal of Hospitality and Tourism Management*, 16, 32–44.
<https://doi.org/10.1375/jhtm.16.1.32>
- Gabarda-Blasco, A., Elias, A., Mendo-Cullell, M., Arenas-Pijoan, L., Forné, C., Fernandez-Oñate, D., Bossa, L., Torrent, A., Gallart-Palau, X., & Batalla, I. (2024). Short- and long-term outcomes of an adventure therapy programme on borderline personality disorder: A pragmatic controlled clinical trial. *Brain Sciences*, 14(3), 236.
<https://doi.org/10.3390/brainsci14030236>
- Gossett, K., & Tingstrom, C. A. (2017). Community-based adaptive recreation: Using an indoor water park for adapted kayaking. *Palaestra*, 31(3), 31–35.
- Gur, A., & Bina, R. (2022). Facilitators of sense of belonging among people with intellectual and developmental disabilities: A systematic review. *Journal of Intellectual Disabilities*.
<https://doi.org/10.1177/17446295211068424>
- Hill, J. (1996). Psychological sense of community: Suggestions for future research. *Journal of Community Psychology*, 24(4), 431–438. [https://doi.org/10.1002/\(SICI\)1520-6629\(199610\)24:4%253C431::AID-JCOP10%253E3.3.CO;2-Z](https://doi.org/10.1002/(SICI)1520-6629(199610)24:4%253C431::AID-JCOP10%253E3.3.CO;2-Z)

- Iwasaki, Y., & Mannell, R. (2000). Hierarchical dimensions of leisure stress coping. *Leisure Sciences*, 22(3), 163–181. <https://doi.org/10.1080/01490409950121843>
- Kleiber, D. A., Hutchinson, S. L., & Williams, R. (2002). Leisure as a resource in transcending negative life events: Self-protection, self-restoration, and personal transformation. *Leisure Sciences*, 24(2), 219–235. <https://doi.org/10.1080/01490400252900167>
- Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation* (1st ed.). Cambridge University Press. <https://doi.org/10.1017/CBO9780511815355>
- Legg, E., Wells, M., Newland, A., & Tanner, P. (2017). Exploring sense of community in adult recreational tennis. *World Leisure Journal*, 59(1), 39–53. <https://doi.org/10.1080/16078055.2016.1277611>
- Long, D. A., & Perkins, D. D. (2003). Confirmatory factor analysis of the sense of community index and development of a Brief SCI. *Journal of Community Psychology*, 31(3), 279–296. <https://doi.org/10.1002/jcop.10046>
- Lundberg, N. R., Taniguchi, S., McCormick, B. P., & Tibbs, C. (2011). Identity negotiating: Redefining stigmatized identities through adaptive sports and recreation participation among individuals with a disability. *Journal of Leisure Research*, 43(2), 205–225. <https://doi.org/10.1080/00222216.2011.11950233>

- McMillan, D. W., & Chavis, D. M. (1986). Sense of community: A definition and theory. *Journal of Community Psychology*, 14(1), 6–23. [https://doi.org/10.1002/1520-6629\(198601\)14:1%253C6::AID-JCOP2290140103%253E3.0.CO;2-I](https://doi.org/10.1002/1520-6629(198601)14:1%253C6::AID-JCOP2290140103%253E3.0.CO;2-I)
- Mueller, K. B., Taylor, W. W., Frank, K. A., Robertson, J. M., & Grinold, D. L. (2008). *Social Networks and Fisheries: The Relationship between a Charter Fishing Network, Social Capital, and Catch Dynamics*. <https://dx.doi.org/10.1577/M07-016.1>
- Papapicco, C., D’Errico, F., Mininni, G., & Leone, G. (2023). The intergenerational memory of a cultural heritage as a means of promoting citizens’ sense of community. *Community Psychology in Global Perspective*, 9(2), 105–124.
- Pearsall, C. N. (2019). *The relationship of adaptive sport participation on sense of community and community integration* [Unpublished thesis]. East Carolina University.
<https://www.proquest.com/docview/2353590777/abstract/C18BF3BE0E3A4085PQ/1>
- Perkins, D. D., & Long, D. A. (2002). Neighborhood sense of community and social capital. In A. T. Fisher, C. C. Sonn, & B. J. Bishop (Eds.), *Psychological Sense of Community: Research, Applications, and Implications* (pp. 291–318). Springer US.
https://doi.org/10.1007/978-1-4615-0719-2_15
- Pretty, G. M. H., Bishop, B. J., Fisher, A. T., & Sonn, C. C. (2006). *Psychological sense of community and its relevance to well-being and everyday life in Australia: A position paper of the Australian Psychological Society*.
<https://api.semanticscholar.org/CorpusID:36007916>

- Pretty, G. M. H., Conroy, C., Dugay, J., Fowler, K., & Williams, D. (1996). Sense of community and its relevance to adolescents of all ages. *Journal of Community Psychology*, 24(4), 365–379. [https://doi.org/10.1002/\(SICI\)1520-6629\(199610\)24:4%253C365::AID-JCOP6%253E3.0.CO;2-T](https://doi.org/10.1002/(SICI)1520-6629(199610)24:4%253C365::AID-JCOP6%253E3.0.CO;2-T)
- Rogers, S., Loy, D., & Bochicchio, C. (2016). Sharing a new foxhole with friends: The impact of outdoor recreation on injured military. *Therapeutic Recreation Journal*, (3), 213-227. <https://doi.org/10.18666/TRJ-2016-V50-I3-2837>
- Sarason, S. B. (1974). *The psychological sense of community: Prospects for a community psychology*. Jossey-Bass.
- Sawilowsky, J., & Markman, B. (2017). Experiment-wise type I error rates in nested (hierarchical) study designs. *Journal of Modern Applied Statistical Methods*, 16(1). <https://doi.org/10.22237/jmasm/1493596980>
- Stevens, J. (2002). *Applied multivariate statistics for the social sciences* (Vol. 4). Lawrence Erlbaum Associates.
- Tarantino, K., & Loy, D. P. (2024). *The Influence of participation attributes on veterans' sense of community in adaptive sport & recreation programs*. [Unpublished Thesis] East Carolina University. <https://go.exlibris.link/Lq878mcf>
- Tourangeau, R. (2000). Remembering what happened: Memory errors and survey reports. In A.A. Stone et al. (Eds.), *The science of self-report: Implications for research and practice* (pp. 29-47). Lawrence Erlbaum Associates.

