

POSITIVE YOUTH DEVELOPMENT AND OUTDOOR EDUCATION: AN 11-YEAR
RETROSPECTIVE PROGRAM EVALUATION OF GRAND CANYON YOUTH

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ABSTRACT

POSITIVE YOUTH DEVELOPMENT AND OUTDOOR EDUCATION: AN 11-YEAR RETROSPECTIVE PROGRAM EVALUATION OF GRAND CANYON YOUTH

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Outdoor education (i.e., organized learning that takes place outdoors; Mansfield et al., 2020) is used for a variety of purposes, including to foster positive youth development. Extant research demonstrates that positive youth development is multi-faceted and dynamic (Masten, 2011). This makes outdoor education particularly well situated to complement traditional or orthodox educational pedagogy in the United States and bolster the development of youth through non-cognitive or non-academic skills. However, the complexity of youth development combined with a lack of unifying frameworks for understanding the impact of outdoor education's effect on youth development across diverse contexts leaves the field lacking a thorough understanding of how innovative programs impact youth, thereby limiting the field's ability to develop and implement outdoor education programs in a world where outdoor spaces are rapidly changing due to urbanization and environmental degradation. Hence, there are two main purposes to this thesis. First, the current study aimed to conduct a descriptive 11-year retrospective program evaluation of innovative programming for youth aged 11-19 delivered between 2010-2021 by Grand Canyon Youth (GCY; <https://gcyouth.org/>), a local 501(c)(3) outdoor education organization that aims to connect diverse youth with the rivers and canyons of the Southwestern United States (GCY, 2022). Second, using the theory-data-cycle, which places findings from this program evaluation in conversation with contemporary frameworks for understanding positive youth development, this study aimed to assess the fit between the Positive Youth Development model (PYD; Lerner et al., 2005) and GCY's programming. While data

were incomplete, survey responses from youth exhibit compelling evidence for positive youth development and transformation consistent with three components of the PYD model: connection to others, competence, and confidence in self. Complementing this, free response data suggested that connection to place and gratitude are also key components of the GCY experience. Findings are discussed in the context of the strengths and limitations of GCY's current approach to measurement and evaluation and the need for further development of the PYD framework. More broadly, recommendations for future research and organizational innovation are provided for procedural and evaluative refinement that includes ongoing empirical data analysis and theory-of-change innovation.

Keywords: outdoor education, program evaluation, Grand Canyon Youth, positive youth development

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Table of Contents

List of Tables.....viii

List of Figures.....ix

Introduction.....1

 Overview.....1

 Outdoor Education as a Pedagogy.....1

 Variability in Terminology and Outcomes.....8

 Variability in Research Outcomes.....13

 Critical Perspectives in the Literature.....16

 Variability in Theoretical Frameworks.....19

 Grand Canyon Youth (GCY)30

 Current Study.....34

Methods.....35

 Procedure.....35

 Data Sources: Inclusion and Exclusion Criteria.....39

 Measures.....43

 Analysis Approach.....47

Results.....50

Discussion.....55

 Outcome Variables.....55

 Concordance of GCY Data with the Positive Youth Development Model.....62

 Strengths and Limitations.....66

 Directions for Future Research.....68

Recommendations to Grand Canyon Youth.....	71
Conclusion.....	73
References.....	77
Tables.....	94
Figures.....	105
Appendix A: Chi-Square Tests.....	120
Appendix B: Sample of Youth Open-Ended Responses Categorized to PYD Model Factors...	125
Appendix C: Examinations of Additional GCY Outcome Variables.....	129
Appendix D: Proportions of Youth Response Counts to Pre-Trip Components and Post-Trip Growth Domains.....	135

List of Tables

Table 1. Comparisons Between Common Outdoor Education or Adventure Programming.....	94
Table 2. Ten Design Principles of Youth Development and Overlapping Research in the Literature.....	95
Table 3. GCY Sample Survey Items Nested Under PYD Model Factors.....	96
Table 4. GCY Quantitative Survey Items by Year, Response Rates, and Missingness.....	97
Table 5. GCY Open-Ended Survey Items by Year, Response Rates, and Missingness.....	99
Table 6. Youth Participant Overall Demographic Descriptive Statistics and Missing Data.....	100
Table 7. Youth Participant Descriptive Statistics: Ethnicity.....	101
Table 8. Youth Participant Descriptive Statistics: Sex.....	101
Table 9. Youth Participant Descriptive Statistics: State/Province of Origin.....	102
Table 10. Youth Open-Ended Response Categorization to PYD Model Factors.....	103

List of Figures

Figure 1. The Positive Youth Development Model.....105

Figure 2. Grand Canyon Youth (GCY) Programming Summary.....106

Figure 3. Perceived Value of Pre-Trip Requirements by Program Type.....107

Figure 4. Perceived Value of Individual Pre-Trip Requirements by Program Type.....108

Figure 5. Perceived Value of Individual Pre-Trip Requirements by Individual Expedition
 Trip.....109

Figure 6. Formed Meaningful Friendships with Other Participants by Program Type.....110

Figure 7. Formed Meaningful Friendships with Other Participants by Trip Location.....111

Figure 8. “Learned Something on Trip to Use in Daily Life” by Program Type.....112

Figure 9. Youth Comfort Communicating with Adults on Expedition by Program Type.....113

Figure 10. Youth Comfort Communicating with Adults on Expedition by Youth-Reported
 Ethnicity.....114

Figure 11. “Will Continue to Do Community Service After Expedition” by Program Type.....115

Figure 12. Perceived Growth in GCY Growth Domains by Program Type.....116

Figure 13. Perceived Growth in GCY Growth Domains by Individual Expedition Trip.....117

Figure 14. Grand Canyon Youth Open-Ended Youth Responses Categorized to PYD Model
 Factors.....118

Figure 15. ‘Discovered Something New About Oneself’ by Program
 Type.....119

Introduction

Overview

The following literature review encompasses the specific role of outdoor education as a pedagogy for youth in fostering positive youth development. Nested within the experiential education philosophy, outdoor education and the associated scientific literature have a vast heterogeneity in terminology, desired organizational outcomes, research methodologies, and theoretical frameworks. This literature review will provide context to outdoor education as a pedagogy and will review the variability in common terminology used in the literature to establish a common vocabulary. Common methodological approaches to researching outdoor education programs are addressed, and shortcomings in the existing literature are reviewed to provide context for the current study. The most common psychological theories in the literature are discussed as frameworks for analyzing and interpreting results from research on outdoor education programs, with particular emphasis on the Positive Youth Development (PYD) model. Finally, an orientation to the organization of focus (Grand Canyon Youth, GCY) is provided to provide context for the overarching goals and specific aims of the current investigation.

Outdoor Education as a Pedagogy

Education that takes place outdoors and involves a more intentional and engaged approach is not new; educational activities in, through, or for the outdoors have existed with the ambition to assist in youth education for nearly half a century (Cook, 1999). In fact, much of the literature suggests a long-standing hypothesis that the aesthetic and novel qualities of wild places can beget holistic growth, overall well-being, and increase self and environmental awareness (Boyes, 2013). Experiential education – which outdoor and adventure education can be nested under – has been developed through scientific research founded on the seminal works of

influential scholars such as Dewey (1938), Piaget (1967), and D. A. Kolb (1984). The idea that education and learning is experiential is also not new; many studies contend that experience is the foundation of education (Shellman, 2014). Despite the longevity of experience and education in the literature, and the abundance of research focusing on the benefits of outdoor education on youth development, the field of outdoor and adventure education remains on the periphery of research and theory (Sibthorp, 2010).

An abundance of anecdotal evidence exists showcasing the benefits of outdoor education on youth development, including greater self-confidence, independence, resilience, and school engagement (Williams et al., 2018). However, there is wide variability in outcomes and the effects of outdoor education programs vary widely among participants (Williams et al., 2018). While the moderators influencing outcome variability present a significant challenge in the field of outdoor education research, Sibthorp (2003) critically points out that youth participant antecedent factors are vital to the subsequent outcomes of outdoor education programs. This indicates that outdoor and adventure education as a pedagogy does not pertain solely to the curriculum or intervention in the form of outdoor programming. Rather, outdoor and adventure education as a pedagogy must include the factors that have been shown to influence learning as well (McKenzie, 2003). For a more in-depth review of the history of outdoor and adventure education, see Cook (1999).

Regarding the diversity in educational approaches and specific goals of outdoor education organizations that are nested under the philosophy of experiential education, many organizations – and as a result, research studies – identify specific constructs to signify their success or failure in attaining their goals. Most outdoor education programs focus on developing non-cognitive skills – or those closely aligned with character attributes and skills – in youth that

have been shown to affect traditional classroom and academic proficiency, such as confidence, self-efficacy, leadership, and decision-making (Shellman, 2014). Studies focusing on the National Outdoor Leadership School (NOLS), a global and well-known institution in outdoor education, have previously focused on communication, leadership, small group behavior, judgment in the outdoors, and environmental awareness as target constructs in evaluating program participant development (Sibthorp et al., 2007). Autonomy and personal relevance have been used in various studies on the effectiveness of summer camp programs (Ramsing & Sibthorp, 2008). Other common target constructs in research on outdoor and adventure-based programming include self-confidence, decision-making, problem-solving skills, and self-determination (Neill et al., 2003; Sibthorp et al., 2007). See Table 1 for a more detailed summary of the variability in educational approaches, strategies, and outcomes for different programs within the United States.

Self-efficacy and empowerment, however, are two of the most prevalent constructs used to indicate an effective program in the field (Shellman, 2014). Many researchers connect empowerment to self-efficacy, and as a result, view self-efficacy as an antecedent and prerequisite to increasing feelings and perceptions of empowerment. As Shellman (2014) notes, empowerment cannot simply be bestowed on participants; a facilitative environment must be fostered that includes an empowering process for participants to undertake. This facilitating (and thereby empowering) environment is precisely what outdoor education programs cultivate as a critical component of their relative pedagogy (Association for Experiential Education, 2013; Shellman, 2014). While an empowering environment can and does develop in traditional and orthodox educational environments (e.g., in indoor classrooms), experiential education programs that take place in outdoor settings are particularly adept at providing this facilitative environment

since their very nature requires providing participants the opportunities to develop and master non-cognitive or character skills such as empathy, giving and receiving feedback, problem-solving, and supporting others in a group that are influential in educational success (Shellman, 2014).

According to the Association for Experiential Education (AEE), there are five pillars nested within the processes and outcomes of experiential education: positive emotion, engagement, relationships, meaning, and accomplishment (AEE, 2022). Among the five pillars, positive emotions have been shown to underpin all others (Seligman et al., 2009). In the present day, experiential education – and as an extension outdoor education – is rooted in a strengths-based approach (Seligman et al., 2009). Stemming from positive psychology, a strengths-based approach focuses and leverages learners’ natural talents to produce outcomes, such as positive emotions, and increased engagement. Enhanced cognitive and behavioral learning, and increased resilience and meaning, have also been reported to result from adopting a strengths-based approach in the learning environment (Seligman et al., 2009). Passarelli et al. (2010) claim that employing an educational, strengths-based approach to outdoor education can enhance positive youth development due to the activities in outdoor education involving incrementally and increasingly challenging activities youth partake in, potentially leading to increased self-efficacy and perceived overall personal growth. This notion is supported by Dewey (1938), who famously suggested that an appropriate balance between serious and playful mental states is optimal for learning.

Although the methodologies and theoretical approaches used in studies are diverse, as well as span a wide range of educational contexts, programs, and populations, anecdotal evidence in the research literature is overwhelming in the conclusion that youth can and do

develop in some capacity through outdoor and adventure programs (Sibthorp, 2010). In reviewing multiple large scale meta-analyses, several results stand out: many unique studies have been conducted exploring the effectiveness of outdoor education programs, and outdoor education programs appear to be effective in promoting youth development across a range of outcomes (Smith & Walsh, 2019). This is notwithstanding the fact that the cognitive benefits of physical activity – in which most of outdoor education is grounded in – are well documented (Hillman et al., 2008; Ryan et al., 2010). In a meta-analysis from the 1990s, Cason and Gillis (1994) found that the length of outdoor and adventure education programs for adolescents moderated the effect sizes found; programs lasting longer in duration had overall larger effect sizes. Thus, the pertinent question pertaining to outdoor and adventure education as a positive intervention for youth development is no longer “*does it work?*” Rather, the question for researchers in the field pertains to moderation, and is more closely related to “*How does it work, and for whom?*” (Williams et al., 2018).

In response to this question, many theories have been developed over time. Experiential Learning Theory (ELT; Kolb & Kolb, 2005) purports a cyclical process for learning that includes experiencing, reflecting, thinking, and acting. The educational effectiveness of ELT pedagogies have already been established independently and outside of the outdoor education environment (Hattie, 2009). As a result, ELT has already been readily adopted into the outdoor education lexicon (Houge Mackenzie et al., 2014). This is most likely since the aspects of processing and learning transfer are vital in experiential education, but more importantly, tend to occur more naturally without external or deliberate intervention via leader facilitation in outdoor education settings (McKenzie, 2003). Additionally, when participants partake in outdoor education activities, they are often subjected to wild, unfamiliar environments, which have been shown to

prompt developmental change when participants must overcome cognitive dissonance as a result of engaging with challenging tasks in unfamiliar environments (McKenzie, 2003). The controlled or mitigated danger, risk, and fear associated with certain outdoor education activities have been identified as critical program elements that promote growth, learning, resilience, and character (Ewert & Yoshino, 2011). Furthermore, autonomy-supportive environments, where participant autonomy is facilitated, fostered, and encouraged and are frequently a part of outdoor education curricula, have been shown to promote adjustment and resilience, learning, and increase traditional academic test performance (Black & Deci, 2000). Andrews (1999) provides further reasoning for this occurrence, as outdoor and adventure education expeditions often create space for participants to question existing societal structures and patterns of personal behavior, and experiment with new patterns.

Design Principles of Programs to Foster Youth Development in Outdoor Contexts.

In a recent publication, Mansfield et al. (2020) put forth ten design principles of youth development pertaining to outdoor education contexts, and when youth development should occur: (1) *adults be utilized in key roles*; (2) *comprise challenging activities*; (3) *be based on a positive social context*; (4) *take place in an unfamiliar, optimally naturally environment*; (5) *provide youth opportunities to develop autonomy and leadership*; (6) *take place over an extended period of time and within a continuum of activity*; (7) *involve participants gaining skills through authentic experiences*; (8) *provide youth with opportunities for reflection in order to process their experiences*; (9) *be supported by a continuum of planning and evaluation*; and (10) *be based on strong connections to the organization's external context*, such as physical or geographical factors associated with the organization's setting (Mansfield et al., 2020). Table 2 summarizes these design principles and their overlap with additional relevant research.

Examining this pedagogical model reveals numerous overlapping constructs, outcomes, and recommendations put forth by other researchers. For example, the first design principle, *adults utilized in key roles*, is directly related to separate research by Shellman (2014) that suggests that youth empowerment must be supported through a facilitative environment, rather than responsibility or authority be automatically granted to youth from the beginning of the program. Risk and challenges associated with outdoor education activities (Ewert & Yoshino, 2011) pertain to principle two (*challenging activities*). Basing development on principle three (*positive social context*) equates to a strengths-based approach and positive emotions (Seligman et al., 2009). Overcoming cognitive dissonance in an unfamiliar, wilderness environment directly maps to principle four, which relates to an *unfamiliar and natural environment* (Norton & Watt, 2014). Providing youth opportunities to develop principle five (*autonomy and leadership*) entails the target constructs of autonomy, self-efficacy, and empowerment of some studies (Neill et al., 2003; Shellman, 2014; Sibthorp et al., 2007). A continuum of principle six (*activity*) relates to the optimal balance of serious and playful mental states for learning purported by Dewey (1938). Student-led, teacher-facilitated programming in the outdoors ties to principle seven (*participants gaining skills through authentic experiences*). Design principle eight (*reflection*) directly relates to the ELT cycle, specifically to processing and reflecting (Kolb & Kolb, 2005; McKenzie, 2003). Principle nine pertains to *planning and evaluation* in youth development (Mansfield et al., 2020). In other words, deliberate intention is vital to ensure not only successful implementation of an outdoor education program, but to maximize the likelihood of positive youth development among participants. Sibthorp (2010) asserts this very principle independently in summarizing the way forward for youth programming in an outdoor educational environment, contending intentional program design and implementation are critical in youth programming when an

experiential education approach is taken. Lastly, principle ten encompasses an *organization's context*, and achieving outcomes has been shown to be tied to the deliberate and intentional planning of both programming and curriculum of an organization (Whittington & Mack, 2010). While variability in organization and program context, methodology, outcomes, and evaluation approaches certainly exist, common themes and results have emerged within the research literature. In utilizing outdoor and adventure education as a pedagogy, leveraging a common framework to make accurate comparisons across contexts, methodologies, and findings, taking a more nuanced and contextual approach to researching outdoor and adventure education programs will only advance the literature further (Williams et al., 2018).