- Tow, S., Gober, J., & Nelson, M. R. (2020). Adaptive sports, arts, recreation, and community engagement. *Physical Medicine and Rehabilitation Clinics of North America*, 31(1), 143–158. <https://doi.org/10.1016/j.pmr.2019.09.003>
- Townley, G., & Kloos, B. (2011). Examining the psychological sense of community for individuals with serious mental illness residing in supported housing environments. *Community Mental Health Journal*, 47(4), 436–446. <https://doi.org/10.1007/s10597-010-9338-9>
- Uçar, M., Güler, E., & Koçdar, S. (2024). Societal bonds in virtual spaces: Exploring the sense of community in online student communities at Anadolu University’s Open Education System. *Asian Association of Open Universities Journal*, 19(3), 264–281. <https://doi.org/10.1108/AAOUJ-11-2023-0128>
- Ville, I., Crost, M., & Ravaud, J.-F. (2003). Disability and a sense of community belonging: A study among tetraplegic spinal-cord-injured persons in France. *Social Science & Medicine*, 56(2), 321–332. [https://doi.org/10.1016/S0277-9536\(02\)00030-8](https://doi.org/10.1016/S0277-9536(02)00030-8)
- Warner, S., Kerwin, S., & Walker, M. (2013). Examining sense of community in sport: Developing the Multidimensional ‘SCS’ Scale. *Journal of Sport Management*, 27(5), 349–362. <https://doi.org/10.1123/jsm.27.5.349>
- White, I. R., Royston, P., & Wood, A. M. (2011). Multiple imputation using chained equations: Issues and guidance for practice. *Statistics in Medicine*, 30(4), 377–399. <https://doi.org/10.1002/sim.4067>

Williams, R., Vogelsong, H., Green, G., & Cordell, K. (2004). Outdoor recreation participation of people with mobility disabilities: Selected results of the national survey of recreation and the environment. *Journal of Park & Recreation Administration*, 22(2), 85–101.

Zhang, F., Loo, B. P. Y., & Wang, B. (2022). Aging in place: From the neighborhood environment, sense of community, to life satisfaction. *Annals of the American Association of Geographers*, 112(5), 1484–1499.
<https://doi.org/10.1080/24694452.2021.1985954>

SECTION II: EXTENDED LITERATURE REVIEW

Since Sarason's (1974) conceptualization of a psychological sense of community, research in this area has progressed significantly, bringing substantial benefits to individuals across all demographic groups. Although substantial evidence supports the numerous social benefits associated with a robust sense of community (Gur & Bina, 2022), individuals with disabilities continue to face multiple barriers to achieving a sense of Membership and belonging (Aubry & Myner, 1996). A potential solution to this challenge is the adaptation of outdoor recreational activities to facilitate the participation of persons with disabilities (PWDs) in outdoor leisure activities and promote social inclusion in outdoor leisure activities.

For this study, adaptive recreation is defined as a leisure activity modified to accommodate the needs of PWDs, enabling their participation and enjoyment of the activity. Outdoor Recreation provides numerous psychological and physiological benefits to participants (James et al., 2018; Peterson et al., 2008; Pretty et al., 2006) and is not exclusive to the general public. PWDs also receive similar benefits but are constrained by structural, interpersonal, and intrapersonal barriers (Badia et al., 2011). This study aimed to investigate the relationship between the time PWD spend engaging in adaptive recreation and its impact on their perceived sense of community.

Sense of Community (SOC)

Since Sarason's (1974) seminal work, *Psychological Sense of Community: Prospects for a Community Psychology*, there has been a multitude of research on the topic with many assessments of various special populations (Gur & Bina, 2022; Townley & Kloos, 2011; Walker, 1999) and the effects of different activities on SOC (Legg et al., 2017; Rogers et al., 2016).

Sarason was one of the first to articulate a sense of community as:

The perception of similarity to others, acknowledged interdependence with others, a willingness to maintain this interdependence by giving to or doing for others what one expects from them, and the feeling that one is part of a larger dependable and stable structure (p. 157).

Since Sarason's publication, the study of sense of community has expanded. For example, McMillan and Chavis (1986) further expanded this theory by distinguishing four main subcategories of SOC: (a) membership, a sense of belonging and sharing personal relatedness; (b) influence, a sense of importance of the individual to the group and the group to the individual; (c) reinforcement of needs, the feeling that a member's needs will be fulfilled by the combined resources of the group; and (d) shared emotional connection, sharing experiences, locations, and history. The creation of this theoretical framework offers the opportunity to adopt these four concepts into assessment tools for measuring the sense of community in various contexts in the future. These four subcategories exemplify the abstract context in which a community can form online (Uçar et al., 2024), through geographic location (Chavis & Wandersman, 1990), and surrounding specific activities such as an adult tennis league (Legg et

al., 2017). These articles highlight the limits of the abstract context in which a community can be established.

One distinct assessment tool is the Sense of Community Index-2 ([SCI-2]; Chavis et al., 2008). The SCI-2 replaced the Sense of Community Index (SCI) because of measurement inconsistencies in its subscales and the use of nominally measured items. The SCI-2 is a 25-question assessment that utilizes six questions from Chavis and McMillan's (1986) four SOC subcategories. Similarly, Long and Perkins (2003) developed the Brief Sense of Community Index, which improved the SCI by using Likert-style questions to allow for higher response sensitivity. The development of scales that assess specific contexts has also been highly effective, as exemplified by Warner et al.'s (2013) Sense of Community in Sport scale (SCS). The SCS assesses SOC in a sport context across six sub-scales (administrative consideration, common interest, competition, equity in administrative decisions, leadership, and social spaces).

SOC remains a strong contributor to an individual's psychological resilience, motivation, and continued engagement in leisure activities (Peterson et al., 2008; Pretty et al., 2006). These factors, when considered in addition to recreation participation, create an opportunity for PWD to experience multiple benefits in a manner that lends itself to a positive feedback loop. These benefits are only barred by a lack of professional knowledge or intentional programming for PWD.

Sense of Community and Disability

The Centers for Disease Control and Prevention (CDC, 2018) reported that 28.7% of Americans have some type of disability, including cognitive, hearing, mobility, vision, self-care, or independent living disabilities. The World Health Organization (2023) reports that 16% of the global population experiences significant disability (World Health Organization, 2023). With this understanding that over a fourth of the adult American population and 16% of the global population has some kind of disability, it must be understood how this population interacts with the other 71.3% or 84% globally, who identify as not having a disability. With such a large portion of the global community having some kind of disability, fostering a sense of community is not just a goal for inclusive efforts but also a necessary factor in planning public health.

The first step in understanding the differences in how individuals with varying levels of ability perceive SOC is to understand the different categorizations of disability and their relationship with SOC. Townley and Kloos (2011) conducted a study on people with serious mental illnesses in supported housing environments. It was posited that, due to the social stigma surrounding serious mental illnesses, there is a need for intentional integration of the individual into a community. Their findings suggested the essential nature of SOC in the process of integrating someone with a serious mental illness into a community with supported housing environments.

Walker (1999) conducted a study on individuals with developmental/intellectual disabilities to assess where they spent their time within their community. Developmental disability can be defined as an individual experiencing limitations to cognitive function along

with limitations to adaptive behavior, which impairs their ability to perform skills that characterize their age group. Intellectual disability is defined as an individual's difficulty in conceptual, social, and practical skills in daily life (APA Dictionary of Psychology, 2023). Walker found that individuals with developmental disabilities frequented locations designed for them. It was also suggested that acceptance is found to be known and physically present at a location. To correct this negative loop, Walker proposed that service workers must foster an inviting environment to support targeted individuals.

Similar to Walker (1999), another study conducted by Gur and Bina (2022) assessed SOC within the same population of individuals with developmental or intellectual disabilities. Gur and Bina (2022) reviewed the factors affecting sense of belonging. This analysis of 13 selected articles found that people with intellectual and developmental disorders experienced a sense of belonging in familiar locations and social circles. There was also an emphasis on the desire to belong to a reference group, such as organized social encounters or employment opportunities. Having a similar interest or connection to an activity or location is paramount in establishing a sense of belonging.

Understanding the inclusion of a person with a disability in various activities can also help us understand how individuals perceive a sense of community among the general population. However, the community among peers with similar experiences should also be considered. Choi et al. (2013) explored this notion by conducting a comparative study of PWD-inclusive and segregated leisure programs. Choi suggested that both types of programming benefit not only individuals but also the entire participating population. An individual with a disability participating in an inclusive program with individuals without a disability creates a

unique opportunity for the elimination of stigmas or stereotypes, allowing for a focus on ability rather than disability.

While there are numerous benefits to recreational participation for people with disabilities (Bourke et al., 2022; Choi et al., 2013), there are also numerous barriers preventing participation for PWD. Bedini (2000) proposed that the stigma surrounding PWDs' participation in recreational activities is a significant barrier for PWDs. Ville et al. (2003) discussed a similar idea through their research that 44% of TSCI (tetraplegic spinal-cord-injured) persons felt that disabled persons do not constitute a community. This demonstrates that a large proportion of PWD perceived a lack of belonging or community.

To better understand how to alleviate the barriers to PWDs' inclusion in SOC, we must assess each of McMillan and Chavis's (1986) four subcategories and their relationship with PWDs. Membership can be restricted by limited accessibility, as individuals with mobility disabilities may not feel like members of the relevant community (Burns & Graefe, 2007). Complementing this subcategory, there could be more involvement of PWD in program and activity planning. Allowing more buy-in from PWD will increase the feeling of influence in the community. Choi et al. (2013) exemplified the benefits of group activities based on peer involvement in their study. Finally, the reinforcement of needs can be accomplished through the adaptation of recreational and leisure activities to support the needs of PWD.

Building Sense of Community in Outdoor Recreation

Adaptive and inclusive recreation creates a unique opportunity for community building among PWD. Gossett and Tingstrom (2017) demonstrated this importance through their case

study of an indoor waterpark that, for a special event, was adapted for kayaking. This provided a unique opportunity for the inclusion of PWD, children in this instance, to participate in an activity that is typically unavailable through various barriers, such as excessive risk, financial limits, and lack of resources. The role of the community is to use community resources to enhance accessibility and participation of PWD. Rimmer (2008) emphasized the need for physical activity communities. Rimmer suggested several strategies to limit barriers for individuals with disabilities, such as recreation planning, mandated accessibility standards, transportation accessibility, and professional training in disability-adaptive techniques. Grieshaber et al. (2017) also posited the need to understand acute traumatic injury and illness in the recreational therapy context, as it presents a participant's desire to return to the pre-incident, a cerebrovascular accident in this case, levels of participation. This raises the question of how adaptive recreation can allow for a closer approach to pre-incident participation levels. Adaptive leisure has been shown to have other social benefits, as demonstrated in Lastuka and Cottingham's (2016) study, which found a positive relationship between PWD's participation in adaptive sports and higher levels of employment. The findings of these studies indicate a positive trend in the participation of adaptive leisure activities with social and health benefits for older adults.

In a similar trend to health and social benefits, numerous psychological benefits have been found for leisure engagement for PWDs, as exemplified in Hutchinson et al.'s (2003) study of traumatic injury and illness. Hutchinson et al. found that leisure provided an escape from the stressors of living with a disability caused by traumatic injuries or illnesses. This study was limited by its narrow focus on examining the role of leisure in the coping process for the general

population compared to the target population of people who have experienced traumatic injuries or illnesses. Complementing this study, Rogers et al. (2016) researched injured military personnel and described the benefits of therapeutic outdoor recreation for them. It has been shown that sharing outdoor experiences promotes social connection and emotional healing and provides a sense of purpose. Both studies exemplify the social benefits of outdoor leisure for individuals who have shared similar experiences and traumas.

Legg et al. (2017) found that SOC would be found from a collection of shared goals, integration, and group identity in a study surrounding participation in an adult recreational tennis league. Although not specific to outdoor recreation, Legg et al. (2017) demonstrated how well the four subcategories of SOC (McMillan & Chavis, 1986) could be supported through leisure activities. Legg et al. (2022) assessed achievement goals and SOC and found that recreation is well-suited for a motivational environment that can support community connection through motivational culture and collective engagement in an activity. While many of these contexts of recreation benefits are not outdoor recreation-specific, they can infer the principles that allow for social and personal benefits to remain true in an outdoor setting as well. With the setting and its context understood, it must also be assessed that there are social stigmas concerning PWD and their participation in outdoor recreation that can be alleviated by intentional and adaptive programming (Williams et al., 2004). This is further affirmed by Lundberg et al. (2011), who interviewed recreation participants with disabilities about their identity negotiation and found that stigma was overcome by feelings of freedom, success, normalcy, and positive comparisons received through their participation in recreational activities. Likewise, Grieshaber et al. (2017) conducted a case study that programming designed for individuals attempting to reintegrate into

recreation communities is best supported by adaptive programming utilizing recreation therapy professionals and professionals experienced in the activity.

SECTION II: REFERENCES

APA Dictionary of Psychology. (n.d.). Retrieved October 20, 2025, from

<https://dictionary.apa.org/>

Aubry, T., & Myner, J. (1996). Community integration and quality of life: A comparison of persons with psychiatric disabilities in housing programs and community residents who are neighbours. *Canadian Journal of Community Mental Health*, 15(1), 5–20.

<https://doi.org/10.7870/cjcmh-1996-0001>

Badia, M., Orgaz, B., Verdugo, M., Ullán, A., & Martínez, M. (2011). Personal factors and perceived barriers to participation in leisure activities for young adults with developmental disabilities. *Research in Developmental Disabilities*, 32(6), 2055–2063.

<https://doi.org/10.1016/j.ridd.2011.08.007>

Bedini, L. (2000). “Just sit down so we can talk.” Perceived stigma and community recreation pursuits of people with disabilities. *Therapeutic Recreation Journal*, 34, 55-68

https://www.researchgate.net/publication/268441154_Just_sit_down_so_we_can_talk_Perceived_stigma_and_community_recreation_pursuits_of_people_with_disabilities

Bourke, J., Nichols-Dunsmuir, A., Begg, A., Dong, H., & Schluter, P. (2022). Understanding the longer-term health, well-being, and sense of community for disabled people following the 2010–2011 Canterbury earthquakes: A repeated cross-sectional study. *International Journal of Disaster Risk Reduction*, 67, 102649.

<https://doi.org/10.1016/j.ijdr.2021.102649>

CDC. (2018, March 28). *Disability and Health Data System*. Centers for Disease Control and Prevention. <https://www.cdc.gov/index.htm>

Chavis, D., Lee, K., & Acosta, J. (2008). *Sense of Community Index 2*.
<https://doi.org/10.1037/t33090-000>

Chavis, D. M., & Wandersman, A. (1990). Sense of community in the urban environment: A catalyst for participation and community development. *American Journal of Community Psychology*, 18(1), 55–81. <https://doi.org/10.1007/BF00922689>

Choi, H. S., Johnson, B., & Kriewitz, K. (2013). Benefits of inclusion and segregation for individuals with disabilities in leisure. *International Journal on Disability and Human Development*, 12(1), 15–23. <https://doi.org/10.1515/ijdhhd-2012-0120>

Gossett, K., & Tingstrom, C. A. (2017). Community-based adaptive recreation: Using an indoor water park for adapted kayaking. *Palaestra*, 31(3), 31–35.