Variability in Terminology and Outcomes

Thus far, the term “outdoor and adventure education” has been used vaguely regarding the wide variety of programming that exists using an experiential education philosophy in an outdoor setting. As Smith and Walsh (2019) note, there is tremendous variation in terminology regarding organizations and programs that operate outdoors and utilize an experiential education approach. This has been shown to be particularly true among studies that share similar constructs (Smith & Walsh, 2019). Perhaps the most common term, outdoor education, is thought of as a pedagogy in which to promote positive psychosocial and emotional development through the teaching of non-cognitive skills to participants through the experiential learning process (Fang et al., 2021). As policies, needs, and organizational goals evolved, so too did the concept of outdoor education (Catalano et al., 2004). However, there is still no universal definition of outdoor education that is used across the literature (Smith & Walsh, 2019). Table 1 summarizes varying programs, strategies, and target outcomes of educational versus therapeutic programs in the United States in more detail.

Since World War II, outdoor and adventure education programming has developed compartmentalized under two broad categories, experiential education and wilderness therapy (Houge Mackenzie et al., 2014). Wilderness therapy, also occasionally known as adventure therapy, was originally derived from the conception of Outward Bound (Hahn, 1957; Stevens et al., 2004). The Outward Bound organization is still operational and has grown and evolved substantially, but explicitly claims its programming is not therapy (Outward Bound, 2021). The most common conception of wilderness therapy entails clinical therapy administered in a residential wilderness environment and include organizations such as Blue Ridge Therapeutic Wilderness (2022), Open Sky Wilderness Therapy (2022), and SUWS of the Carolinas (2022), for example. In these instances, clinical sessions are coordinated with the prescriptions of outdoor and adventure activities to kinesthetically engage youth on a cognitive, affective, and behavioral level (Gass et al., 2012). Wilderness therapy and other explicitly health-focused organizations typically describe programs of interest as wilderness therapy or adventure therapy, and target outcomes include characteristics such as reduced aggression, behavior change, physiological recovery from acute injury, recidivism reduction, and improved well-being (Smith & Walsh, 2019). However, other terms for wilderness therapy can include wilderness adventure therapy, outdoor therapy, outdoor behavioral healthcare, and adventure-based counseling (Gillis et al., 2008). Some studies have used the term ‘therapy’ to denote what is not currently regarded as wilderness therapy while studying constructs more aligned with educational or experiential focuses like self-esteem (e.g., Herbert, 1998), despite the argument that self-esteem could be seen as a health-outcome. Others have used adventure programming as interventions for explicitly health-related outcomes, such as health related quality of life (HRQL) among children with cancer and labeled the program intervention as adventure therapy (Stevens et al., 2004).

Variation in terminology is common, however, the specific placement of an outdoor organization in the experiential education landscape can be distinguished based on the target outcomes being researched. Reducing recidivism rates, aggressive behavior, drug use and dependency, and increasing internal locus of control and positive peer relations are common target outcomes for health-focused outdoor programs (Gillis et al., 2008; Russell, 2003; Smith & Walsh, 2019). Moreover, Gillis et al. (2008) found statistically significant results that an adventure-based behavior management program was effective over a three-year timespan in reducing re-arrest rates among male juvenile delinquents. In another wilderness therapy program with adolescents with various mental health issues, Bowen et al. (2016) found statistically significant improvements in psychological resilience and self-esteem.

Meanwhile, Ward and Hobbs (2006) found that mean levels of social, personal, and physical anxiety post-expedition were lower after a short program intervention in college. Indeed, there is a plethora of literature that showcases a multitude of individual benefits from various outdoor programs. Furthermore, in the aforementioned study with youth participants with cancer, researchers found that the adventure education program utilized as a therapy intervention supported existing research that adventure education as a therapeutic intervention facilitates improvement in health-related quality of life and self-esteem (Stevens et al., 2004). Relatedly, some results indicate that the viewing of and immersion into nature has a significant positive impact on vitality, well-being, anger, anxiety, stress, and attention (Bird, 2007; Rohde & Kendle, 1994; Ryan et al., 2010). Herzog et al. (1997) found that participants of an outdoor adventure-style expedition that only lasted a few days in duration reported less irritability, mental fatigue, and improved concentration problem-solving skills. Multiple studies have found that, after adjusting for age, gender, socioeconomic status (via household income), and general

physical activity level, there was a significant relationship between time spent in outdoor, green spaces and emotional well-being (Korpela et al., 2014; Triguero-Mas et al., 2015). Maas et al. (2009) further found that physician-assessed morbidity was related to the prevalence of green spaces in individuals' living environments. Additionally, in a meta-analysis of 24 studies, Hans (2000) found that internalized locus of control was increased among participants who participated in an adventure education program with an effect size of .38, above what was expected. In wilderness therapy settings, providing youth with opportunities to master skills as a result of their own effort can result in increased self-efficacy and reduction in self-defeating attitudes and behavior (Kimball, 1991).

Meanwhile, educationally focused programs are often described in terms of environmental education, adventure education, outdoor education, or a combination of some or all of the three (Sammet, 2010; Wentworth-Larson, 2010). These organizations and programs typically focus on personal and social outcomes, such as self-esteem, courage, relationships, environmental virtue, social justice, and others (Smith & Walsh, 2019). However, the integration of an experiential learning approach in an outdoor learning environment is what is currently known most commonly as outdoor education (Carlson, 2005). Outdoor education programs leverage hardship and challenge that is embedded in programming to develop personal, character-related skills, such as confidence and self-efficacy (D'Amato & Krasny, 2011). Mutz and Muller (2016) define self-efficacy as an individual's perception of their ability to successfully achieve a desired outcome through actions. Self-efficacy has been previously linked to youth perceptions of personal empowerment as well as learning relevance of the outdoor education program (Sibthorp, 2003). In a meta-analysis of 12 studies, researchers found that youth self-efficacy improved after participation in an outdoor education program, but the

relationship was moderated by mental health status, and duration of the interventions (Fang et al., 2021). While a medium-to-large effect size was noted (Hedge's $g = .597$), larger effect sizes were found for youth participants with mental health concerns (Fang et al., 2021).

Outdoor education has been leveraged in promoting positive youth development in young girls, specifically, as well. Previous research has consistently found differences in important developmental outcomes like empathy and self-esteem between sexes (McMullin & Cairney, 2004). Solo events, an activity within outdoor education where a participant remains alone for a predetermined period, provide youth – particularly girls – with an opportunity to internally discover what they are capable of (Angell, 1994). In a study that focused on at-risk adolescent girls, increased empowerment was a significant outcome found among those who participated in ropes course challenges and a hiking trip (Autry, 2001). Whittington and Mack (2010) further found that both physical and expressive confidence (defined as confidence in one's body and in expressing oneself vocally, respectively) increased in girls who participated in an outdoor education program. Other studies utilizing semi-structured interviews of adolescent girls in 7th, 8th, and 11th grades found that a similar outdoor education program facilitated by the aforementioned organization NOLS may have contributed to stronger social connections, self-efficacy in leadership positions, and overall reappraisal of individual and group identities (Richmond et al., 2018). Furthermore, all youth participants in an outdoor education program catered for girls reported the program positively influenced their body image; many participants claimed that their body image was still positively influenced three years post-program and attributed the change to their instructors and peers in the program, and the time spent in the natural environment (Barr-Wilson & Roberts, 2016). It is unclear whether these same effects pertain to adolescent boys as well, and more research is needed in this domain.

The target outcomes in research on outdoor education programs vary widely. While one study focusing on the outcomes of youth from camp experiences found multidimensional growth in the domains of positive identity, social skills, positive values, and spirituality (Thurber et al., 2007), others found correlations between youth's perception of the impact of their outdoor education course and traditional classroom performance (Cooley et al., 2015; Williams, 2013). In both health focused and educationally focused organizations, target outcomes can become entangled because integral pieces of outdoor education programming are shared, including immersion in the outdoors and the foundational tenet of experiential education (Robbins, 2015). This is primarily the reason why overlap can be found between organization type and goals, and scientific research target outcomes; for example, finding statistically significant improvements in psychological resilience and self-efficacy among adolescents with various mental health issues participating in a wilderness therapy program (Bowen et al., 2016).

Experiential education can conceptually be traced back to Socrates, in that teaching and learning is concentrated on asking students questions – facilitating an empowering environment (Shellman, 2014) – instead of simply providing answers (Crosby, 1995). Experiential education is facilitated by teachers but led by students (Chapman, 1995), and teachers can be considered guides for student learning while students autonomously process and experience the ELT cycle (Robbins, 2015). In all variations of outdoor experiential programming, the elements of the outdoors, interdisciplinary styled education delivery, and engaged hands-on learning are prevalent (Robbins, 2015) but use elements to different goals. For a more comprehensive review of how outdoor education is conceptualized, see Smith and Walsh (2019) and Gillis, et al. (2008).

Variability in Research Methodologies

Given the breadth of scope and variability in target outcomes reviewed above, it is inevitable that scientific research focusing on the role of outdoor education programs on youth development will further vary methodologically. Specifically, studies adopt different methodological approaches that most aptly fit the organization, sample population, and data. As a result, a mixture of qualitative, quantitative, and mixed methods can be found across the research literature on outdoor education programming on youth development. Anecdotal observation remains one of the primary methods in which outdoor education organizations and practitioners can witness and understand the potential benefits to their programming (Williams & Allen, 2012). Qualitative, anecdotal, and otherwise non-quantitative analysis is leveraged to discover patterns and themes that result from activities and programs (Stevens et al., 2004), and is often used to guide future research and assist in model building (Sibthorp et al., 2007). In a study on how outdoor education can complement traditional educational pedagogy and classroom performance, semi-structured interviews conducted with adolescent girls were conducted to uncover how non-cognitive benefits such as social connectedness and self-efficacy can contribute to traditional classroom competency (Richmond et al., 2018). A similar approach was undertaken by Mutz and Muller (2016), who conducted semi-structured interviews with adolescents participating in a hiking expedition before and after the trip. Hill and Sibthorp (2006) used self-determination theory in a quasi-experimental study to guide adolescents with diabetes at a residential summer camp, using a mixture of deliberate and autonomy-supporting activities informed by theory to increase positive internalization of diabetes management. Finally, Bowen et al. (2016) used formal interviews on participants in a clinical setting before and after an adventure therapy program was implemented as an intervention to mental health to gauge overall adolescent mental health.

Meanwhile, quantitative analysis has the potential to quantify behavior and generalize results to larger populations, as well as test models. Due to the nature of outdoor education programming and the resulting data, very few organizations and practitioners utilize quantitative and empirical data collection mechanisms (Williams et al., 2018). However, qualitative research alone cannot provide the comprehensive evidence base that is needed to influence policy change (Williams et al., 2018). Utilizing a repeated measures design to track longitudinal changes over time and latent growth curve modeling to derive results, Williams et al. (2018) found benefits to psychosocial, emotional, physical, spiritual, and educational domains after youth participated in an outdoor education program. Relatedly, multiple studies have used pre- and post-testing, as well as post-testing 90 days after completion of an outdoor education program for youth for some, to measure effects of an outdoor education program as an intervention (Norton & Watt, 2014; Rose et al., 2018). Korpela and colleagues (2016) were able to conduct mediation analysis from data collected via online surveys to over 3,000 Finnish youth who completed outdoor interventions in a study measuring youth depression. Barr-Wilson and Roberts (2016) also used secondary data that was already collected by the organization to uncover the potential impacts of their programming on adolescent girls' body image and overall mental health. In a study conducted through NOLS, Sibthorp et al. (2007) operationalized objectives in conjunction with NOLS practitioners to measure the outcomes of interest.

A mixed-methods and iterative approach, in which qualitative and quantitative methods build and test models respectively and cyclically, may be the most appropriate approach in researching outdoor education programs (Sibthorp et al., 2007). Studies that have incorporated both qualitative and quantitative aspects have found results that suggest outdoor education programs support youth participants' development (Passarelli et al., 2010). Through this iterative

and cyclical process, models – such as the developmental assets and Positive Youth Development models – have been able to be developed and employed in outdoor education research. As a result, comprehensive confirmatory factor analyses have been conducted on certain models that aim to measure youth development in various capacities, thereby increasing the validity and credibility of mechanisms for measuring positive youth development in an outdoor and/or experiential learning setting (Bowers et al., 2010; Conway, Heary, & Hogan, 2015; Dvorsky et al., 2019; Jelicic et al., 2007; Phelps et al., 2009), leading to increased scientific understanding of the mechanisms at work in youth development. However, these advancements in the scientific literature are limited, and many scientific deficiencies have been noted in the literature on outdoor education's role in youth development.

Critical Perspectives in the Literature

Critical analysis of any existing literature will bring to light various inefficiencies and flaws in logic, methodology, replicability, and validity. With the diversity in outdoor education organizations, programs, and corresponding scientific studies researching the efficacy of such programs, it is inevitable that literature will abound on shortcomings in the field. Such recommendations are inevitable, and of course, are welcome to strengthen the research literature and advance the field of outdoor education research. In a critical analysis, Henderson and Fox (1994) list ten areas of improvement that would dramatically improve the outcomes of scientific research studies in this area. Many of these areas involve improving methodological approaches, gaining definitional and operational clarity of constructs, and basing studies on unifying frameworks (Henderson & Fox, 1994). Researchers in addition to Henderson and Fox (1994) note the scarcity of quantitative, longitudinal, and randomized control studies in the overall field of experiential education (Gillis et al., 2008). Self-selection, small sample sizes, and a variety of

potentially confounding variables unfortunately pervade studies on outdoor education and hinder the development of common and replicable evidence-based practices and empirically validated models (Hattie et al., 1997; Ewert & Sibthorp, 2009). For example, Norton and Watt (2014), in studying the impact of an outdoor education program for urban youth, noted the possibility of test-retest bias in their study. These methodological shortcomings lead to issues of understanding exactly why outdoor education programs are effective, inhibiting the ability to derive causal inferences (Henderson, 2004).

Numerous studies, including large meta-analyses, have found null findings or impermanent effects in both original and replicated studies (Cason & Gillis, 1994; Green et al., 2000; Hattie et al., 1997; Riger, 1993; Sheard & Golby, 2004; Williams et al., 2018). Considering the significant heterogeneity in foci in extant studies, there may be several reasons for these null findings or fleeting effects. In a study exploring the effects of outdoor education programming on self-esteem, Leather (2013) noted that it was critical to concretely define operational constructs in outdoor education so that ambiguity and bias can be more effectively removed, and clarity can be achieved with results. Gillis et al. (2008) also call for increased operational construct clarity and note the need for differences in constructs depending on the demographic of youth being served and studied. These calls for broadly and consistently clear operational constructs may inadvertently highlight a potential cause of null findings, particularly in meta-analyses. Meta-analyses appear to be the most effective way of discerning generalizable effect sizes in the outdoor education literature (Smith & Walsh, 2019). This rationale is due to the disparity in operational definitions in the industry. Systematic reviews are thought by some to be the most effective way to measure the impacts of outdoor education programs on youth development precisely because of the general inability to efficiently compare findings across

broad contexts. Indeed, meta-analyses have reported promising findings in the outdoor education literature (Cason & Gillis, 1994; Hattie et al., 1997; Hans, 2000; Fang et al., 2021; Bowen & Neil, 2013). However, with the disparate definitions between therapeutic and educational outcomes, and resulting differences between outdoor education goals, meta-analyses may not be a sufficient method of fully understanding outdoor education outcomes on youth development due to the aggregation and analysis of completely different constructs.