Grieshaber, A., Johnson, D., & Crowe, B. (2017). Returning to golf after a cerebrovascular accident in collaboration with a PGA golf pro and a recreation therapist. *American Journal of Recreation Therapy*, 16(3), 37–47. <https://doi.org/10.5055/ajrt.2017.0139>

Gur, A., & Bina, R. (2022). Facilitators of sense of belonging among people with intellectual and developmental disabilities: A systematic review. *Journal of Intellectual Disabilities*.
<https://doi.org/10.1177/17446295211068424>

- Hutchinson, S., Loy, D., Kleiber, D., & Dattilo, J. (2003). Leisure as a coping resource: Variations in coping with traumatic injury and illness. *Leisure Sciences*, 25, 143–161.
<https://doi.org/10.1080/01490400306566>
- James, L., Shing, J., Mortenson, W. B., Mattie, J., & Borisoff, J. (2018). Experiences with and perceptions of an adaptive hiking program. *Disability and Rehabilitation*, 40(13), 1584–1590. <https://doi.org/10.1080/09638288.2017.1302006>
- Lastuka, A., & Cottingham, M. (2016). The effect of adaptive sports on employment among people with disabilities. *Disability and Rehabilitation*, 38(8), 742–748.
<https://doi.org/10.3109/09638288.2015.1059497>
- Legg, E., Wells, M., & Barille, J. (2022, July 22). The relation of achievement goals to sense of community in an adult recreational sports league: A multi-level perspective. *The Sport Journal*. <https://thesportjournal.org/article/the-relation-of-achievement-goals-to-sense-of-community-in-an-adult-recreational-sports-league-a-multi-level-perspective/>
- Legg, E., Wells, M., Newland, A., & Tanner, P. (2017). Exploring the sense of community in adult recreational tennis. *World Leisure Journal*, 59(1), 39–53.
<https://doi.org/10.1080/16078055.2016.1277611>
- Long, D., & Perkins, D. (2003). Confirmatory factor analysis of the Sense of Community Index and development of a Brief SCI. *Journal of Community Psychology*, 31(3), 279–296.
<https://doi.org/10.1002/jcop.10046>

- Lundberg, N., Taniguchi, S., McCormick, B., & Tibbs, C. (2011). Identity negotiating: Redefining stigmatized identities through adaptive sports and recreation participation among individuals with a disability. *Journal of Leisure Research*, 43(2), 205–225. <https://doi.org/10.1080/00222216.2011.11950233>
- McMillan, D., & Chavis, D. (1986). Sense of community: A definition and theory. *Journal of Community Psychology*, 14(1), 6–23. [https://doi.org/10.1002/1520-6629\(198601\)14:1%253C6::AID-JCOP2290140103%253E3.0.CO;2-I](https://doi.org/10.1002/1520-6629(198601)14:1%253C6::AID-JCOP2290140103%253E3.0.CO;2-I)
- Peterson, N., Speer, P., & McMillan, D. (2008). Validation of a Brief Sense of Community Scale: Confirmation of the principal theory of sense of community. *Journal of Community Psychology*, 36(1), 61–73. <https://doi.org/10.1002/jcop.20217>
- Pretty, G., Bishop, B., Fisher, A. T., & Sonn, C. (2006, September 1). *Psychological sense of community and its relevance to well-being and everyday life in Australia: A position paper of the Australian Psychological Society*. <https://www.semanticscholar.org/paper/Psychological-sense-of-community-and-its-relevance-Pretty-Bishop/463635c2fd006db1eb97ef6a565467b57c338670>
- Rimmer, J. (2008). Promoting inclusive physical activity communities for people with disabilities. *Research Digest*. <https://permanent.fdlp.gov/gpo148798/Digest2008PromotingInclusivePhysicalActivityCommunitiesforPeoplewithDisabilitiesSeries9Number2June.pdf>

- Rogers, S., Loy, D., & Bochicchio, C. (2016). Sharing a new foxhole with friends: The impact of outdoor recreation on injured military. *Therapeutic Recreation Journal*, 50(3), 213-227. <https://doi.org/10.18666/TRJ-2016-V50-I3-2837>
- Sarason, S. B. (1974). *The psychological sense of community: Prospects for a community psychology*. Jossey-Bass.
- Townley, G., & Kloos, B. (2011). Examining the psychological sense of community for individuals with serious mental illness residing in supported housing environments. *Community Mental Health Journal*, 47(4), 436–446. <https://doi.org/10.1007/s10597-010-9338-9>
- Uçar, M., Güler, E., & Koçdar, S. (2024). Societal bonds in virtual spaces: Exploring the sense of community in online student communities at Anadolu University's open education system. *Asian Association of Open Universities Journal*, 19(3), 264–281. <https://doi.org/10.1108/AAOUJ-11-2023-0128>
- Ville, I., Crost, M., & Ravaud, J.-F. (2003). Disability and a sense of community belonging: A study among tetraplegic spinal-cord-injured persons in France. *Social Science & Medicine*, 56(2), 321–332. [https://doi.org/10.1016/S0277-9536\(02\)00030-8](https://doi.org/10.1016/S0277-9536(02)00030-8)
- Walker, P. (1999). From community presence to sense of place: Community experiences of adults with developmental disabilities. *Journal of the Association for Persons with Severe Handicaps*, 24(1), 23-32. <https://doi.org/10.2511/rpsd.24.1.23>

- Warner, S., Kerwin, S., & Walker, M. (2013). Examining sense of community in sport: Developing the multidimensional 'SCS' scale. *Journal of Sport Management*, 27(5), 349-362. <https://doi.org/10.1123/jsm.27.5.349>
- WHO. (n.d.). *Disability*, Retrieved October 14, 2025, from <https://www.who.int/news-room/fact-sheets/detail/disability-and-health>
- Williams, R., Vogelsong, H., Green, G., & Cordell, K. (2004). Outdoor recreation participation of people with mobility disabilities: Selected results of the national survey of recreation and the environment. *Journal of Park and Recreation Administration*, 22(2), 84-100.

SECTION III: EXTENDED DISCUSSION

Limitations

The major limitation of this study was a smaller sample size (N=36) due to the practical and realistic constraints involved with surveying such a specific population (i.e., individuals with disabilities who participate in outdoor recreation). Given the nature of outdoor recreation and its barriers to participation in PWD, it can be assumed that accessing this population can be difficult. Because this survey was sent to specific organizations and programs that provided these opportunities, the convenience sample may have prevented a broader generalization of results. While this may be somewhat alleviated via respondent referrals, the limitation remained. Another limitation to consider was the 12-month recall required for the survey. While a 12-month recall is necessary as many outdoor recreational activities are seasonal and would require a full-year to incorporate a variety of outdoor recreation opportunities, respondents may have experienced memory decay over the 12-month recall period potentially impacting the validity of the participation measurement (Tourangeau, 2000).

A limitation that this study faced was an influx of automated bot responses to the incentive survey that was distributed. This attack consisted of over 200 automated responses within a brief timer period that ultimately limited the researchers' ability to assess valid responses. This attack also caused an amendment to the protocols as outlined in the IRB submission requiring a temporary closing of the survey further limiting responses available during this closure period. This change in procedure was determined based on consultation with the IRB. This issue was able to be corrected by integrating a Qualtrics bot security and the

addition of an initial Captcha for the incentive survey. Invalid responses were then removed from the criteria, and surveys originating from identical IP addresses were also removed. These challenges and the correction thereof were consistent with the current guidelines of managing survey fraud (Donkin et al., 2025; Frank-Ito et al., 2026).

Compounded by the bot attack, this survey suffered from a limited sample. Therefore, sampling efforts did not meet the goal of 84 valid responses limiting the associated power of this study. In addition to this issue, many of the 98 total responses to the data collection survey were invalid due to incomplete responses despite the inclusion of a mandatory request indicator on responses. Due to incomplete surveys and respondents not meeting collection criteria, 66 total responses were not analyzed. According to Dillman et al. (2014), online surveys are commonly afflicted with incomplete responses that can introduce nonresponse bias and limit generalizability. The limited sample size also reduced statistical power, increasing the likelihood of Type II error (Cohen, 1992).

While the sample was limited, there were many factors that made this sample also limited diversity. For example, this sample was predominantly individuals with a physical or mobility disability (79% of valid respondents). This can be attributed to the organizations that were asked to share the survey. While catering to all ability types, these outdoor recreation organizations tend to focus on physical disabilities and how to best adapt outdoor recreation to their specific needs. Due to the limited sample, limited diversity across the race was also observed as 80.6% of the sample was white, while 19.4% responded as non-white with no multiple responses of another race/ethnicity. No meaningful analysis was able to be conducted to ascertain any possible relationships between race and all other categories due to the limited diversity of

respondents. This lack of diversity made the researchers unable to determine any potential relationships via statistical analysis.

Understanding Community in Adaptive Outdoor Recreation

While no major relationship was discovered as a whole, this finding allowed for a better understanding of the nature of the sense of community in adaptive outdoor recreation. As outdoor recreation categories are so distinct from each other, with various subcultures within each category, this non-relationship confirms the notion that SOC should be assessed at the level of activity as opposed to the genre of activities, that being outdoor recreation. Through the completed statistical analysis, it was found that there was *a non-significant* relationship ($p = .291$) between the total SOC score collected from the SCI-2 and total time participated in adaptive outdoor recreation.

While there is limited research related to sense of community in disabled communities, results of this study somewhat contradict previous research indicating nature-based recreation does have an association with sense of community (Breunig et al., 2010) in general populations without disabilities. Similarly, Soria et al. (2022) conducted a study on instructor-led recreation activities, including outdoor recreation, and assessed the effects of participation on sense of belonging. It was found that outdoor recreation was one of the strongest predictors of a sense of belonging for college students. While previous research indicates there may be some associations in total outdoor recreation engagement and sense of community within non-disabled communities, this study focused on those social connections within disabled communities due to the vast differences in challenges faced by those with disabilities (Bedini, 2000).

Specific to disability, there is limited research suggesting that total nature-based recreation does have an association with sense of community in disabled populations (Bedini, 2000; Rogers et al., 2016). Bedini et al. suggested that individuals with disabilities face many challenges to recreation participation that often promote social exclusion and limit meaningful participation in recreational activities that potentially develop a sense of community. It was also found that non-participants in community recreation exhibited feelings of helplessness, while this was not present with respondents who reported active participation in recreational activities. It was additionally noted that the specific social elements of the recreational activity may have been an important factor in the participation and social implications of the activity. More specific to outdoor recreation programming, Rogers et al. examined show a specific outdoor recreation program provided a “brotherhood” connection among injured military veterans and the nature of these activities provided similar participatory associations veterans previously experienced during active duty. While the small sample size in this study most likely influenced the lack of a meaningful relationship between the total amount of outdoor recreation participation and total sense of community), it makes further sense to further examine the relationships of *individual* outdoor recreation activities with the *specific* attributes of sense of community due to our understanding that participation within recreation activities is contextualized so much to each individual experience (Williams et al., 2004).

The Individual Context of Outdoor Recreation in Sense of Community

Another focus of this research study was examining the relationships of specific outdoor recreation activities and sense of community attributes. Recreation experience and the perceived sense of community is perceived and interpreted through an individual lens by each participant

(Legg et al., 2017). While a relationship between total participation in adaptive outdoor recreation and sense of community was not found, this current study suggested that the experiences, outcomes, and even enjoyed attributes of outdoor recreation can be contextualized to each individual and their specific experience. That said, it does seem important to understand how specific outdoor activities are associated with the components of a sense of community. The following provides a better discussion of some of those individual relationships.

Reinforcement of Needs in Outdoor Recreation

A significant relationship was found in this study between reinforcement of needs and trail activities ($p = .013$). Much of this relationship may be related to a community that has shared and similar needs. One such need may be related to physical challenges experienced in outdoor recreation participation. Considering 69% of the sample in this study had a physical disability, it is logical to assume that the majority of the group did have shared physical challenges that may impact the outdoor recreation experience. While this study was not designed to ascertain the extent of these disabilities, it is well documented that people with physical and mobility disabilities have greater difficulties and barriers to outdoor recreation such as trail activities (Darcy & Dickson, 2009; Williams et al., 2004). Partially, many public trails are not accessible to wheelchairs and alternatively, the equipment necessary for traversing non wheelchair accessible trails is costly and often out of reach for many aspiring recreationists with disabilities (Williams et al., 2004). Therefore, participating in adaptive outdoor recreation programs may provide specialized equipment, training, and even staff that can assist in facilitating the outdoor trail activity experience (Gossett & Tingstrom, 2017). Because data was collected through existing adaptive outdoor recreation programs, many of the respondents

participated in group trail programs that brought individuals together to meet many of these shared physical needs (Choi et al., 2013). Choi et al. found that when people of similar ability levels participate together, it can provide the individual with opportunities to engage in recreation with peers of similar skill levels, providing an enhanced experience and emotional connection.

This relationship of needs reinforcement and trail activities demonstrated a deeper relationship and dynamic between the individual and the specific outdoor recreation community, as individually, the recreationist may be unable to acquire the resources to engage in trail activities, but as a larger group, the resources and cost may be lessened for the individual, providing more opportunity for recreation. This finding that reinforcement of needs and trail activities speaks to the importance of accessible infrastructure and adaptive resources for people with disabilities (Crawford & Godbey, 1987; Williams et al., 2004). Trail-based recreation appears to help individuals and the group fulfill their needs when structural barriers can be eliminated or reduced. Crawford and Godbey (1987) suggested in their research that the three types of barriers can help to contextualize the limitations to participation in recreation allowing for programmers and recreation providers to develop a better understanding of the barriers their population is experiencing. Only after this understanding can the provider overcome these barriers.