In addition to the need for clear and common operational definitions across the literature, potential moderators abound that muddle the interpretation of outdoor education programming effects. Some researchers argue that experiential education outcomes in general are context-specific (Riger, 1993). Potential moderators exist among both youth participants and programmatic implementation, with age, ethnicity, sex, socioeconomic status, geographic origin in key developmental periods, floor and ceiling effects, and many others contributing to the potential list of moderators among youth participants (Williams et al., 2018). Meanwhile, inconsistent program and activity implementation by staff and timing of the implementation contribute to the list of potential program moderators (Williams et al., 2018). For example, the majority of youth participants in outdoor education programs are Caucasian boys (Bandoroff & Scherer, 1994; Russell et al., 2008; Warren, 1996; Wilson & Lipsey, 2000). Additionally, the outdoor education industry is expensive; consequently, many families and youth are not able to experience it due to affordability, skewing the youth samples in research (Williams, 2013).

Due to the distinct nature of many outdoor education organizations and programming, many outdoor education studies are not replicable (Davis-Berman & Berman, 1994; Ewert, 1989). This directly inhibits the advancement of the research literature in the field, and further highlights the need for unifying theoretical frameworks and clear operational definitions. The

lack of common frameworks across outdoor education studies has been noted repeatedly and calls for researchers to move toward an integration of research findings by making epistemological links between programmatic elements to underlying psychological processes is not new (Houge Mackenzie et al., 2014). Empirical results from studies have offered evidence that some outdoor education programs are fundamentally effective, but most studies still cannot explicitly communicate a complete understanding as to why they are effective (Shooter, 2010). Despite the research speaking to the benefits of outdoor education programs on youth – most notably in self-efficacy and empowerment – there are gaps in the literature regarding the longevity of program outcomes, and whether those outcomes translate into other environments, samples, contexts, and domains (Shellman, 2014). In a study promoting adolescent health and well-being through an outdoor education program, Rose et al. (2018) found evidence that supports the hypothesis that such programs can improve youth well-being, but the benefits were found to be domain specific, not ubiquitous. Taken together, this places outdoor educators and scientific researchers at a crossroads. Outdoor educators are aware of an effectiveness in their programs because educators witness idiomatic transformation occurring in youth participants (Houge Mackenzie et al., 2014). However, to scale and effect change in educational programming to best support positive youth development, explicit developmental frameworks, constructs, and measures must continue to gain traction in literature with a more focused approach (Sibthorp, 2010).

Variability in Theoretical Frameworks

Many studies adopt different psychological theories as frameworks in which to view and interpret results and the efficacy of the program in question (Houge Mackenzie et al., 2014). Some theories appear to support outdoor education programming more seamlessly than others,

and as a result, some theories are more prevalent in the research literature. Some noteworthy psychological theories used in the research literature regarding the role and effects of outdoor education on youth development include the aforementioned self-determination theory (Deci & Ryan, 2000), place-based education (PBE; Wattchow & Brown, 2011), developmental systems theory (Ford & Lerner, 1992), the developmental assets model (Scales et al., 1999), and the Positive Youth Development model (Lerner et al., 2005).

Self-Determination Theory (SDT). Self-determination theory (Deci & Ryan, 2000) is a relevant framework in which to view outdoor education research due to the large number of target constructs that overlap between it and outdoor education, mainly self-efficacy, empowerment, and autonomy (Autry, 2001; Fang et al., 2021; Mutz & Muller, 2016; Sibthorp, 2003). In self-determination theory, three key factors are hypothesized to be necessary to comprise optimal development: competence, autonomy, and relatedness (Deci & Ryan, 1985). Competence (Neill et al., 2003; Williams, 2013), autonomy (Ramsing & Sibthorp, 2008), and relatedness (Thurber et al., 2007; Vroegop, 2015; Williams, 2013) are all prevalent constructs that outdoor education programs focus on and strive to achieve in their participants. In an experiment to attempt to foster increased responsibility and autonomy in personal diabetes management among adolescents, Hill and Sibthorp (2006) successfully used self-determination theory as a guiding principle in the experimental setting – a residential camp – resulting in an increased positive internalization of diabetes management. Choosing self-determination theory as a guiding psychological framework to conduct similar scientific research aimed at promoting autonomy, self-efficacy, and positive self-perception is logical, as Deci and Ryan (2000) postulate that individuals are motivated to behave in various ways to the extent that they experience a true sense of volition and choice. By creating and facilitating an empowering

environment (Shellman, 2014), youth are given freedom and are supported to experiment with new thought processes and behavior (Andrews, 1999).

Place-Based Education (PBE). Meanwhile, place-based education (PBE) is not a new psychological theory but is becoming increasingly popular in educational settings (Smith & Walsh, 2019). It is currently practiced in numerous private and charter schools, and some public school systems within and outside of the United States (Molyneaux & Tyler, 2014). Place-based education is rooted in previous pedagogies – including that of Dewey (1897, 1938) – in that it employs a dynamic learning process against a backdrop of specific context. Place-based education is currently difficult to define as its focus changes across contexts in which it is implemented in, and due to its adaptability within different environments or places (Smith, 2002). Indeed, one critical point to PBE is that the “place” may not always hold a positive connotation to the individual (Somerville, 2007). However, Sobel (2004) attempts to define PBE in general terms, claiming PBE is a pedagogy that uses the local community and environment in which one is situated as a foundation to teach various subjects across the curriculum. The idea that the place in which learning occurs is influential in the learning process is not isolated. Wattchow and Brown (2011) also assert that the place in which an experience occurs is the primary filter in which to process the experience. More broadly, time and place appear to matter when it comes to development (Holsen et al., 2017). Therefore, it is no surprise the PBE has gained traction in both existing school systems and outdoor education organizations outside of traditional school systems.

Its rising popularity in being implemented in educational settings – particularly in outdoor education – can be seen as a response to criticisms of perceived weak points in the United States education system (Deringer, 2007). Greunwold and Smith (2014) posit that PBE

has risen in popularity due to criticisms in the U.S. school system regarding the current perceived lack of value towards nuance, context, and community in education. The increased value and reliance on standardized testing in public school systems is seen by some as a detriment to learning for youth, and PBE has been adopted to supplement those gaps in key pedagogy (Gruenwold & Smith, 2014). Place-based education requires learners to ask critical questions about the place in which learning is taking place, potentially connecting learners to the area and community the education is taking place in and provides an opportunity for deeper learning to take place overall (Wattchow & Brown, 2011).

Despite the increasing popularity of PBE, scientific research on PBE is lacking, with no theoretical basis and explanation connecting overarching theories with local context (McInerney et al., 2011). While there is not enough scientific evidence to validly assess its impact on educational outcomes in youth, it does offer extremely promising pathways for future research (Smith & Walsh, 2019). For a more in-depth review of place-based education, see Deringer (2007) and Gruenwold and Tyler (2014).

Developmental Systems Theory (DST). Developmental systems theory (Ford & Lerner, 1992) adopts a systems approach to making sense of and analyzing complex interactions and subsequent outcomes. Similar to chaos and complexity theory (Pratt, 2008; Richardson & Cilliers, 2001), DST posits that biological and behavioral traits emerge from the complex interactions between innumerable factors that an individual experiences, forming a single complex system (Pradeu, 2015). It further postulates that nature and nurture do not contribute to an individual's development independently; rather, nature and nurture as factors, and the influences they impose on individuals, are inextricably intertwined in the complex process of development (Lewkowicz, 2011). Over time, due to its rich history and theoretical foundations in

biology and philosophy (Griffiths & Tabery, 2013), DST has been interpreted and leveraged in research in numerous ways. Since developmental outcomes are explained at a systems level, and context has been shown to influence development complexly, the impression and interpretation of the system in question becomes extensive (Griffiths & Tabery, 2013). Moore (2016) points out at least three different ways in which DST is conceptualized and utilized in scientific research.

The Developmental Assets Model. The Developmental Assets model is a concept derived by the Search Institute to identify the elements of a successful strengths-based approach to development (Benson, 1990; Scales et al., 1999). In this model, 40 developmental assets in total are grounded in developmental systems theory and can be categorized overall into external and internal assets (Benson, 2007). External assets (20 in total) include youths' external support systems, perspectives of responsibility, and how they constructively use their time – creative activities, youth programs, religious or spiritual involvement, and quality of time spent in the home (Scales & Leffert, 2004). Internal assets (20 in total), meanwhile, pertain to values and competencies, including commitment to learning, positive values, social competencies, and positive identity (Scales & Leffert, 2004). Developmental assets can be seen as specific building blocks of health development (Scales & Leffert, 2004), and are hypothesized to be additive or cumulative in nature (Benson, Scales, & Syvertson, 2011). Scales et al. (1999) have suggested in studies that possessing more assets as a youth leads to engaging in less risky behavior. Having both external and internal assets has been shown to be a strong predictor of future success for youth, and research has shown that avoiding risky, delinquent behavior in adolescence reduces the risk of repeating the same behavior in adulthood (Benson et al., 2004). In programs that utilized the developmental assets model in outdoor education activities for urban youth, a

positive impact on both internal and external assets was found regardless of gender or ethnicity (Norton & Watt, 2014). Although findings have shown that ethnicities can moderate the exact combination of developmental assets influenced by outdoor education programs (Norton & Watt, 2014), over 20 years of research on developmental assets support the validity of the model across many different common characteristics in psychological literature, including gender, ethnicity, geographic location, and socioeconomic status (Benson, Scales, & Syvertson, 2011).

Consequently, the current pertinent question in scientific research is identifying specifically which types of programming, experiences, activities, and relationships actually bolster these assets. The strengths-based approach of youth development has slowly become the predominant conceptual lens through which youth are studied within the United States (Lerner et al., 2010). In a meta-analysis of more than 800 studies pertaining to developmental assets in various contexts, researchers found that not only is the developmental asset model firmly supported by the literature, but that context and individual differences are key moderators in the relationship between the assets and outcomes (Scales et al., 1999). For an excellent overview of developmental systems theory and its variations, see Moore (2016) and Griffiths and Tabery (2013). For an in-depth review of developmental assets, see Benson (2007) and Benson et al. (2011).

The Positive Youth Development (PYD) Model. Despite differences in terminology, desired outcomes, and theoretical frameworks used in the literature, there are commonalities among studies that indicate common and critical core factors for quality youth programs. In an overview on community-based organizations and their role in youth development – of which outdoor education programs certainly are a part of – Eccles and Gootman (2002) cite the National Research Council on common elements, including: developmental frameworks,

commitment to accountability and integrity of outcomes, competent staff, safety, supportive relationships, positive social norms, opportunities to effect change, and integration with family, school, and communities. Many outdoor education programs enact these elements naturally, and the Positive Youth Development (PYD) model frames much of the scientific research on health and development in adolescence (Lerner et al., 2010). Literature abounds highlighting the increasing need for the experiential education field to move toward an integrated and common framework to reduce theoretical differentiation (Houge Mackenzie et al., 2014; Robbins, 2015; Sibthorp, 2010; Smith & Walsh, 2019). Just as research has shown that youth development programs must embrace a nuanced and contextual approach to foster a positive developmental environment (Mansfield, Cotton, & Ginns, 2020), the contextual elements of outdoor education programming must also be embraced in outdoor education research to derive clear and definitive results (Ewert & McAvoy, 2000; Henderson, 2004; Williams et al., 2018). While this may seem counterintuitive, this can be done by adopting a common framework or model in which to analyze outdoor education data that capitalizes on the commonalities of outdoor education programming while leaving room for nuance and context (Eccles & Gootman, 2002; Lerner et al., 2010).

Of the frameworks reviewed above, the PYD model was identified as one of the most promising and most relevant for this thesis project for reasons discussed below. The PYD model is becoming increasingly prevalent in the research literature and is supported by empirically, well-validated findings (Bowers et al., 2010; Heck & Subramaniam, 2009). Grounded in developmental contextualism and developmental systems theory (Lerner, 2002, 2004), the PYD model is comprised of the “Five Cs” as factors: (1) *Competence*; (2) *Confidence*; (3) *Connection*; (4) *Character*; and (5) *Caring* (Lerner et al., 2005), with each of the Five Cs acting as latent

constructs that load onto a higher-order latent construct of positive youth development (Lerner et al., 2005). A sixth “C” of *Contribution* is also hypothesized to exist when the previous five factors are present in an individual, where youth contribute positively to the self, community, and then society (Lerner et al., 2005). See Figure 1 for a visual overview of the PYD model. According to the PYD model, *Confidence* pertains to a positive view of one’s actions in social, academic, cognitive, and/or vocational domains (Lerner et al., 2005). *Confidence* refers to an internal sense of positive self-worth and self-efficacy. *Connection* refers to positive bonds with other people and institutions. *Character* pertains to respect for societal and cultural rules, a sense of morality and right and wrong, and integrity. Lastly, *Caring* refers to sympathy and empathy for others (Lerner et al., 2005, p. 23). See Table 3 for more detailed definitions of the PYD model factors within the GCY context. The PYD model adopts a strengths-based orientation toward youth – as opposed to a deficit-orientation historically adopted – attempting to reduce unhealthy behavior while simultaneously aiming to foster strengths in the individual in the social and emotional domains (Passarelli et al., 2010; Roth & Brooks-Gunn, 2003; Thurber et al., 2007). In essence, the PYD model postulates that when individual strengths are aligned with strengths of a given context, positive and healthy youth development will occur (Bowers et al., 2010; Brandtstadter, 2006; Lerner, 2004). Correspondingly, programs that foster the Five Cs would promote competence in the social, emotional, cognitive, behavioral, and moral domains (Catalano et al., 2004). The PYD model has been supported explicitly and implicitly in numerous studies on outdoor education (Barr-Wilson, 2016; Feenstra, 2015; Larson, 2006; Lerner et al., 2005; Lerner et al., 2010; Norton & Watt, 2014; Passarelli et al., 2010; Rose et al., 2018; Thurber et al., 2007; Whittington & Mack, 2010; Williams, 2018;), and even in studies that have

examined non-adventure education-related interventions such as the effects of sports participation on youth (Zarrett et al., 2009).

Statistical Validation. In addition to research on outdoor education programs as interventions in youth development, the PYD model has gone through extensive statistical validation as a model (e.g., Bowers et al., 2010; Chen et al., 2018; Conway et al., 2015; Dukakis et al., 2009; Dvorsky et al., 2019; Geldhof et al., 2013; Holsen et al., 2017; Jelicic et al., 2007; Phelps et al., 2009). The PYD model posits that the five latent variables of *Competence*, *Confidence*, *Connection*, *Character*, and *Caring* are distinct but interrelated, and can be accounted for by one common underlying higher order latent construct of positive youth development (Bowers et al., 2010; Lerner et al., 2005). Not only is it critical that scientific research in the field move towards utilizing a common framework and derive a common vocabulary across studies so that research findings can be compared, but it is also vital to develop adequate and accurate measures of the construct to ensure organizations and researchers are making accurate and correct assertions regarding outdoor education programming (Dukakis et al., 2009).

Lerner et al. (2005) and Phelps et al. (2009) have established the PYD model as a valid measure across early adolescence, and Bowers et al. (2010) expanded this validity through middle adolescence with youth in eighth, ninth, and tenth grades. Measurement invariance in the PYD model has been tested extensively to ensure group comparisons can be made over time with parameters such as mean difference and regression coefficients, and between group characteristics such as gender, age, and ethnicity (Bowers et al., 2010; Schmitt & Kulijanin, 2008). Previous structural equations models on the same data from the seminal 4-H study of the PYD model (Lerner et al., 2005) have suggested that the Five Cs as latent constructs load onto a

second-order latent construct of positive youth development, which has been found to be related to societal contribution, depression, and risk behavior (Jelicic et al., 2007). Phelps et al. (2009) furthered the verification of the Five Cs construct by verifying that the model could be operationalized through the lower-order latent constructs that directly represent each of the Five Cs to younger adolescents.