Shared Emotional Connections in Outdoor Recreation

Next, a relationship was found between observational recreation activities and shared emotional connection and Total SOC. that require the participant to observe and connect to nature (e.g., bird watching, nature photography). This relationship can best be understood through the lens of transformative experiences in nature (Clayton et al., 2017). It is well documented that the emotional impacts of experiences in nature can be significant, and it can be assumed that these experiences are even more valuable for individuals with disabilities due to limited opportunities to engage in nature-based and outdoor recreation (Williams et al., 2004). Shared experiences in outdoor environments serve as powerful catalysts for emotional connection through mechanisms of emotional synchrony and convergence (Cheong et al., 2020).

Research demonstrates that experiencing intense emotions with others, even without requiring precise emotional convergence, can even reinforce social bonds through physiological arousal indexed by cardiac and respiratory activity (Chung et al., 2024). The key mechanism involves joint attention, where participants' shared focus on the same environmental elements creates opportunities for emotional alignment that strengthens prosocial attitudes within groups. The significant relationship between observational recreation and both shared emotional connection and total SOC demonstrated the importance of nature-based experiences that can still have impact while maintaining low-barriers to participation. Activities such as bird watching, scenic observation, and nature photography allows individuals to share their connection to nature in a manner that does not require a high amount of physical exertion that is often impractical due to functional limitations faced by people with disabilities. These opportunities to observe nature seem to provide multiple pathways to create shared emotional bonds between (Chung et al., 2024).

Influence in Outdoor Recreation

Lastly, the relationship between SOC influence and hunting and fishing was significant and can be assessed and understood when providing additional context to these activities. hunting and fishing are typically engaged in with smaller groups, as a larger community may be present for participants to maintain membership. Given these small group sizes and the skill and knowledge base that must be acquired and shared between members for this activity to be conducted, there is a greater opportunity for members to share thoughts and knowledge to influence group decisions (Mueller et al., 2008). This dependency on skill sharing creates a relationship between mentors and novices in an informal format and can ultimately provide feelings of competence and belonging while also elevating feelings of influence (Lave & Wenger, 1991). Continued interaction between community members has been shown to strengthen SOC aspects such as influence (Pretty et al., 2006). The relationship between hunting/fishing and influence within SOC suggests that knowledge sharing and collaboration, along with participation in decision making, can foster a sense of influence within a community. With the smaller groups necessary for hunting and fishing, it also creates increased opportunities for individual voices to be heard. By mentoring and sharing skills and knowledge, this community can grow while also not diminishing the influence of a single voice.

Validation of the Sense of Community Index-2

While secondary to the research questions of this study indicate that the SCI-2 should be considered a practical and valuable tool for exploring a sense of community within disability. An exploratory factor analysis (EFA) was conducted to examine the underlying factor structure of the SCI-2. Before analysis, the suitability of the data was assessed. The Kaiser-Meyer-Olkin measure of sampling adequacy indicated that the sample was adequate for factor analysis ($KMO = .754$), exceeding the recommended threshold of $KMO = .60$ as established by Kaiser (1974). Additionally, Bartlett's Test of Sphericity was significant, $\chi^2([15]) = 80.859, p < .001$, suggesting that correlations among items were sufficient for EFA (see Table 2). The EFA was conducted using the Maximum Likelihood Method with a ProMax rotation. Factor retention was guided by eigenvalues greater than 1.0, inspection of the scree plot, and interpretability of the factor solution. The analysis revealed a 1-factor solution for all subscales and the total composite variable of total SOC. Items were retained if they demonstrated factor loadings of at least .40 and did not exhibit substantial cross-loadings (i.e., loadings greater than .30 on multiple factors). Based on these criteria, six items were retained across the four factors and all four factors for total SOC. Factor loadings indicated adequate item-factor relationships including reinforcement of needs (range .624 to .829), membership (range = .567 to .887), influence (range = .514 to .874), and shared emotional connection (range .479 to .773) (Table 2). Internal consistency reliability was also assessed using Cronbach's alpha. Cronbach's alpha values above .70 indicate acceptable internal consistency reliability (Nunnally & Bernstein, 1994). The total SOC demonstrated acceptable reliability ($\alpha = .921$) with each subscale also demonstrating reliability (reinforcement of needs $\alpha = .855$, membership $\alpha = .874$, influence $\alpha = .832$, shared emotional connection $\alpha = .792$). All values met or exceeded the recommended threshold of .70, indicating

satisfactory internal consistency. Overall, the results of the EFA support the multidimensional structure of the SCI-2, providing evidence of construct validity and reliability for use in subsequent analyses.

Future Research

While this study has provided additional insight into recreational communities, this study lacks a large enough sample to justify many of these findings. One recommendation is for future research to include a larger collective sample to better facilitate statistical associations. In addition, this larger sample size would be more likely to obtain a more diverse sample to provide more understanding in how different demographic variables can influence SOC. Expanding recruitment efforts with a wider range of organizations and geographic locations and alleviate these limitations. A longitudinal study assessing how longevity of participation in recreational activities influences perceived SOC. This would allow for a better understanding in the causality of SOC and how SOC changes over time.

Considering the different types of disability that someone might experience and the level it may affect an individual, we can assume there are many recreation participants with disabilities have caretakers who often accompany them to their activities of choice. While many of these individuals who are volunteer or professional caretakers, there is still a strong social bond between the caretaker and PWD (Lundberg et al., 2011; Townley & Kloos, 2011). Creating a better understanding of the caretaker's role in the community and their perceptions could help frame the larger community that a person with disability experiences.

Implications for Practice

The suggested association between reinforcement of needs and the participation in trail activities support continued, and if not increased, investment in adaptive trail designs, accessible facilities, and specialized equipment to promote participation and perceived community support (Lundberg et al., 2011; Tow et al., 2020). Furthermore, practitioners should consider group-based trail programming to promote an easier distribution of specialized resources like trail capable wheelchairs to those who may have previously been unable to participate without those resources. Results in this study also suggested that observational nature based activities were associated with shared emotional connections among group. Many adventure based programs use these shared social group connections as therapeutic modalities to positively impact individuals with emotional and behavioral challenges (Gabarda-Blasko et al., 2024). The emotional connections within nature continue to be a powerful tool for therapists and outdoor programmer alike. These Observational nature-based Observational activities are also something that practitioners should consider within their programming as they can provide regular low barrier opportunities for nature observance in its many forms can allow for people with disabilities who are not looking for physically exhausting activities to share emotionally connections with others in nature. These results also suggest that practitioners should consider incorporating participant-led recreational activities and mentorship opportunities that provide opportunities to enhance SOC (Choi et al., 2013; Rogers et al., 2016).

Finally, adaptive recreation practitioners may provide evidence of the value of their programs to promote SOC due to an inability to collect and measure SOC. This study suggests that the SCI-2 is a valid and practical instrument worthy of using not only as a research tool but as a means to examine if programs are promoting sense of community. Warner et al. (2013)

suggested that survey instruments [e.g., Sense of Community in Sport Scale (SCS, 2013)] can be used to evaluate how specific program elements with recreation and sport are perceived by participants to promote SOC. Practitioners are encouraged to consider using survey methodologies like the SCI-2 to evaluate the effectiveness of their outdoor programs to promote SOC.

Conclusion

This study was designed to examine the relationship between participation in adaptive outdoor recreation and SOC among those with disabilities. While results indicated no significant relationship between total outdoor recreation participation and the total SOC score as provided by the SCI-2, other findings revealed that specific types of recreation activities *are* associated with distinct attributes of SOC. Trail activities were related to reinforcement of needs, observational recreation was associated with Shared emotional connection, and hunting and fishing were strongly linked to influence. These relationships suggest that total participation in adaptive recreation is not a key indicator for SOC, but rather the context and structure of the activities themselves play a much more critical role in the fostering of a sense of community. Programs that offer adaptive opportunities that also emphasize accessibility, shared experiences, and participant agency and engagement are more effective at promoting community connections. Despite limitations related to sample size and a lack of diverse responses, this study contributes a better understanding of the underpinnings of how formed communities in the recreation contexts for people with disabilities to highlight the importance for intentional program designs. This study also provides a foundation for future research exploring the role of outdoor recreation in providing social inclusion and belonging within disabled communities.

SECTION III: REFERENCES

- Badia, M., Orgaz, B. M., Verdugo, M. A., Ullán, A. M., & Martínez, M. M. (2011). Personal factors and perceived barriers to participation in leisure activities for young and adults with developmental disabilities. *Research in Developmental Disabilities*, 32(6), 2055–2063. <https://doi.org/10.1016/j.ridd.2011.08.007>
- Breunig, M. C., O’Connell, T. S., Todd, S., Anderson, L., & Young, A. (2010). The Impact of Outdoor Pursuits on College Students’ Perceived Sense of Community. *Journal of Leisure Research*, 42(4), 551–572. <https://doi.org/10.1080/00222216.2010.11950218>
- Cheong, J. H., Molani, Z., Sadhukha, S., & Chang, L. J. (2020). *Synchronized affect in shared experiences strengthens social connection*. PsyArXiv. <https://doi.org/10.31234/osf.io/bd9wn>
- Choi, H. S., Johnson, B., & Kriewitz, K. (2013). Benefits of inclusion and segregation for individuals with disabilities in leisure. *International Journal on Disability and Human Development*, 12(1), 15–23. <https://doi.org/10.1515/ijdhhd-2012-0120>
- Chung, V., Mennella, R., Pacherie, E., & Grezes, J. (2024). Social bonding through shared experiences: The role of emotional intensity. *Royal Society Open Science*, 11(10), 240048. <https://doi.org/10.1098/rsos.240048>
- Clayton, S., Colléony, A., Conversy, P., Maclouf, E., Martin, L., Torres, A.-C., Truong, M.-X., & Prévot, A.-C. (2017). Transformation of Experience: Toward a New Relationship with Nature. *Conservation Letters*, 10(5), 645–651.

- Cohen, J. (1992). Statistical Power Analysis. *Current Directions in Psychological Science*, 1(3), 98–101. <https://doi.org/10.1111/1467-8721.ep10768783>
- Crawford, D., & Godbey, G. (1987). Reconceptualizing barriers to family leisure. *Leisure Sciences*, 9, 119–127. <https://doi.org/10.1080/01490408709512151>
- Darcy, S., & Dickson, T. (2009). A Whole-of-Life Approach to Tourism: The Case for Accessible Tourism Experiences. *Journal of Hospitality and Tourism Management*, 16, 32–44. <https://doi.org/10.1375/jhtm.16.1.32>
- Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed mode surveys: The tailored design method, 4th ed* (pp. xvii, 509). John Wiley & Sons, Inc.
- Donkin, L., Henry, N., Kercher, A., Pedersen, M., Wilson, H., & Chan, A. H. Y. (2025). Effective Recruitment or Bot Attack? The Challenge of Internet-Based Research Surveys and Recommendations to Reduce Risk and Improve Robustness. *Interactive Journal of Medical Research*, 14(1), e60548. <https://doi.org/10.2196/60548>
- Frank-Ito, W., Eldridge, L. A., & Matthews, J. (2026). *Digital Deception: Survey Bots and the Ethics of Data Integrity*.
- Gabarda-Blasco, A., Elias, A., Mendo-Cullell, M., Arenas-Pijoan, L., Forné, C., Fernandez-Oñate, D., Bossa, L., Torrent, A., Gallart-Palau, X., & Batalla, I. (2024). Short- and Long-Term Outcomes of an Adventure Therapy Programme on Borderline Personality Disorder: A Pragmatic Controlled Clinical Trial. *Brain Sciences*, 14(3), 236. <https://doi.org/10.3390/brainsci14030236>

- Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation* (1st ed.). Cambridge University Press. <https://doi.org/10.1017/CBO9780511815355>
- Lundberg, N. R., Taniguchi, S., McCormick, B. P., & Tibbs, C. (2011). Identity Negotiating: Redefining Stigmatized Identities through Adaptive Sports and Recreation Participation among Individuals with a Disability. *Journal of Leisure Research*, 43(2), 205–225. <https://doi.org/10.1080/00222216.2011.11950233>
- Mueller, K. B., Taylor, W. W., Frank, K. A., Robertson, J. M., & Grinold, D. L. (2008). *Social Networks and Fisheries: The Relationship between a Charter Fishing Network, Social Capital, and Catch Dynamics*. <https://dx.doi.org/10.1577/M07-016.1>
- Pretty, G. M. H., Bishop, B. J., Fisher, A. T., & Sonn, C. C. (2006). *Psychological sense of community and its relevance to well-being and everyday life in Australia: A position paper of the Australian Psychological Society*. <https://api.semanticscholar.org/CorpusID:36007916>
- Rogers, S., Loy, D., & Bochicchio, C. (2016). Sharing a new foxhole with friends: The impact of outdoor recreation on injured military. *Therapeutic Recreation Journal*, 50(3), 213-227. <https://doi.org/10.18666/TRJ-2016-V50-I3-2837>
- Soria, K. M., Boettcher, B., & Hallahan, K. (2022). The effects of participation in recreational activities on students' resilience and sense of belonging. *Recreational Sports Journal*, 46(2), 184–192. <https://doi.org/10.1177/15588661221125201>

- Tow, S., Gober, J., & Nelson, M. R. (2020). Adaptive sports, arts, recreation, and community engagement. *Physical Medicine and Rehabilitation Clinics of North America, Cerebral Palsy*, 31(1), 143–158. <https://doi.org/10.1016/j.pmr.2019.09.003>
- Townley, G., & Kloos, B. (2011). Examining the psychological sense of community for individuals with serious mental illness residing in supported housing environments. *Community Mental Health Journal*, 47(4), 436–446. <https://doi.org/10.1007/s10597-010-9338-9>
- Warner, S., Kerwin, S., & Walker, M. (2013). Examining sense of community in sport: Developing the multidimensional ‘SCS’ scale. *Journal of Sport Management*, 27(5), 349–362. <https://doi.org/10.1123/jsm.27.5.349>
- Williams, R., Vogelsong, H., Green, G., & Cordell, K. (2004). Outdoor Recreation Participation of People with Mobility Disabilities: Selected Results of the National Survey of Recreation and the Environment. *Journal of Park & Recreation Administration*, 22(2), 85–101. (19626696).

APPENDICES

Appendix A

Survey

The Sense of Community Index 2 (Chavis et al., 2008) is used with permission through an account purchased through the Department of Recreation Sciences & Sport Management.