In response to concerns about the generalizability of the PYD model in measuring positive youth development, numerous validations of the model have been conducted outside of the United States. In Ireland, the model was replicated successfully using 672 Irish youth (Conway et al., 2015). Both internal reliability and construct validity were supported, as well as measurement invariance from early adolescence to late adolescence. Although internal reliability across the Five Cs was replicated, the *Competence* factor had the lowest internal reliability ($\alpha = .45$, 95% CI 0.37–0.52) (Conway et al., 2015). This could arguably be expected as one could expect the personal values of adolescents – particularly regarding competence – will change over time as youth develop (Bowers et al., 2010). Despite the low internal reliability, the researchers reported that all competence indicators loaded significantly onto the latent factor *Competence*, warranting their inclusion in the model (Conway et al., 2015). In another replication outside of the United States, Chen et al. (2018) used exploratory structural equations modeling instead of confirmatory factor analysis and found a better fitting model and relatively smaller factor correlations, further suggesting that some of the Five C factors may represent the same latent construct (Conway et al., 2015). In another study outside of the United States, inconsistencies were found between the *Confidence* and *Competence* factors within the model in a Chinese youth sample but may potentially be due to cultural differences between Chinese and American societies and respective common adolescent values (Chen et al., 2018). Holsen et al. (2017), in

another study verifying the construct validity of the PYD model outside of the United States, found weaker factor loadings and differences in invariance measurement in a Norwegian youth sample. Despite this, latent correlations matched previous research findings (Holsen et al., 2017).

In advancing the literature on the PYD model to refine it to its best fit, Dvorsky et al. (2019) found that a bifactor model of the PYD model fit significantly better and showed measurement invariance across sex with a global measure of PYD and one of five constructs that represent the variance of each of the Five C factors after controlling for global PYD as the two factors; a shortcoming of the previously tested models (Bowers et al., 2010; Lerner et al., 2005). In the bifactor model, each of the Five Cs represent systematic item variance not directly related to the higher-order latent construct of PYD, circumventing the assumption that youth are positively developing and resulting in corresponding youth's scores on the Five Cs (Dvorsky et al., 2019).

Based on recent research concerning the factor structure and validity of the Five Cs as an adequate construct measuring positive youth development, further investigation is required to achieve a fully accurate, solidified model. However, given that the Five Cs of Positive Youth Development continue to be the most empirically researched theoretical models pertaining to youth development (Heck & Subramaniam, 2009) and its demonstrated utility for the assessment of outdoor education programs (Smith & Walsh, 2019), it was selected for use as a framework to help place the current program evaluation in conversation with the extant theoretical and empirical literatures on outdoor education.

Therefore, the PYD model (Lerner et al., 2005) has been chosen for this purpose due to its empirical support and general reverence in the research literature (Heck & Subramaniam, 2009; Lerner et al., 2010). By categorizing open-ended responses from youth participants post-

expedition survey data to factors of the empirically tested model of positive youth development and making recommendations based on available data, this thesis embraces the theory-data-cycle through the incorporation of a theory, incorporating data, and making refinements to said theory based on the data in a cyclical fashion. In this sense, the PYD model is incorporated not to function as an indicator of success or failure of GCY to achieve positive youth development from their programming. Rather, it is meant to function as a benchmark, comparison, and general direction to GCY's programmatic and data mechanisms due to its unique stature as a well-validated empirical model (Barr-Wilson, 2016; Feenstra, 2015; Larson, 2006; Lerner et al., 2005; Lerner et al., 2010; Norton & Watt, 2014; Passarelli et al., 2010; Rose et al., 2018; Thurber et al., 2007; Whittington & Mack, 2010; Williams, 2018). Therefore, this thesis utilizes the PYD model as the theory, incorporates GCY data into the theory, and will subsequently generate informed refinements to the model based on GCY data, existing psychological frameworks that invoke values held by the GCY, and GCY elements of interest produced by organizationally internal theory-of-change discussions that occurred simultaneously to the current study, to hypothesize a refined model that more aptly fits youth programming in outdoor or experiential learning contexts.

Grand Canyon Youth (GCY)

Grand Canyon Youth (GCY) is a 501(c)(3) organization based in Flagstaff, Arizona, that offers educational outdoor expeditions that aim to connect youth to the transformative powers of the rivers and canyons of the Southwest (GCY, 2022). As stated on their website and in program materials, the organization envisions “a diverse and equitable world where all youth are empowered to live with purpose while discovering and caring for self, community, and the natural world,” and currently holds six official values: *connection, adventure, curiosity, respect,*

intention, and *responsibility* (GCY, 2022). As an organization, GCY is relationship-focused, which remains at the core of most outdoor education and adventure programs that serve youth (Sibthorp, 2010). Other similarities between GCY and the reviewed literature include GCY's viewpoint that growth and development occur healthily in a circular model of expansion outwards, from the (1) self, (2) immediate community, and (3) nature (e.g., Lerner et al., 2005; GCY, 2022). Interestingly, GCY developed a framework that postulates a hierarchical logic of valuing – and taking care of – first the self, then one's immediate community and surroundings, and finally the larger community or nature completely independently of the scientific literature reviewed in the current study and of this study's influence during the collaborative process. This organizational framework is not shown or encompassed in the current study due to its ongoing refinement in a larger organizational discussion at GCY.

Grand Canyon Youth's stated values and emphasis on oneself in the context of community interrelates with the existing literature on self-efficacy and empowerment (Shellman, 2014). Furthermore, GCY programming heavily relates to the aforementioned design principles of youth development; Table 2 showcases the design principles that GCY actively fosters in their programming. GCY also relies heavily on the concept of place-based education (Wattchow & Brown, 2011). GCY's pre-expedition fundraising and volunteer activities assigned to youth participants, and their adamant Leave No Trace policies (Leave No Trace, 2022) both align with the PBE principles of engagement through community connection and environmental justice (Deringer, 2017). Although there is not enough empirical research on PBE to use it to assess the impact of places on educational or developmental outcomes, its addition offers great potential for developing new theoretical frameworks or adapting existing models in future research (Smith & Walsh, 2019) and is discussed in directions for future research.

GCY's "Individual Expeditions" (IE) are one of three overall types of programming offered. The other two main programs are "Group & School Expeditions" (Group) and "Peer Support Expeditions" (Grand Canyon Youth, 2022). For more information regarding Peer Support Expeditions, see <https://gcyouth.org/expeditions/>. Individual Expeditions are composed of youth who apply independently, as opposed to a preformed group or community. As a result, many youths meet each other for the first time during pre-expedition activities. Conversely, in Group Expeditions, youth arrive in pre-formed groups, usually in the form of the grade school classrooms that wholly partakes in the GCY trip. Figure 2 displays a visual depiction of GCY's overall programming.

Individual Expeditions (IE) are organized primarily by the age group of youth and are designated separately. Youth ages 15 to 19 participate in "Partners in Science" (PIS) expeditions and have the choice of completing an Upper Grand Canyon (9 days), Lower Grand Canyon (10 days), or Full Grand Canyon (19 days) expedition. Partners in Science expeditions were developed in collaboration with the Grand Canyon Monitoring and Research Center (GCMRC), whose goals are to "to develop monitoring and research programs, and related scientific activities, that evaluate short and long-term impacts of the Glen Canyon Dam on the biological, cultural, and physical resources of the Colorado River Ecosystem" (GCY, 2022). Accordingly, youth who participate in a Partners in Science expedition are accompanied by both GCY guides and GCMRC scientists to complete education curricula.

Youth in the age group of 11 and 14 years can attend a "Middle School Adventure" (MSA) expedition and have the choice of signing up for an Upper San Juan (6 days) or Lower San Juan River (7 days) expedition (Grand Canyon Youth, 2022). Grand Canyon Youth endeavors to also provide these youth with an educational curriculum where youth can learn

about the ecology, geology, and history of the San Juan Canyon, and specifically strive to spark curiosity and promote fun (Grand Canyon Youth, 2022).

Lastly, youth between the ages of 11 and 14 can engage in a Verde Valley Explorer expedition, which are single-day kayaking trips on the Verde River. Due to the nature of these expeditions, the primary focus of Verde Valley Explorer is to engage youth in exploration, play, teamwork and team-building activities, and build a sense of community among youth (Grand Canyon Youth, 2022). Unfortunately, examination of existing GCY data that was utilized in the current study revealed insufficient data for Verde Valley Explorer youth participants. Therefore, data regarding IE will focus on PIS and MSA expeditions. Additionally, it should be noted that GCY recently began offering “full” versions of both PIS and MSA expeditions for the Colorado and San Juan rivers, respectively. Data from youth participants who participated in “Grand Canyon Full” or “San Juan Full” expeditions were included in the current study.

Meanwhile, Group Expeditions are determined primarily through communication between the trip coordinator – usually the youth participants’ classroom teacher or related adult chaperone – and GCY office staff. These expeditions are titled uniquely, and do not fall under the Partners in Science, Middle School Adventure, or Verde Valley Explorer nomenclatures. Furthermore, expedition details – such as trip location, duration, and curriculum – are bespoke in nature, being developed and coordinated directly between trip coordinator and GCY office staff to tailor a unique experience optimally suited to the youth participants. A Group Expedition, therefore, is also known as a Custom Expedition within GCY. In the current study, the term “Group [Expedition]” has been deemed the default term and is used to denote an expedition that is comprised of youth from an already-existing group. This predominantly results in youth from a grade school class – hence being titled “Group & School Expeditions” (Grand Canyon Youth,

2022), but non-school based youth groups do participate in Group Expeditions. Regardless, Group Expeditions are distinct from IE in both group dynamic and curriculum, and therefore are labeled as Group [Expeditions] in the current study.

Current Study

The first purpose of this thesis is to systematically and empirically evaluate the efficacy of GCY's IE and Group Expedition programs based on existing data collected by GCY over time and internally determined organizational goals. Accordingly, this thesis will seek to identify program elements and/or data collection mechanisms that are robust or missing in order to bolster GCY's ability to assess its impact on positive youth development. Using self-report data collected from youth ages 11-19 over the past 11 years, this investigation has the following specific aims in evaluating GCY IE and Group Expeditions:

Specific Aim 1: Using the PYD model as a guiding theoretical framework, systematically organize and describe the strengths of GCY's IE and Group Expeditions for youth. Specifically, the percentage of youth participants and responses that claim perceived growth due to a GCY river rafting expedition will be closely examined.

Specific Aim 2: Existing data from current data collection mechanisms will be analyzed to identify the strengths and limitations of GCY's current approach to measurement and evaluation, with an emphasis on describing gaps in data collection procedures and/or missing data that might hinder GCY's ability to assess its impact on youth.

The second purpose of this thesis is to advance the literature of outdoor education's effects on youth development and the robustness of GCY's data collection efforts by adopting the theory-data-cycle (Campbell & Stanley, 1963) to place the current program evaluation in conversation with extant literature on PYD.

Thus, the specific aims associated with the second purpose of this thesis focus on the possibility and degree to which the data and programming of an outdoor education non-profit organization with a particular emphasis (i.e., GCY) can be nested under an existing, empirically tested model that measures positive youth development. Additionally, a key research question for the second purpose of the current study is: To what extent does the PYD fit with an organization that operates primarily in the outdoor adventure and education industry (i.e., contexts that are different from those in which the PYD has been initially developed)? Aims for the second purpose of this thesis include:

Aim 3: Proportions of youth participant open-ended responses to post-expedition surveys will be examined and categorized to identify if any PYD model factors are closely aligned with GCY program outcomes. Based on the GCY mission statement and set goals, it is predicted that existing GCY data will align closely with the PYD model factor *Confidence* (self-efficacy).

Aim 4: Identified gaps in data will be examined to provide concrete and specific organizational recommendations to refine data collection mechanisms to produce more efficacious conclusions of positive youth development specifically from GCY programming. Furthermore, informed refinements to the PYD model will be generated based on youth open-ended responses (“data” in the theory-data-cycle) to form a refined PYD model that may be more aptly suited to an outdoor educational context.

Methods

Procedure

The current study was approved by Northern Arizona University’s Institutional Review Board, confirmation #1851994-1. All data utilized for this study was obtained directly from GCY in the form of secondary data. Grand Canyon Youth administers one (1) survey post-

expedition to all its youth participants and parents of youth participants regardless of expedition/program type. One (1) survey is sent to each youth and corresponding parent/guardian electronically shortly after returning from the expedition, and there is no deadline for youth or parents to respond. Survey and demographic data were obtained from GCY as separate files and originally provided in raw form as Excel files (.xlsx and .csv, respectively). Since demographic and survey data are collected and maintained independently, demographic and survey data were provided separately. Accordingly, both survey and demographic data were cleaned and harmonized manually in Excel due to the variability in survey items by year – including language variability – variability in data format by year, and inconsistency in missing data across survey items and responses, demographics, and by year. As a result, expedition names were not standardized, as GCY staff would record the expedition name of a youth participant in their database, but the participant inputted the name of their expedition in an open-ended format (if remembered) which resulted in various misspellings, mistakes, and overall individualization on behalf of the participant. Expedition names thus were harmonized by cross-referencing the cleaned demographic and survey data files (e.g., data meeting exclusion criteria were removed) by expedition name and matching demographic information. Grand Canyon Youth staff were also leveraged in this process for their knowledge of variations in expedition nomenclatures.

Harmonization of Survey Items. Survey items were harmonized based on exact wording in the post-expedition surveys. Survey item evolution from 2010 to 2021 was distinctive, and slight variations in wording or phrasing were common across years. Survey items were evaluated by the purpose of the question; if variations in wording were minute but all variations were seeking the same information from youth participants, the survey items were combined in wording and minimally paraphrased for the purposes of data analysis. For example,

between 2010 and 2016, youth participants were asked “*Do you think the pretrip components were an important aspect of your Grand Canyon Youth experience?* [Italics added]”. However, in 2017 and 2018, youth participants were asked “*Do you think the pretrip components (service, fundraising, educational project) were an important aspect of your Grand Canyon Youth experience?*” In 2019 and 2021, this item is split into three separate items: “*Were the GCY Pre-Trip Components a valuable part of your experience? [Fundraising]*”; “*Were the GCY Pre-Trip Components a valuable part of your experience? [Community Service]*”; and “*Were the GCY Pre-Trip Components a valuable part of your experience? [Educational]*”. Accordingly, because the items gauging the perceived value of GCY pre-trip components in general among youth are essentially similar, they were combined not only to increase the sample size of this potential outcome, but to harmonize the value for preparation of ingesting into R for analysis. In this example, the two survey items gauging the of general pre-trip components in general had slight differences in language – in that GCY staff were starting to become more specific in their idea of what they were querying with the 2017 and 2018 survey item – but prompted youth in a comparable way. No fundamental changes to survey item wording or exclusion occurred in the data cleaning process, and the three items gauging the perceived value of each individual GCY pre-trip requirement in 2019 and 2021 remained separate. See Tables 4 and 5 for a full breakdown of survey items by year.

Data Organization. Once each data set was cleaned, harmonized, and formatted, the demographic and survey data files were merged in R for preparation for analysis. The data were merged by first and last name as the most fundamental datum in both data files, with no complications in merging if first and/or last name was missing. See Appendix A for the full R source code for the current study. Individual and Group Expeditions were both included to

potentially identify significant differences in GCY programming type on youth outcomes of interest. Regarding IE, youth generally arrive to pre-expedition meetings and functions – including the aforementioned pre-trip components – without prior knowledge of their trip colleagues. However, youth can and do occasionally arrive to these pre-trip functions and on expedition with previous relationships to other youth on the trip.

Conversely, Group Expeditions are inherently and deliberately pre-formed. This can potentially change youth outcome data for variables of interest, such as PYD model factors *Connection* or *Caring*. Corresponding to Tuckman’s stages of group development (1965), IE youth participants will spend an undeterminable amount of time learning about one another in the “storming” and “norming” phases. Meanwhile, Group Expedition youth participants will inherently be further ahead in this progression, as their group existed prior to the expedition and already gone through the “forming”, “storming”, and ideally, “norming” phases (Tuckman, 1965). Furthermore, the dynamic between youth while on expedition likely influences how they interact with adults on expedition. It is more likely that youth participants of Group Expeditions know their trip coordinator before expedition, and the higher likelihood of already having formed friendships amongst one another likely influences how comfortable they are engaging with adults on expedition (trip coordinator and/or river guides). This potential could result in a positive or negative outcome and is examined in the analysis.

Lastly, Individual Expeditions are structured according to expedition type: Verde Valley Explorer, Middle School Adventure (MSA), Partners in Science (PIS), etc. While these programs differ starkly among vital characteristics, each expedition is structured similarly within its own type. In other words, although GCY completes multiple MSA expeditions over the course of the year, all MSA expeditions are structured similarly. Partners in Science and Verde Valley

Explorer are similar in this fashion. Thus, there is increased interest in differentiating not only between GCY program type (Individual vs. Group Expeditions), but between expedition types as well (e.g., MSA vs PIS; Figure 2).