Adaptive Outdoor Recreation

You are being invited to participate in a research study titled Adaptive Outdoor Recreation on Sense of Community being conducted by Ray Harris, a graduate student at East Carolina University in the Recreation Sciences and Sport Management department. The goal is to survey 100 individuals in/at various recreational contexts. The survey will take approximately 5 minutes to complete. It is hoped that this information will assist us to better understand how adapting adaptive outdoor recreation can provide a person with a disability with an increased sense of community. Your responses will be kept confidential and no data will be released or used with your identification attached. Your participation in the research is voluntary. You may choose not to answer any or all questions, and you may stop at any time. We will not be able to pay you for the time you volunteer while being in this study however you may sign up to be entered in a random drawing for one of ten \$10 e-gift cards. Your email will be collected in this incentive survey, but will not be linked to your responses. There is no penalty for not taking part in this research study. Please email Ray Harris at harrisco19@students.ecu.edu for any research

related questions or the University & Medical Center Institutional Review Board (UMCIRB) at 252-744-2914 for questions about your rights as a research participant.

Do you have a disability?

- ☐ Yes
- ☐ No

What organization are you completing this survey with?

Adaptive Recreation can be defined as a leisurely activity that is pursued for its own enjoyment and modified to allow individuals with disabilities or limitations to participate in said activity.

Within the last year, how many times in each recreational activity listed below have you participated in, and on average, how much time, in hours, did you spend participating in the activity each time you participated?

For this survey, we define a community as a group of people with whom you engage in outdoor recreational activities with you. Please keep this definition in mind while completing the next section of this survey.

	Times participated in a year	Time spent in activity each time (Hours)
Trail Activities (Trail running, Hiking, Etc.)		
Wheeled Recreation (Cycling, ATVs, Etc.)		
Camping		
Hunting/Fishing		
Water Recreation (Kayaking, Canoeing, Boating, Etc.)		
Observational Recreation (Birdwatching, Nature Photography, Etc.)		
Other Nature-Based Activities (please list below)		

How important is it for you to feel a sense of community with other community members?

- o Prefer Not to be Part of This Community
- o Not Important at All
- o Not Very Important
- o Somewhat Important
- o Important
- o Very Important

	Not at All	Somewhat	Mostly	Completely
1. I get important needs of mine met because I am part of this community.				
2. Community members and I value the same things.				
3. This community has				

been successful in getting the needs of its members met.				
4. Being a member of this community makes me feel good.				
5. When I have a problem, I can talk about it with members of this community.				
6. People in this community have similar needs, priorities, and goals.				
7. I can trust people in this community.				

8. I can recognize most of the members of this community.				
9. Most community members know me.				
10. This community has symbols and expressions of membership such as clothes, signs, art, architecture, logos, landmarks, and flags that people can recognize.				
11. I put a lot of time and effort into being				

part of this community.				
12. Being a member of this community is a part of my identity.				
13. Fitting into this community is important to me.				
14. This community can influence other communities.				
15. I care about what other community members think of me.				
16. I have influence over what				

this community is like.				
17. If there is a problem in this community, members can get it solved.				
18. This community has good leaders.				
19. It is very important to me to be a part of this community.				
20. I am with other community members a lot and enjoy being with them.				

21. I expect to be a part of this community for a long time.				
22. Members of this community have shared important events together, such as holidays, celebrations, or disasters.				
23. I feel hopeful about the future of this community.				
24. Members of this community care about each other.				

How would you describe your disability?

- ☐ Mobility/Physical
 - ☐ Developmental/Intellectual
 - ☐ Sensory/Audio/Visual
 - ☐ Serious Mental Illness
 - ☐ Other _____
-

When did your disability begin?

- ☐ From Birth
 - ☐ After Birth (Please list time, in years, since acquisition)
-

How old are you?

What is your gender?

- ☐ Male
- ☐ Female

- ☐ Non-binary / third gender

How do you identify your race/ethnicity?

- ☐ White
- ☐ Black or African American
- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Native Hawaiian or Pacific Islander
- ☐ Middle Eastern or North African
- ☐ Hispanic or Latino/a/x/e
- ☐ Other _____

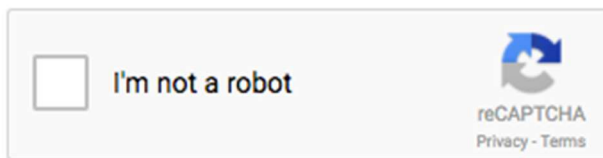
Please feel free to share this survey link with others who you believe would complete this survey. https://ecu.az1.qualtrics.com/jfe/form/SV_42WjggW9pG2rrL0

Do you have any recommendations or feedback for the organization that shared this survey with you?

Appendix B

Incentive Survey

Participant Awards



To protect the integrity of the research and ensure fair compensation, responses will be monitored for indicators of fraudulent or automated (bot) activity. Participants may be disqualified from receiving compensation if there is evidence suggesting that responses were not provided by a human participant or were otherwise invalid. This may include but is not limited to: Use of automated systems, bots, or scripts to complete the study Multiple submissions from the same individual or device not permitted by the study protocol Providing false, inconsistent, or nonsensical responses Unusual response patterns that indicate inattention or non-human behavior. Participants identified as engaging in fraudulent activity or failing data quality checks may be removed from the study and may not receive compensation. These determinations will be made using objective, pre-established criteria applied consistently to all participants. All data

review procedures are designed to protect participant privacy and will be conducted in accordance with applicable regulations and Institutional Review Board (IRB) requirements.

Please provide an email here to be entered in a random drawing for one of ten \$10 e-gift card.

Appendix C

INSTITUTIONAL REVIEW BOARD APPROVAL

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board
Willis Building · Mail Stop 682
Office 252-744-2914 · Fax 252-744-2284 · redc@ecu.edu · redc.ecu.edu/umcirb

Notification of Exempt Certification

From: Social/Behavioral IRB
To: [Colin Harris](#)
CC: [David Loy](#)
Date: 2/23/2026
Re: [UMCIRB 25-001635](#)
Outdoor Recreation and Sense of Community

I am pleased to inform you that your research submission has been certified as exempt on 2/22/2026. This study is eligible for Exempt Certification under category # 2B.

It is your responsibility to ensure that this research is conducted in the manner reported in your application and/or protocol, as well as being consistent with the ethical principles of the Belmont Report and your profession.

This research study does not require any additional interaction with the UMCIRB unless there are proposed changes to this study. Any change, prior to implementing that change, must be submitted to the UMCIRB for review and approval. The UMCIRB will determine if the change impacts the eligibility of the research for exempt status. If more substantive review is required, you will be notified within five business days.

For research studies where a waiver or alteration of HIPAA Authorization has been approved, the IRB states that each of the waiver criteria in 45 CFR 164.512(i)(1)(i)(A) and (2)(i) through (v) have been met. Additionally, the elements of PHI to be collected as described in items 1 and 2 of the Application for Waiver of Authorization have been determined to be the minimal necessary for the specified research.

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

IRB00000795 East Carolina U IRB #1 (Biomedical) IORG0000418
IRB00000796 East Carolina U IRB #2 (Behavioral) IORG0000418