Data Sources: Inclusion and Exclusion Criteria

Data utilized in the current study were entirely secondary data; previously collected data from youth ($n = 1,257$) and parents by GCY prior to commencement of the current program evaluation study. As a result, no prospective or extant communication was conducted with youth or parents in the sample. At the time of survey collection, youth and parent respondents received no incentives for completing the post-expedition surveys. Although only youth data is examined in the current study, both youth and parent respondents were asked in the post-expedition survey that the existing data is derived for permission to use their responses for publications on the condition of anonymity. All youth participants and parent respondents who declined permission to use their data in publications were omitted during the data screening process. Full completion of the GCY post-expedition surveys (administered electronically), were not an inclusion criterion for the current study because demographic data are inputted into the GCY database regardless of survey completion and are a part of a separate database from survey data.

The sample of the current study was composed of youth who live in the United States who completed a GCY IE, Group Expedition, or both. Thus, the main inclusion criterion for this sample was youth participation in a GCY Group and/or IE between the years of 2010 and 2021. Repeated participation across multiple expeditions was not an exclusion criterion. In fact, due to the program evaluation nature of the current study, there are only three exclusion criteria:

Survey and demographic data were collected, stored, and provided independently by GCY. However, the initial survey data files also included first name, last name, and expedition

name, as basic identifying variables. Within the survey response data, data were excluded from the final sample if the majority of survey responses for a participant and participant names were missing. Within the demographic data, missing demographic data was not an exclusion criterion for this sample due to the independent data collection mechanisms at GCY between demographic and survey data. This included participant first and last names, as survey data could be analyzed devoid of all demographic information. However, as is explained in the results and discussion sections below, description of survey data was limited by the missing demographic data, which precluded certain statistical comparisons by youth demographics. Taken together, the threshold for an unacceptable amount of missing data per participant was established as the combination of missing vital demographic information in addition to a majority of missing survey responses from the participant. Due to the inconsistent nature of survey data collection across years, there were data entries with completely missing values; these entries were excluded.

The second exclusion criterion for this sample was youth and parents who responded according to the youth's participation in a Healing Lands expedition, as this expands the scope of study significantly and includes vastly different organizational goals, desired outcomes, and potential moderators among youth (see Figure 2). Similarly, all parent survey data (across all GCY program types) were not examined in the current study due to the limitations in scope for the current study. Future research pertaining to GCY should examine the relationship between youth participant data and corresponding parent responses to the post-expedition survey.

The third and final exclusion criterion was any youth who participated in GCY programming before 2010. This is because GCY switched from physical paper and mail-in surveys to electronic surveys in 2009. Thus, data before 2009 was not able to be collected. Data

from 2009 was inadequate to include in this study (in both quantity and quality); therefore, data from 2010 onwards were included for analysis.

Youth who wish to partake in a GCY expedition experience slightly different admissions processes depending on programming type (e.g., Group vs IE). For IE enrollment, youth or parents/guardians may sign up individually via the GCY website (<https://gcyouth.org/expeditions/individual-expeditions/>). Trip coordinators – adults who partake in the expedition with the youth but are not necessarily working as a river guide, are adults who are involved with GCY in some capacity, and have been shown to be apt leaders and capable of managing a group of youth in an outdoor education context. Youth who end up partaking in Group Expeditions are enrolled through a cohort process, pre-formed in a group among their peers and typically in the form of their respective grade school class. As a result, the adult trip coordinator(s) on these expeditions are typically the students' teacher or involved parent of a youth participant. It is important to note that these examples of Group Expedition planning, assignment of trip coordinator, and overall enrollment processing are not exhaustive; rather, the primary purpose of this distinction is to highlight the differences between the administrative components of Individual and Group Expeditions.

Youth Participant Demographics. After data obtainment and harmonization, a total of 1,257 data entries were included for analysis in the current program evaluation. First names were included in 1,031 entries, while last names were included in 1,035 entries. Of the 1,257 total entries, 835 entries were unique youth participants. Thus, 203 data entries were from repeat expeditions. Demographic information collected by GCY include sex, ethnicity, birth date, and city, state/province, and country of origin. Additionally, information on the GCY expedition name and location were also recorded by GCY staff during the enrollment process. In the final

sample, expedition locations included: Grand Canyon “Full”, Grand Canyon “Upper”, Grand Canyon “Lower”, San Juan “Full”, San Juan “Upper”, San Juan “Lower”, and the Verde River. Of the 1,257 total entries in the sample, sex was recorded for 713 (56.7%) responses, ethnicity was recorded for 683 (54.3%) responses, and birth date was recorded for 715 (56.9%) responses in the final sample. City (698 entries, 55.5%), state/province (676, 53.8%), and country (671, 53.4%) had similar responses rates in the final sample. Expedition name was recorded for 1,000 (79.6%) responses, and expedition location was recorded for 681 (54.2%) responses in the final sample. In the final sample, 756 (60.1%) of the entries were for IE, and 244 (19.4%) of the entries were for Group Expeditions. See Table 6 for a full breakdown of youth participant descriptive statistics, for both Individual and Group Expeditions, and aggregated.

Ethnicity was self-reported by the youth participant. In the final sample of youth participants, 575 (45.7%) entries for ethnicity were missing. Aggregated counts of unique ethnicities, as provided by youth participants, encompass the following in decreasing order: Caucasian (500, 39.8%); Hispanic/Latino (80, 6.4%); Native American (63, 5.0%), Asian (45, 3.6%), African American (24, 1.9%), Pacific Islander (8, 0.6%), and “Prefer Not to Say (4, 0.3%). See Table 7 for a full breakdown of youth participant ethnicities. Note that the distribution of ethnicity in the final sample is unlikely to be fully representative of all GCY youth participants due to the considerable amount of missingness.

Reporting options for the demographic “sex” included “Male”, “Female”, and “Not Listed”. In the final sample, 545 (43.4%) entries for sex were missing, 365 (29%) entries reported male, 345 (27.5%) entries reported female, and 2 (0.2%) reported that their sex was not listed. When missing values for sex are removed, the breakdown of male and female youth

participants is 51.3% and 48.5%, respectively. See Table 8 for a full breakdown of youth-reported sex.

The majority of data entries in the final sample included missing values for state/province of origin (581, 45.2%). However, most participants report originally being from Arizona when missing values are excluded (487, 37.7%). All other states of origin reported by participants were minorities in the data. The following states are the next most frequent known state/province of origin in decreasing order: California (40, 3.2%), Colorado (36, 2.9%), New Mexico (14, 1.1%), and Illinois (12, 1.0%). See Table 9 for a full breakdown of state/province of origin.

Measures

Youth participants and parent/guardians were asked various questions pertaining to the administration of pre-expedition processes, activities and processes while on expedition, perceptions of the implemented curriculum while on expedition, and perceived growth. Both youth and parent surveys were internally designed and iterated by GCY staff, and to this author's knowledge, did not stem from existing literature or existing empirically tested measures. Survey iteration was decided internally by GCY staff and followed internal organizational logic based on programmatic, logistical, or financial circumstances and constraints of that year.

Consequently, while responsive to changing conditions, the GCY survey iteration did not correspond to the evolution of research on outdoor education outside of the GCY context.

Frequently, youth and parent respondents are asked for their feedback in the form of a binary or Likert formatted response, and subsequently asked to elaborate descriptively in an immediate follow-up item. As a result, survey items were classified by key indicators and item type – either outcome, process/activities, or resources/administrative – and were influenced by the Center for Disease Control (CDC) program evaluation model and Harvard University Center on the

Developing Child IDEAS Impact Framework (CDC, 2011; Center on the Developing Child, 2022) only as a guiding framework (not shown).

The following survey items are organized by a classification outcome, process, and administrative variables, and not in the order they are administered by GCY:

Outcome-based variables. Items that asked youth or parents if a pre-expedition or expedition activity changed, contributed to learning, or affected the youth participant in various ways were classified as outcome variables.

Youth survey items. Youth participants were asked more outcome items than parents. Items regarding personal valuation of pre-expedition activities and perceptions of growth were asked in an aperiodic fashion, with valuations of pre-expedition activities and perceived growth in five domains being asked only since 2019. Open-ended, descriptive items asking youth respondents to elaborate were asked for the questions, “*Were the GCY Pre-Trip Components a valuable part of your experience?*”, “*Did you learn something new on your river trip that you can use in your daily life?*”, “*Did you discover anything new about yourself on your river trip?*”, “*Have you used anything you learned on your trip since you've returned?*”, and “*Did your GCY experience improve your ability to persevere in challenging or uncomfortable situations?*” Response rates varied based on question and year but were overwhelmingly less frequent than responses for binary/Likert response items. See Table 4 and Table 5 for a detailed summary of quantitative and descriptive survey items, respectively.

Parent survey items. Outcome variables asked to parents were less in overall number and focused exclusively on appraisals of their child before and after the expedition. Perceived value of pre-expedition activities and perceived growth of the youth were asked to parents since 2010, with open-ended descriptive items following in a similar fashion. The only other open-ended

descriptive item asked to parents was the question, “*Do you feel Grand Canyon Youth provided your daughter with an educational experience?*”

Process-based variables. Items that focused on processes administered by GCY staff before or while on expedition, as well as open-ended feedback items, were classified as process variables.

Youth survey items. Youth participants were asked questions regarding the behavior of expedition guides and opportunities provided to youth participants while on expedition. Questions include, “*Did your trip coordinator do fun and educational activities with you on the river?*”, “*Did the guides add to the educational and leadership aspects of your trip?*”, “*Were you comfortable communicating with you trip coordinator and the guides?*”, “*Do you feel your trip coordinator managed your trip effectively (pre-trip, on river, post-trip)?*”, and “*Were you given an opportunity to develop leadership skills while on the river?*” Youth participants were also asked general feedback questions, including “*Do you have any recommendations to improve the Grand Canyon Youth program?*”, and “*Could you share some trip highlights with us?*”

Parent survey items. Process-based items asked to parents were open-ended descriptive feedback items, including “*Would you like to recommend any improvements or changes that we could make to the program?*”, “*Could you share some insights or comments about our program?*”, and “*Do you have anything else that you would like to share with us or comment on?*”

Administrative-based variables. Survey items that pertained to the application process, interactions with GCY staff before and after the expedition, and safety were classified as administrative variables. Parents were asked more administrative questions than youth, as parents were essential in the pre-expedition process.

Youth survey items. Youth participants were asked if they felt the application process was clear (*yes/no*), asked to elaborate in the subsequent item, and if they felt their safety needs were met (*yes/no*), and asked to elaborate further in the subsequent item.

Parent survey items. In addition to the same administrative items asked to youth participants, parent respondents asked if the GCY staff was accessible and supportive with response options of “yes/no.” Parent respondents were also asked if the trip coordinator was helpful throughout the program, with variations in response options based on year and survey iteration. Additionally, parent respondents were asked if the program was reasonable in terms of cost and availability of scholarships. All administrative items asked to parent respondents were followed by an open-ended descriptive item allowing parent respondents to elaborate on their answer.

PYD Outcomes. Outcomes of interest from the PYD model were identified through the determination of meaningful interactions between outcome variables in post-expedition surveys and relevant programmatic characteristics. Meaningful interactions were defined as of interest to GCY, evidenced in the literature, and/or based on availability of data in the final sample. Outcome variables chosen for analysis in the current study include the perceived value of the GCY pre-trip components, perceived growth among the five growth domains contained in the post-expedition surveys, connections formed while on expedition, youth participant comfort with engaging adults on during the entire GCY process, youth perceptions of self-discovery and learning. Programmatic characteristics chosen as relevant for analysis include all aforementioned demographic information, expedition location, expedition type and name, and geographic point of origin.

To achieve the second purpose of the current study, youth responses that fell outside of the constructs defined by the PYD model were initially categorized as *Other* and set aside for further categorization. Consistent with engagement in the theory-data cycle, new factors were then identified based on patterns observed of youth open-ended responses that were not captured by the PYD model (e.g., gratitude) and implications for both program and theory development were discussed.

Analysis Approach

Data file merging and statistical analysis were conducted with R 4.2.1 (R Core Team, 2023) after completion of data cleaning and harmonization. Overall, interactions between outcome variables, program characteristics, and youth characteristics of interest were examined by calculating group means for outcome variables with Likert-response scales and proportions of group endorsement by year for outcome variables with dichotomous response scales. Differences in proportions between Individual and Group Expeditions, IE expedition types, expedition name, location, youth geographic origin, and youth ethnicity by the aforementioned survey outcome variables were examined. Although data from youth who participated in Verde Valley Explorer expeditions were originally meant to be investigated, there was not sufficient data to examine group mean differences over time and across program or youth characteristics ($n = 27$). Therefore, distinctions between IE type in all analyses were constrained to MSA and PIS expeditions. Moreover, there were several descriptive comparisons that were of interest to GCY that could not be examined due to insufficient data. See Tables 6—9 for full summaries of available data.

For the purposes of the current study, expedition name and location unofficially acted as proxies for other measures: expedition curriculum and duration, respectively. There is evidence

that trip duration is a key moderator of outcomes in outdoor education (Cason & Gillis, 1994). However, expedition duration is not a variable currently recorded by GCY staff in data archives, although it is known at the time of each trip. The location of the expedition (e.g., Grand Canyon Upper) signifies the duration of the expedition because expedition locations are explicitly connected to expedition type and corresponding curricula and do not deviate in duration. Likewise, among IE programming, IE type corresponds to the expedition location. Age is the main differentiating factor among IE programming; Middle School Adventure (MSA) expeditions take place on the San Juan River, while Partners in Science (PIS) expeditions take place on the Grand Canyon, and each involve different curricula for the youth participants (Figure 2). In this sense, proportions of endorsement or means between IE type among outcome variables may highlight GCY programmatic or logistical characteristics, or geographic features that may be influencing outcomes and positive youth development. Therefore, while no official programming recommendations will be made from these variables acting as proxy measures for expedition curriculum and duration, examining these variables as both potential moderators of outcomes and unofficial proxies for expedition curriculum and duration potentially allow for more specific elucidations to be made from existing GCY data, further highlight areas of future research, and more adeptly inform program recommendations made to GCY.

All self-report survey items other than free response items in GCY's post-expedition surveys are either dichotomous in nature (*Yes/No*) or follow a revised Likert scale (Likert, 1932). For example, in 2019 and 2021, youth participants were asked to report their perceived value of three distinct pre-trip components: *Fundraising*, *Community Service*, and *Educational* [components] on a Likert scale of 0 to 3, with 0 corresponding to "*Not Valuable*" and 3 corresponding to "*Very Valuable*". Similarly, in the same years youth were asked to report their

perceived growth in the five post-trip growth domains of *Environmental Awareness*, *Leadership*, *Teamwork*, *Personal Growth*, and *Cultural Awareness* on a Likert scale from 0 to 2, with 0 corresponding to “*Learned nothing and did not grow*”, and 3 corresponding to “*Learned and grew a lot!*”. As a result of these variables being categorical, in addition to examining group mean differences across time for pre-trip components and post-trip growth domains, and by characteristics of interest, Chi-square tests of independence were conducted between major variables of interest that also correspond to examined group proportions. The inclusion of Chi-square tests of independence supplements the examined group proportions over time with limited data by providing slight convergent validity that there are indeed differences between various groups of interest. Fisher’s exact test was not utilized in lieu of Chi-square tests due to the number of comparisons being sought and the asymmetry of existing GCY data and subsequent sample sizes.

The PYD Model. The Positive Youth Development Model, as composed of the Five Cs plus the sixth of *Contribution*, is visualized as a factor model based on empirical research of its construct validity (Bowers et al., 2010; Dvorsky et al., 2019; Phelps et al., 2009). As such, categorization of youth open-ended, descriptive responses to PYD model factors were conducted by the author and an undergraduate research assistant, who was included in this study’s IRB approval and received approval from GCY to be involved. In order to facilitate the theory-data-cycle, open-ended responses were categorized as relevant to a PYD model factor only if it strictly met the original definitions of the model factors (Lerner et al., 2005, p. 23). Cohen’s κ was calculated for each PYD model factor prior to full categorization ($n = 2,581$) to ensure adequate agreement between two raters (Cohen, 1960). All open-ended responses were randomly assigned numbers using the RAND() function in Excel during data organization, and selecting

the responses tied to the top .10 of all aggregated responses. Full categorization of all open-ended responses was conducted after adequate Cohen's Kappa was achieved for all PYD model factors. See Table 10 for Cohen's Kappa statistics for all PYD model factors.

Results

Between 2010 and 2021, a total of 835 unique youth participants of GCY expeditions among 1,257 total entries of data were examined to identify areas of strength and weakness in GCY's programming and data collection. Perceived value of pre-trip components in general fluctuated by year between both Individual and Group Expeditions, however, youth from Individual Expeditions appear to have responded more favorably than those from Group Expeditions (Figure 3). However, a Chi-square test between perceived value of pre-trip components and GCY program type was non-significant, $\chi^2(1) = 0.65, p = .421$. Further examination of perceived value of specific pre-trip components of *Fundraising*, *Community Service*, and *Educational* [components] revealed similar perceived value among youth, apart from the educational component among Group Expedition youth between 2019 and 2021 (Figure 4). Chi-square tests between program type and individual pre-trip components were non-significant, $\chi^2_{\text{Fundraising}}(3) = 3.18, p = .365$, $\chi^2_{\text{CommunityService}}(3) = 3.89, p = .273$, and $\chi^2_{\text{Educational}}(3) = 3.88, p = .274$ (See Table A1 in Appendix A). However, plotted means by year and individual pre-trip components reveal a noticeable increase in perceived youth value of the Fundraising component between 2019 and 2021 among both Group and IE youth (Figure 4). Further examination of perceived value of the specific pre-trip components among IE between MSA and PIS expeditions revealed relatively consistent valuation among PIS youth in 2019 and 2021, but there was a noticeable decrease in perceived value among MSA youth between 2019

and 2021 among all three pre-trip components (Figure 5), suggesting MSA youth from 2021 perceived the pre-trip components much less favorably than their 2019 MSA youth counterparts.

When asked if they formed meaningful friendships with other participants on their expedition, there was more year-to-year variability among Group Expedition youth than IE youth (Figure 6). However, Chi-square tests indicate no significant difference between program types, $\chi^2 (1) = 0.29, p = .588$. Group differences in meaningful friendships formed were also non-significant by expedition location among IE, $\chi^2 (3) = 0.28, p = .963$, but state/province of origin revealed significant differences between groups among IE, $\chi^2 (11) = 22.04, p = .024$ (See Table A3 in Appendix A). Figure 7 reveals this is likely due to missing values – as youth ratings with missing state/province data were aggregated and the only groups that reported not forming meaningful friendships were “Missing” or “Not Arizona” – suggesting there may be some influence of state/province on whether youth form meaningful friendships on expedition, but more data is needed. There was noticeably more year-to-year variability among both Individual and Group Expedition youth pertaining to self-discovery, where youth were asked if they discovered anything new about themselves, but this difference was also statistically non-significant, $\chi^2 (1) = 2.66, p = .103$. Further examination of self-discovery by IE expedition location and state/province of origin both revealed no significant group differences, $\chi^2_{\text{Location}} (5) = 5.81, p = .325$, and $\chi^2_{\text{State/Province}} (13) = 20.54, p = .083$. However, there were significant differences between program type and youth participants learning something they can use in their everyday life, $\chi^2 (1) = 6.95, p = .008$ and Figure 8 reveals youth in Group Expeditions are less likely to learn something on their expedition that they can use in their daily life. Further examination of this outcome reveals that expedition location does not significantly influence this

outcome, $\chi^2 (5) = 5.99, p = .306$, but state/province of origin does, $\chi^2 (13) = 24.49, p = .027$ among IE youth.

When asked if youth were comfortable communicating with the adults involved in their expedition, including their trip coordinator, lead teacher (among Group Expedition youth), and/or GCY guides, there was a significant difference in responses between Individual and Group Expedition youth, $\chi^2 (1) = 3.83, p = .05$. Figure 9 suggests this as well, as IE youth overall group proportions were 1.0 (dichotomous variable) across all years, while Group Expedition youth were not, indicating that youth in Group Expeditions are less comfortable communicating with adults on their expedition. However, in comparing ethnicities to this outcome to examine whether youth of minority ethnicities were less comfortable communicating with adults, the association was non-significant, $\chi^2 (9) = 2.03, p = .991$. Figure 10 further corroborates this, as proportions for all ethnicities were 1.0 for all years except for “Missing” ethnicity, which was aggregated. Separately, while group proportions indicate that IE youth typically agree that they will continue to do community service after their expedition more than their Group Expedition youth counterparts (Figure 11), Chi-square test between the two indicate a non-significant association, $\chi^2 (1) = 1.66, p = .198$. Additionally, when asked if they felt youth learned something about the cultural and natural history of the area, there were no significant differences between Individual and Group Expeditions, $\chi^2 (1) = 1.94, p = .163$.

Regarding the GCY-created post-expedition growth domains measured in 2019 and 2021, there was a significant difference in perceived *Cultural Awareness* growth between Individual and Group Expedition youth, $\chi^2 (2) = 7.16, p = .028$. Figure 12 indicates that Group Expedition youth may grow less in cultural awareness than IE youth, as Group Expedition means were generally lower than IE means in both 2019 and 2021. However, these survey items have only

been queried in 2019 and 2021, and additional data may provide additional clarity. Differences in perceived growth in the domain *Leadership* comes close to conventional statistical significance, $\chi^2(2) = 5.83, p = .054$, but group mean differences between 2019 and 2021 are noticeably larger than other growth domains. Additional data may reveal a significant association for youth perceived growth in leadership by Group and IE as well. Chi-square tests between program type and the other three growth domains were non-significant (see Table A4 in Appendix A), but Figure 12 shows perceived value of the pre-trip components among Group Expedition youth were generally lower than their IE youth counterparts in both 2019 and 2021.

Examining these growth domains among specific Individual Expeditions reveal considerable difference between MSA youth in years 2019 and 2021, as shown in Figure 13. While Chi-square tests could not be conducted for all combinations of growth domain, IE type, and year within the scope of this program evaluation, the group means for growth domains *Environmental Awareness, Leadership, Personal Growth, and Teamwork* are observably lower among MSA youth in 2021 than MSA youth-perceived growth in 2019. Group means for IE youth are relatively similar between 2019 and 2021.

Use of the PYD Model to Describe GCY Survey Responses

Of 1,257 total data entries and 835 unique youth participants in the final sample, there was a total of 2,581 descriptive, open-ended responses generated by youth participants in the post-expedition surveys. Table 10 exhibits the distribution of these responses categorized to the core PYD model factors by year and partitioned by IE and Group Expeditions in both number and proportion (percentage) of all responses, and Figure 14 visualizes this the aggregated distribution across years. When ignoring *Other* ($n = 1,271$ [49.24%]), *Connection* was the most relevant PYD factor in IE survey data, with 725 youth responses relating to *Connection*

(28.01%). This was followed by *Competence* with 462 responses (17.82%), and *Confidence* with 276 responses (10.65%). *Character*, *Contribution*, and *Caring* followed, with 113 (4.38%), 70 (2.71%), and 48 (1.86%) responses, respectively. Overall responses rates by year vary significantly, and the exact reasoning is unclear. The post-expedition survey from 2019 garnered the most responses from youth by far, with 646 total open-ended responses. The second-highest response year was 2021, with 414 total youth open-ended responses, and the third highest with 262 total open-ended responses was for 2011. From existing data, it is unable to be determined if the reasoning is due to GCY survey administration processes or some youth or parent/guardian factor.

Distinctions in youth open-ended response categorization between Individual and Group Expeditions follow a similar order. For IE survey data, *Other* had 656 responses categorized to it (48.45%). When ignoring *Other*, *Connection* had the most open-ended responses categorized to it, with 383 responses (28.29%). *Competence* was the model factor with the next highest number of open-ended responses categorized to it, with 261 responses (19.28%). *Character*, *Contribution*, and *Caring* followed with 62 (4.58%), 38 (2.81%), and 34 (2.51%) responses, respectively. For Group Expedition survey data, *Other* was again the most relevant, with 617 of 1,227 total open-ended responses (50.29%). Ignoring *Other*, *Connection* was the most frequently categorized PYD model factor, with 342 responses (27.87%). *Competence* followed, with 199 responses (16.2%). Lastly, *Character*, *Contribution*, and *Caring* followed similarly with 51 (4.16%), 32 (2.61%), and 14 (1.14%) responses, respectively. Due to the relatively even ratio of open-ended response categorization between Individual and Group Expeditions, response categorizations were not broken down by specific program type for each individual year; the aggregated data was deemed sufficient.

In extending the PYD model to better address youth data collected from this outdoor education context, the 1,271 open-ended responses categorized at *Other* were systematically organized and categorized to the complementary model factors of *Gratitude*, *Connection to Place*, *Respect for Nature*, *Self-Care*, *Humility*, *Program Recommendations*, and *Other*. These new factors were determined based on patterns of observed youth open-ended responses, identification of frequent themes and topics in responses, additional relevant psychological frameworks, and GCY organizational values, to identify pertinent outcomes that are most relevant to positive youth development but not captured by the existing PYD model. Table 10 also exhibits the categorization of open-ended responses to these complementary model factors. Of the 1,271 responses that did not relate to any core PYD model factor, 268 responses were subsequently related to *Connection to Place* (21.04%). Additionally, 130 responses were related to *Gratitude* (10.20%), 47 responses were related to *Self-Care* (3.69%), 28 responses to *Humility* (2.20%), and 26 responses were related to *Respect for Nature* (2.04%). Over 85 responses were program recommendations ($n = 87$ [6.83%]). Lastly, 712 responses (55.89%) were not related to any of the new complementary factors. With incorporation of the complementary factors, only 712 responses were unrelated to a model factor (27.59%), as opposed to 1,271 responses (49.24%) unrelated when only comparing against the original PYD model factors.

Discussion

Outcome Variables

This study examined 11 years of secondary data from a local 501(c)(3) outdoor education organization that offers river rafting expeditions that connect youth to the transformative powers of the rivers and canyons of the southwest (GCY, 2022) in a program evaluation. Among the plethora of associations examined in this program evaluation, several were statistically

significant and operationally meaningful, illuminating areas for immediate attention for an organization that relies on achieving its goals to continue operations. Furthermore, the distribution of youth growth components observed in the data feature several prolific findings that impact both the organization and framework alike. Indeed, the overall responses from youth across all survey items and year were overwhelmingly positive, and the limited variability in survey responses due to the majority of the data corresponding to a high Likert response in the pre-trip components and post-trip growth domains, as well as endorsing the multitude of dichotomous variables (e.g., “1”), which prevents the interpreting of meaningful conclusions from the respective associations. As such, the interpretations should be considered preliminary analyses that highlight areas for future research or programmatic refinement. However, it should still be noted how positive most youth responses were in each respective variable. While the current study focused on differences, the largest similarity among the data is the sheer ubiquity of positive responses from youth participants and perceived positive growth among the multitude of variables observed since 2010.

Counterintuitively, youth in Group Expeditions were less likely to feel comfortable communicating with adults on expedition ($p = .05$). This revealing finding actively challenges the underlying assumption that IE youth spend the nascent stages of their expedition getting to know one another, their trip coordinator, and GCY guides, while Group Expedition youth have pre-existing relationships with their peers and trip coordinator and therefore are more comfortable communicating upon the expedition’s start. A reluctance among youth to communicate with their trip coordinator or lead teacher may exist precisely due to a pre-existing relationship; there is the potential that that relationship is not always conducive to an environment where youth feel they can speak openly, candidly, honestly, without reservation or

inhibition, and without fear of consequences. This potential reluctance and/or anxiety among youth may persist due to the reality that their expedition group will remain intact after returning from expedition. Particularly on river rafting expeditions, participants – both youth and adult alike – typically become close due to the duration spent in proximity and devoid of common distractions (e.g., cell phones, etc.). As a result, youth openness and vulnerability are not only organically and non-forcefully encouraged by GCY staff in order to cultivate personal growth on expedition – it is perhaps inevitable. However, a reluctance to engage with GCY guides may also emerge due to the presence of their teacher or a known parent/guardian of a peer (or their own parent/guardian) acting as trip coordinator.

Similarly, youth who participate on a Group Expedition were less likely to think they learned something new they can use in their daily life than their IE youth counterparts ($p = .008$). Group expedition youth may be experiencing their expedition in a different context than their IE youth counterparts regardless of the curriculum, expedition location, duration, or any demographic characteristics among youth participants. It may be that youth who participate in Group Expeditions with pre-formed groups of peers they are already acquainted with removes a sense of novelty and adventure with the experience because their relationships turn into support systems and youth experience the unfamiliarity together. Individual Expedition youth may believe they are learning something new that they can use in their everyday life more than Group Expedition youth because IE youth may be more likely to be mentally preparing themselves for an entirely new experience – which includes an entirely new group of strangers that they must navigate. Meanwhile, Group Expedition youth navigate their expedition together and are inextricably tied to their school or original group context – which includes broad learning

objectives – while IE youth form a new group on expedition, becoming entirely unique to every participant.

In fact, there was a noticeable trend among group proportions for many of the outcome variables between Individual and Group Expedition youth, where proportions for Group Expedition youth responses were prominently lower than their IE youth counterparts. This trend was observed for the perceived value of GCY pre-trip components in general (Figure 3), forming meaningful friendships on expedition (Figure 6), learning something new that can be used in daily life (Figure 8), comfort communicating with adults on expedition (Figure 9), perception of continuing community service after returning from expedition (Figure 11), and learning something new about themselves (Figure 15). Despite the non-significance of many of the Chi-square tests of difference for these outcomes (See Table A2 in Appendix A), this conspicuous trend raises questions regarding how youth from Group Expeditions may benefit from GCY programming differently than their IE youth peers, as there are likely significant differences in dynamic and context between programs that are not currently being measured.

Geographic place of origin also appeared to influence the association between two youth outcomes: forming meaningful friendships and learning something that can be used in daily life. The state/province that youth report originating from revealed significant group differences and results are more predictable as it could be assumed that youth who do not reside in and therefore are not familiar with the geography of the southwest feel they are getting more out of the expedition. For example, it is reasonable to assume that among two hypothetical youth who enter the Grand Canyon, the one who has never seen it before is more impacted emotionally and mentally than the one who has visited it frequently due to their proximity. In this sense, youth who are not familiar with the environment on their expedition may be more open to learning –

both skills they can use in their daily life and other participants and form meaningful friendships. Objectively, the youth participant who lives on the east coast is less likely to know the skills that entail rafting the Colorado, San Juan, or Verde rivers, and thus more likely to learn something new they believe they can use in their daily life, for example. Moreover, traveling farther distances may result in the expedition meaning more for youth, and thus are more sensitive to the highly likely real outcomes of making friends and learning skills.

The fact that both Individual and Group Expedition youth from 2021 perceived the pre-trip component of fundraising as more valuable than youth from expeditions in 2019 is noteworthy. The appealing explanation is the COVID-19 pandemic, as research is still untangling the effects of the virus and various but ubiquitous physical distancing measures, and much is still unknown regarding its impact on youth. The financial burden inflicted on many families due to the pandemic may have resulted in a shifted perspective on GCY costs and utility of the fundraising component. The fundraising pre-trip component exists to support the families of youth participants and to assist in easing the costs of conducting such expeditions incurred by the youths' parents or guardians. It is logical to assume that the COVID-19 pandemic impacted and increased youth and their families' need for supplemental funding, and consequently perceive the value of it significantly higher than their youth counterparts who participated in an expedition in 2019.

However, group means of MSA youth in 2021 found that youth in 2021 perceived all pre-trip components as less valuable than their counterparts from 2019 – considerably so. Even with limited data, there was still noticeable differences between the perceived value responses from MSA youth in 2019 and 2021 (Figure 5). This may be due to age, with younger youth in middle school grades potentially being less interested in an educational requirement attached to a river

rafting trip. But this does not account for the substantial drop in perceived value among all pre-trip components, especially when there was no similar pattern among PIS youth of the same years. The fact that the same pattern in the data was not observed from PIS expeditions indicates the lack of a time or environmental effect, but rather differences in youth participant characteristics. This reveals a substantial area for future focus, with next steps incorporating 2022 data and examining if there is a larger pattern among MSA youth compared to their PIS counterparts.

Moreover, a similar decrease in group means among IE youth was observed for three of the five growth domains set by GCY in their post-expedition survey (growth domains: *Cultural Awareness*, *Environmental Awareness*, *Leadership*, *Personal Growth*, and *Teamwork*). Individual Expedition youth from 2021 rated their perceived growth in *Environmental Awareness*, *Personal Growth*, and *Teamwork* significantly lower than their 2019 counterparts, which may be due to unexamined effects of the COVID-19 pandemic. Another potential explanation for lower growth among 2021 IE youth is the dynamic within IE compared to Group Expeditions. Particularly with *Teamwork*, it is a logical – but not irrefutable assumption – that Group Expedition youth grow more in *Teamwork* in 2021 than their IE youth counterparts because they have already “formed”, “normed”, and potentially “stormed” within their group (Tuckman, 1965). However, this argument cannot be as reasonably extended to *Environmental Awareness* or *Personal Growth*, but it is a possibility that the dynamic of pre-formed groups on Group Expeditions influence youths’ perceived growth differently while on expedition than the IE group in numerous domains. However, resultant granular examination of IE expeditions revealed the perceived growth among MSA youth in 2021 was significantly lower among *Environmental Awareness*, *Personal Growth*, and *Teamwork* than MSA youth reported in 2019 –

the exact pattern shown among IE youth more broadly – suggest that MSA youth are likely contributing to the decrease in overall IE group means in 2021 compared to 2019 (Figure 13). The fact that the youth sample reporting significantly lower growth in these domains in 2021 is the same youth sample who reported less perceived value of all three pre-trip components in 2021 compared to their 2019 counterparts, with a statistically significant difference among the educational pre-trip component, is striking. Indeed, it is interesting that significant differences were found among *Environmental Awareness*, *Personal Growth*, and *Teamwork*, and not *Cultural Awareness of Leadership*. Logical arguments could be made tying the concepts of either environmental or cultural awareness with education. In other words, there is either likely no association between 2021 MSA youth and a potential disdain among the cohort for the educational aspects of the expedition, or the interaction must be re-examined with larger sample sizes and less variability. Another potential explanation for this difference pertains to COVID-19: burnout, depress, stress accumulation, apathy are some potential causes that should be examined more closely within the context of these growth domains. Notwithstanding, it is possible that GCY processes in implementing MSA expeditions changed between 2019 and 2021 in yet-unknown ways.

The fact that IE youth from 2021 rated their perceived value of *Fundraising* significantly higher than their counterparts in 2019, but further examination of MSA and PIS youth revealed that MSA youth in 2021 rated their perceived value as much lower than their 2019 MSA youth counterparts raises questions. The most likely explanation for this is that the concentrated examination between MSA and PIS expeditions shown in Figure 5 omits data from youth who participated in Verde Valley Explorer expeditions or had pertinent missing data. While the Verde Valley Explorer data was insufficient to examine independently or via comparisons in this study,

the influence of this data and youth who responded to the post-expedition survey but had expedition name missing cannot be ignored and most likely had an influence in their associated group means.

It should also be noted that more data across all variables would increase the accuracy of all examined interactions contained in the current study, particularly for those with Chi-square tests with small sample sizes. As a result, many of the interactions observed function most applicably as starting points for future examination and analysis. For example, some Chi-square approximations were noted as empirically unreliable given small sample sizes, and both resultants prevented the empirical determination of concrete interactions of interest but highlight potential targets for future focus that may be revealed with larger sample sizes. All potentially unreliable Chi-square approximations are denoted in their corresponding tables. Yet, the value of the current data should be viewed primarily through the overwhelmingly positive lens of youth endorsement to the multitude of variables contained in the current study. While the variability in responses and endorsement – as well as perceived group differences across outcome variables and youth demographics – shed some light on where GCY can focus in future program iteration, data collection, and evaluation refinement, these distinctions should not detract from the considerable amount of positive growth reported by youth participants across all years and measured variables.

Concordance of GCY Data with the Positive Youth Development Model

Categorization of youth open-ended responses to an existing, empirically validated positive youth development ultimately served a variety of purposes. Administratively, the identification of absolute response counts illuminated vast discrepancies in survey implementation over time, as it is highly unlikely that youth participant response rates vary

sometimes as substantially as 565 responses (e.g., $n_{2015} = 81$; $n_{2019} = 646$). Moreover, apart from 2020, fluctuations in youth participation or total expeditions completed at GCY each year are not so extreme. Therefore, the most likely explanation for the sizable variability in sample sizes across years is a combination of random youth participation response rate variability and GCY post-expedition survey implementation efforts. Recommendations for next steps for this situation are outlined below in the recommendations section.

Additionally, however, partitioning youth responses by GCY program type illuminated an unexpected and counterintuitive result: there were no meaningful differences in the distribution of response categorizations to model factors between Group and IE youth responses. Youth participants receive the same post-expedition survey regardless of participation in a Individual or Group Expedition. Logically, one might expect that the frequency of responses categorized to some core PYD model factors would be different between the two program types due to the fundamental difference in group forming, youth dynamic, and curriculum. For example, one might expect that responses from Group Expedition youth would categorize either more or less to the *Connection* factor compared to responses from IE youth, considering that the *Connection* factor is defined as positive bonds with other individuals and institutions (Lerner et al., 2005). One could also argue both that responses from Group Expedition youth would categorize either more or less heavily to this factor due to the nature of their expedition group being pre-formed and youth participants having pre-existing relationships with one another. However, full categorization of 2,581 open-ended responses indicates that there was only a slight difference in categorization distribution, as shown in Table 10.

Incorporating the PYD model into this program evaluation of GCY allows the organization itself to be a part of the symbolic conversation regarding positive youth

development. Utilizing the theory-data-cycle in this program evaluation also prevents the replication of another outdoor education program evaluation that evaluates the subject organization's data against itself, perpetuating the cycle of producing siloed research and ungeneralizable or scalable evaluation mechanisms. Incorporation of the PYD model thus allows for advancement in the literature through the theory-data-cycle as the theory is tested in a novel environment that it was not originally intended for. Identifying where the model falls short in encapsulating GCY's data, and how much of GCY's data is unrelated to an empirically tested positive youth development model, results in the PYD model aiding in characterizing GCY's data. Likewise, GCY's data also aids in characterizing the PYD model, especially with potential refinements that are proposed to adapt it to be appropriate in an outdoor education context; potentially the first of its kind in the literature.

Consequently, the incorporation of *Other*, a factor included to capture responses that did not strictly relate to any of the PYD factors, resulted in the most response categorizations. Disregarding *Other* for the sake of analysis, however, *Connection* was unsurprisingly the factor with the most response categorizations, as GCY highly values connection and actively fosters it in their programming. However, it was unexpected that the factor *Contribution* obtained more response categorizations than *Caring*. According to Lerner et al. (2005), *Contribution* is a sixth model factor, supplementary to the core model of the Five C's, which theoretically becomes applicable and beneficial to positive youth development only when the previous five factors are satisfied in the individual. Therefore, it is interesting that more GCY open-ended responses were categorized under *Contribution* than *Caring*. While the exclusion of *Contribution* as a factor option to categorize responses to was considered due to the postulated mechanism of the PYD model (Lerner et al., 2005), it was ultimately included to prevent omission of an important aspect

of positive youth development. Overall, this finding predominantly resulted in an early indicator that the PYD model would not adequately capture youth data from an outdoor education context.

The first step in this refinement was with the creation of six additional complementary model factors of *Gratitude*, *Connection to Place*, *Respect for Nature*, *Self-Care*, *Humility*, and *Recommendations* composed of open-ended responses originally categorized as *Other*. It is not surprising that *Connection to Place* was the complementary factor with the most categorizations, as connection to place has a deeply rooted station within GCY. *Gratitude* also had a predictable number of categorizations, as evidence suggests that gratitude can be a natural byproduct of engaging in outdoor, experiential, or otherwise nature-based activities (Howell et al., 2011). Moreover, it is an unofficial but normative practice in GCY to express gratitude. However, the number of categorizations for *Respect for Nature*, *Self-Care*, and *Humility* is also surprising. These factors are also commonplace within GCY, are principally normative among all GCY programs, and are actively encouraged on expedition. Yet, *Respect for Nature* obtained the fewest categorizations. This may be due to an overshadowing effect; responses that would be categorized as *Respect for Nature* may have already been categorized as *Contribution* due to the overlap between having respect for nature and wishing to contribute to its sustainment.

Although the complementary factor *Other* – included as a necessity to categorize ensure no responses were uncategorized – obtained the most categorizations among the complementary factors, this was predicted. A large proportion of open-ended responses originally categorized as *Other*, pooled across all open-ended survey items, were responses to administrative and non-outcome, process-oriented survey items. These responses, to questions such as “*Did you feel the application process was clear?*”, “*Do you feel your safety needs were met?*”, and “*May we use your responses in publications?*” are mostly composed of responses such as “Yes”, “No”, “N/A”,

and similarly simple, vague, or unproductive responses in the context of positive youth development outcomes. These responses are, however, useful in different contexts. These contexts exist within the GCY organization and include aspects such as youth safety on expedition, experience of and feedback regarding clarity and ease of administrative processes, and feedback on the behavior of adults on expedition (i.e., trip coordinator[s] and GCY guides). These examinations were beyond the scope of the current study.

Refining an existing model that measures what could be considered the ultimate outcome of youth development research to measure common outdoor education outcomes of interest is the first step in creating a new model that can be leveraged across different outdoor education organizations and programs. Specifically, incorporating the PYD model component into this program evaluation allows for better characterization of GCY data, potentially setting the organization on a path to more efficiently leveraging the data to serve their purposes. Maximizing the efficacy of GCY's data and positioning the organization where program data can efficiently and promptly assist in program refinement is an overarching goal of this program evaluation. Explicitly incorporating the nuance of GCY (e.g., connection to place) was additionally a way to supplement shortcomings in existing data.

Strengths and Limitations

Strengths. The program evaluation nature of an outdoor education organization while simultaneously incorporating an empirically validated framework for positive youth development bolsters this study's strengths since it evaluates innovative programming descriptively while simultaneously incorporating it into conversation with a contemporary framework. The meticulous examination of group differences over time across a wide variety of variables allowed for the identification of both meaningful distinctions and trends in the data,

which are incredibly valuable within the context of program evaluation for GCY to further refine and iterate programming and ensure positive youth development is being achieved. Furthermore, the concordance of the PYD model into this program evaluation not only allowed for the characterization of GCY's data within an empirically validated framework to identify the congruity of an outdoor education organization's observed outcomes based on data and positive youth development, but it provides the organization incredibly useful context and directions for future programming and data collection. Taken together, this study allows GCY to make evidence-based decisions for its programming and improve the already-positive outcomes that are being exhibited among youth participants of GCY expeditions.

Limitations. This program evaluation has numerous limitations. Predominantly, a final sample of 1,257 data points results in inadequate sample sizes when substantially partitioned into numerous subgroup (i.e., $n = 96$ for unique expedition names). As a result, many examined interactions had suboptimal sample sizes, which may have produced results that should be seen as preliminary rather than inferential or causal. This includes many of the Chi-square approximations. Given that the Chi-square test depends on several assumptions, one of which that expected cell frequencies should be greater to or equal to five, many Chi-square approximations should be seen as preliminary results until group differences can be reanalyzed with additional data. In general, this program evaluation was predictably unable to derive inferences in GCY programming on youth development, or more specifically, positive youth development as an outcome. Proportions of missingness were profound across a multitude of categories and patterns of missingness were certainly not random. However, it was unable to be determined exactly what pattern the missingness followed due to the asymmetrical and disparate nature of the data of a community-based 501(c)(3).

Lastly, socioeconomic bias may exist in the sample, as outdoor education programs tend to be expensive due to general costs incurred by the organization for equipment, permits, salaries, and transportation (Williams, 2013). This bias may be alleviated due to the pre-expedition activities set forth by GCY, including fundraising efforts and activities guided by GCY and performed by youth enrolled in an upcoming expedition (GCY, 2022). Unfortunately, this interaction was unable to be analyzed, as the only survey item measuring a resemblance of financial security or means among participants and/or their families is a survey item in the post-expedition parent/guardian survey, where the parent/guardian is asked “*Was the program reasonable in terms of cost and availability of scholarships?*” This proxy measure for financial means was not deemed adequate as a substitute. Additionally, all parent data were excluded from analysis in the current study due to limitations in scope for the thesis. Future research should examine the interaction between youth perceived outcomes and growth from GCY programming and financial situation.

Directions for Future Research

Despite the limitations of this program evaluation, there are countless directions for future research pertaining to GCY. Earliest future research should entail the incorporation of 2022 data, as this data was not available for the timeline of the current study. All data from 2022 should be integrated into the data frames and R source code produced for this program evaluation, and all statistical tests should be replicated with 2022 data included. Specifically, interactions of interest after inclusion of 2022 data include differences of group means among the *Fundraising* and *Educational* GCY pre-trip components across program and IE type, and how youth participant state/province of origin influence youths’ perception of various GCY outcomes. The inconsistent evidence shown in Figure 4 that youth in both Individual and Group

Expeditions from 2021 rated their perceived value of the fundraising component higher than their peers from 2019 (Figure 4), but that a substantial decrease in perceived value among MSA youth in 2021 compared to 2019, support the notion that more data is needed.

Future research should examine the potential moderating effect of state/province of origin for the following outcomes (as measured from survey items): “*Did you learn something new on your expedition that you can use in your daily life?*”, “*Did you form meaningful friendships with other participants on the trip?*”, and “*Were you comfortable communicating with the adults on this expedition?*” Focus on youth ethnicity should be placed regarding youth comfort communicating with adults due to the inability to rule out a statistically significant interaction from aggregated data with missing ethnicity data.

Additional future research can also adopt the different contexts in which to view the data that are relevant to GCY but was beyond the scope of the current study. These previously mentioned contexts include administratively- and process-oriented survey items, such as “*Did your trip coordinator do fun and educational activities with you on the river?*”, “*Did the guides add to the educational and leadership aspects of your trip?*”, “*Do you feel your trip coordinator managed your trip effectively?*” and “*Were you given an opportunity to develop leadership skills while on the river?*” These variables, while not directly tied to known pathways to positive youth development, are nonetheless relevant in an outdoor education and evaluative lens. Fidelity on the behavior and perceived effectiveness of GCY guides and trip coordinators from youth participants’ perspectives would be extremely valuable to GCY, as they could potentially pinpoint various issues that would otherwise remain hidden. It is worth noting, however, that these survey items were administered in the post-expedition survey – with slight individual year variations – until 2018 (Table 4). These items were removed in the large survey iteration

between 2018 and 2019. Consequently, examination of these items could potentially inform GCY of their utility to reinclude into the survey or keep omitted.

Once GCY data collection mechanisms are standardized and consistent, the complementary PYD model factors should be added as post-expedition survey items to begin data collection on these factors and test the empirical suitability of these factors in GCY's operations. Additionally, more traditional psychological or otherwise scientific research should be conducted with explicit hypotheses aimed at measuring positive youth development. The incorporation of *Connection to Place* as a relevant factor in a revised PYD model suited for an outdoor education context may act as a basis for leveraging Place-Based Education (PBE; Wattchow & Brown, 2011) as a foundational framework. The potential to incorporate a control group into future research is not impossible, however realistically unfeasible. Youth who are waitlisted for an expedition or ultimately cannot be enrolled and participate for whatever reason can populate a control group. With proper incentivization for participation data collection, similar response rates could be achieved on par with average response rates already being obtained. Inclusion of a control group into research would drastically improve the validity of any research conducted with GCY, and bolster results toward a goal of causal inference.

Parent or guardian data should also be examined. Parents or guardians also receive a post-expedition survey and is sent at the same time as the youth participant survey. Examining parent/guardian data would be particularly beneficial to GCY and is especially fruitful in this context. Examining correlations between parent/guardian financial means and security is key potential moderator in youth perception of pre-expedition components, post-expedition growth domains, and numerous outcomes of interest measured in the survey. Comparing parent or guardians' perception of their youth's growth as a result of GCY programming to their youth's

own perception of growth is a particularly rich area of exploration and may shed additional light on each youth's demographic background and circumstances – which would be relevant in analyzing outcomes of growth. However, this research first required data matching between youth participants and parent survey respondents; an effort that should be undertaken once demographic and survey databases are merged and sortable.

Recommendations to Grand Canyon Youth

The visualization of categorized youth open-ended response counts and rates by year highlights several potential courses of action. First, this program evaluation will hopefully impart the importance of adept data collection and sound, stable collection mechanisms that will not dissolve over time or due to employee turnover, and lead to improvements in practices that reinforce the value of the data. Second, survey completion incentives for both youth and parents are implicitly recommended to achieve more comprehensive data sets; flexibility of group mean comparisons, examined interactions, and quality of outcomes hopefully emphasize this immediate but short-term strategy as well – although financial realities and constraints are understood. Overall, steps should be taken to obtain higher response rates from both youth participants and parent or guardians; especially if future research is being seriously considered.

Similarly, GCY should restructure or reform their core database to achieve ease of access, navigation, and analysis, and compatibility across variables. Storing participant demographic and survey data on separate databases, and collecting data for each separately, directly and severely inhibits competent data analysis. Altogether, current data management practices create more work for any individual dedicated to analyzing GCY data in meaningful ways, as it requires an abundance of work in initial stages to screen, clean, standardize, and merge the data in preparation for statistical analysis. Employment of a relational database would

streamline the storing and organization of data. Based on GCY data, database management systems that are capable of handling relational data and that can support complex queries and data analysis is required. Based on a balance of need, training and expertise, and resources (including financial), MySQL, PostgreSQL, and SQLite are potentially tenable options, but other open-source database management systems that are deemed more suitable upon further inspection are also options and should not be excluded from consideration. The predominant importance of such a database is that all GCY data is stored and organized in a single place, data collection mechanisms seamlessly feed into the database in order to produce streamlined data outputs regardless of hypothesis, bespoke queries are able to be made to produce said outputs without a suboptimal or unnecessary amount of work required, and the database can be managed across time regardless of employee turnover.

Expansion of existing data topics also provide a pathway to obtaining more robust data. Conditional logic can be implemented in the electronically administered post-expedition survey that pre-sorts various data points based on responses to a previous question. For example, if youth respond “No” to “Were you comfortable communicating with the adults on the trip?”, a survey formatted with conditional logic can ask the youth participant why they were uncomfortable communicating with adults in an open-ended format. Conditional logic allows surveys to collect more data from respondents while not fatiguing other participants to which such questions do not apply. Conditional logic could be implemented in many current GCY survey items already to great avail.

Additionally, an examination and evaluation of youth program recommendations to GCY should be completed. A total of 87 youth participants made program recommendations to GCY through open-ended responses. While not all recommendations are feasible, sound, or congruent

with GCY organizational values, full review of open-ended responses during the PYD model categorization process revealed that many responses are potentially useful and include a spectrum of sentiment from youth participant and parent/guardian alike. Text mining software can be leveraged to identify trends and patterns in youth and parent/guardian open-ended responses and can identify predominant categories of recommendations to potentially inform programmatic refinements during ongoing theory-of-change discussions.

Lastly, the 25th anniversary of GCY should be taken advantage of to collect data from GCY alumni. Whether in the form of electronic survey(s), qualitative interviews, or open-ended feedback sent to GCY, the 25th anniversary of GCY provides an excellent opportunity to obtain follow-up data that can then be compared to current post-expedition survey data. As such, data topics for collection should roughly mirror the existing post-expedition survey or what the next iteration of the survey will be. This effort should be properly incentivized to capitalize on the rare opportunity provided to engage with alumni of all years.

Overall, it is recommended that GCY institute a comprehensive database management software for data storage and organization that is conducive to thorough analysis. Additionally, it is strongly recommended that GCY engage in deliberate data collection efforts to ensure adequate sample sizes for subsequent analysis and innovate on existing collection mechanisms – in both structure and content. Data collection mechanisms and analysis procedures can be refined accordingly to accomplish the organizational target goals. Existing GCY data in its current form is already rich; the challenge is accessing, structuring, and standardizing it in an unconnected system. Should these recommendations be executed, opportunities for future program evaluation and hypothesis-driven research abound.

Conclusion

This thesis focused on outdoor education as an intervention for positive youth development. This thesis was structured as a program evaluation – instead of hypothesis-driven research – aimed at characterizing the data of a local 501(c)(3) organization that brings youth on educational river rafting expeditions in the southwest against the backdrop of the experiential education architecture. Grand Canyon Youth, celebrating its 25th anniversary in 2023, is widely considered an institution not only where it is based in Flagstaff, Arizona, but the wider southwest geography and even beyond – with youth participating in GCY programming traveling as far as Alaska and Ontario. This is no surprise, as GCY leverages the transformative powers of the southwest’s rivers and canyons, with one of their main programs actively operating in the Grand Canyon, which attracted over 4.5 million visitors in 2022, is one of the seven wonders of the world, and a UNESCO World Heritage Site (NPS, 2023). Indeed, enrollment for GCY Individual Expeditions is consistently high and many youth sign up for each expedition’s waiting list, further demonstrating GCY’s high-demand status among youth and families and the positive effect its programming has on its youth participants. Motivation for this thesis came in part due to interaction with GCY and witnessing its effects on youth and adults alike. Initial examinations of the data contained in this thesis further exhibited the tremendous positive effects that GCY programming is already having on youth participants.

With the aim of characterizing the current study as a program evaluation and GCY as the organization of focus, the historical and current nature of experiential education was addressed and contextualized. Delineations between common terms within experiential education – predominantly outdoor education and wilderness therapy – are necessary when approaching research in an outdoor education environment due to the vast heterogeneity in both practice and the research literature. Heterogeneity and variability in research methodologies, outcomes, and

limitations within the scientific literature likely stem from a concordant unsystematic practice among experiential education organizations. Consequently, commonalities in methodological approaches, psychological and/or educational frameworks utilized as foundations to experiential education programs, and subsequent pedagogy must be sought to achieve clarity and potentially generalizable results in contemporary research in experiential education.

By analyzing existing GCY data from 2010—2021 against organizationally specified goals and outcomes of interest, this program evaluation identified associations that can be of use in targeting specific existing program components and interactions for improvement or discontinuance. This was not only to aid in improving the quality of GCY programming and experience of the youth that are served, but also to potentially prevent unfavorable incidents involving youth; some of which may originate as insignificant issues but have the potential to become disastrous under the right (or wrong) circumstances in the remote settings that GCY operates. Differences and comparisons in group proportions of endorsement between two fundamental GCY programs – Individual and Group Expeditions – served as the starting point. More granular examination of the data ensued, with the identification of significant differences of group proportions of endorsement between Middle School Adventure (MSA) and Partners in Science (PIS) expeditions. In this particular case, MSA and PIS data also acted as unofficial proxies for youth participant age and expedition programming; MSA and PIS are pre-structured for respective middle school-aged youth and high school-aged youth rafting in different rivers and geographic locations altogether.

In a broader scope, this thesis was a contribution to a larger, multi-component programming and evaluation overhaul currently underway at GCY that incorporates refinements in empirical data collection pilot programs – including this thesis – that focus on non-intrusive,

stimulating qualitative data collection programming, and innovations in programming that emphasize meaning-making for youth participants who experience a potentially life-changing expedition. By highlighting the many strengths and relative shortcomings of GCY's existing data, data collection mechanisms, and programming, the results of this program evaluation can function as a starting point for program refinement and iteration, future program evaluation or hypothesis-driven research, as well as serve as a resource to secure funding and funding sources and bolster enrollment efforts.

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Tables

Table 1

Comparisons Between Common Outdoor Education or Adventure Programming

Experiential Education		
Outdoor Education		Wilderness Therapy
Educational-focused	Character-focused	Commonalities
E.g., National Outdoor Leadership School (NOLS)	E.g., Outward Bound; Grand Canyon Youth (GCY)	Outdoor setting Hands-on learning
Technical focused outcomes: Rock climbing; Backpacking; Kayaking; Mountaineering; Leadership abilities; etc.	Character focused outcomes: Self-esteem; Resilience; Courage; Positive social relationships; Environmental virtue; Social justice (Smith & Walsh, 2019)	Interdisciplinary-style education (Robbins, 2015) Student-led, teacher-facilitated (Chapman, 1995)
Leverage challenge and hardship to develop personal skills (D'Amato & Krasny, 2011)		Health focused outcomes: Recidivism rates; Aggressive behavior; Drug use and dependency; Increasing internal locus of control (Gillis, Gass, & Russell, 2008; Russel, 2003; Smith & Walsh, 2019)
Other terms include: environmental education; adventure education; outdoor education; or a combination of the three (Sammet, 2010; Wentworth-Larson, 2010)		Leverage the wilderness with clinical counseling to increase health-related quality of life and reduce risky behavior (Benson et al., 2004; Gass, et al., 2012)
		Other terms include: wilderness adventure therapy; outdoor therapy; outdoor behavioral healthcare; and adventure-based counseling (Gass et al., 2012)

Table 2*Ten Design Principles of Youth Development and Overlapping Research in the Literature*

	Design Principles (Mansfield et al., 2020)	Overlapping/ Relevant Research	Currently Implemented at GCY?
(1)	Adults be utilized in key roles	Youth empowerment must be aided through a facilitative environment with adults (Shellman, 2014)	✓
(2)	Comprised of challenging activities	Risks and challenges (Ewert & Yoshino, 2011)	✓
(3)	Be based on a positive social context	Strengths-based approach & positive emotions (Seligman et al., 2009)	✓
(4)	Takes place in an unfamiliar environment	Overcoming cognitive dissonance in unfamiliar environments (Norton & Watt, 2014)	✓ ^a
(5)	Provides youth with opportunities to develop autonomy and leadership	Autonomy, self-efficacy, & empowerment target constructs (Neill et al., 2003; Shellman, 2034; Sibthorp et al., 2007)	✓
(6)	Takes place over an extended period of time and within a continuum of activity	Optimal balance of serious & playful states for learning (Dewey, 1938)	✓
(7)	Involves participants gaining skills through authentic experiences	Student-led, teacher-facilitated programs (Chapman, 1995)	✓
(8)	Provides youth with opportunities for reflection to process experiences	Processing & reflecting in the Experiential Learning Cycle (ELT; Kolb & Kolb, 2005; McKenzie, 2003)	✓
(9)	Be supported by a continuum of planning and evaluation	Deliberate intention (Mansfield et al., 2020)	
(10)	Be based on strong connections to the organization's context	Intentional program and curriculum planning (Whittington & Mack, 2010).	✓

Note. ^a Many youth participants reside in the greater Flagstaff, Arizona area, which may lead to less of an “unfamiliar environment” due to proximity to the expedition locations.

Table 3*GCY Sample Survey Items Nested Under PYD Model Factors*

Positive Youth Development (PYD) Model					
Model Factor	Competence	Confidence	Connection	Character	Caring
Definition (Lerner et al., 2005, p. 23)	Positive view of one's actions in social, academic, cognitive, and vocational competences	Internal sense of overall positive self-worth and self-efficacy	Positive bonds with people and institutions	Respect for societal and cultural rules; sense of right and wrong (morality); integrity	Sympathy & empathy for others
Grand Canyon Youth (GCY) Survey Items Related to Positive Youth Development (PYD) Model Factors	<p>“Were the GCY pre-trip components a valuable part of your experience? [Educational]”</p> <p>“Have you used anything you learned on your trip since you've returned?”</p> <p>“Were you given an opportunity to develop leadership skills while on the river?”</p> <p>“Do you feel that you learned and grew in the areas of: [Leadership]”</p>	<p>“Do you feel that you learned and grew in the areas of: [Personal Growth]”</p> <p>“Did you discover anything new about yourself on your river trip?”</p> <p>“Did your GCY experience improve your ability to persevere in challenging or uncomfortable situations?”</p>	<p>“Did you form meaningful friendships with other participants on the trip?”</p> <p>“Do you feel that you learned and grew in the areas of: [Teamwork]”</p> <p>“Were you comfortable communicating with your trip coordinator and the guides?”</p>	<p>“Do you feel the trip meant more to you because you earned it through pre-trip requirements?”</p> <p>“Do you think you will continue to participate in community service after your experience with GCY?”</p> <p>“Do you feel that you learned and grew in the areas of: [Cultural Awareness]”</p>	<p>“Did you form meaningful friendships with other participants on the trip?”</p> <p>“Do you feel that you learned and grew in the areas of: [Teamwork]”</p> <p>“Did you learn something new on your river trip that you can use in your daily life?”</p>

Note. Survey items are not mutually exclusive to PYD model factors. Items listed are examples of questions that may prompt responses from youth participants that are relevant to the PYD model Factors.

Table 4

GCY Quantitative Survey Items by Year, Response Rates, and Missingness

Survey Item	2010 n = 41	2011 n = 76	2012 n = 61	2013 n = 60	2014 n = 46	2015 n = 14	2016 n = 103	2017 n = 39	2018 n = 62	2019 n = 79	2021 n = 50	Average (%)
Did you feel the application process was clear?	41 (100)	75 (98.68)	57 (93.44)	59 (98.33)	45 (97.83)	14 (100)	102 (98.08)	38 (97.44)	61 (98.39)	N/A	N/A	98.02
<i>Do you think the pre-trip components were an important aspect of your experience?</i>	39 (95.12)	75 (98.68)	57 (93.44)	59 (98.33)	46 (100)	14 (100)	100 (96.15)	39 (100)	61 (98.39)	N/A	N/A	98.12
<i>Were the GCY pre-trip components a valuable part of your experience? (Fundraising)</i>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	63 (79.75)	50 (100)	89.88
<i>Were the GCY pre-trip components a valuable part of your experience? (Community Service)</i>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	69 (87.34)	50 (100)	93.67
<i>Were the GCY pre-trip components a valuable part of your experience? (Educational)</i>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	75 (94.94)	50 (100)	97.47
Do you feel the trip meant more to you because you earned it through pre-trip requirements?	39 (95.12)	74 (97.37)	57 (93.44)	58 (96.67)	46 (100)	14 (100)	102 (98.08)	39 (100)	61 (98.39)	N/A	N/A	97.67
<i>Did you learn something new on your river trip that you can use in your daily life?</i>	36 (87.80)	67 (88.16)	46 (75.41)	55 (91.67)	40 (86.96)	14 (100)	83 (79.83)	36 (94.74)	54 (87.10)	79 (100)	50 (100)	90.15
<i>Did you discover anything new about yourself on your river trip?</i>	36 (87.80)	67 (88.16)	44 (72.13)	55 (91.67)	40 (86.96)	14 (100)	83 (79.83)	37 (97.37)	54 (87.10)	79 (100)	50 (100)	90.09
Did your trip coordinator do fun and educational activities with you on the river?	36 (87.80)	67 (88.16)	45 (73.77)	55 (91.67)	40 (86.96)	14 (100)	83 (79.83)	35 (92.11)	54 (87.10)	N/A	N/A	87.49
Did the guides add to the educational and leadership aspects of your trip?	36 (87.80)	67 (88.16)	45 (73.77)	55 (91.67)	39 (84.78)	14 (100)	82 (78.85)	36 (94.74)	54 (87.10)	N/A	N/A	87.43
<i>Were you comfortable communicating with your trip coordinator and the guides?</i>	36 (87.80)	66 (86.84)	45 (73.77)	55 (91.67)	40 (86.96)	14 (100)	81 (77.88)	36 (94.74)	54 (87.10)	79 (100)	50 (100)	89.71
Do you feel your safety needs were met?	36 (87.80)	67 (88.16)	45 (73.77)	55 (91.67)	41 (89.13)	14 (100)	83 (79.83)	36 (94.74)	54 (87.10)	79 (100)	50 (100)	90.20
Do you feel your trip coordinator managed your trip effectively (pre-trip, on river, post-trip)?	31 (75.61)	62 (81.58)	45 (73.77)	51 (85.00)	31 (67.39)	14 (100)	74 (71.15)	36 (94.74)	48 (77.42)	N/A	N/A	80.74
<i>Do you feel you learned something about the cultural and natural history of the area?</i>	32 (78.05)	62 (81.58)	44 (72.13)	51 (85.00)	32 (69.57)	14 (100)	78 (75)	34 (89.47)	47 (75.81)	N/A	N/A	80.73
<i>Did you form meaningful friendships with other participants on the trip?</i>	31 (75.61)	62 (81.58)	44 (72.13)	51 (85.00)	32 (69.57)	14 (100)	76 (73.08)	34 (89.47)	47 (75.81)	N/A	N/A	80.25
Were you given an opportunity to develop leadership skills while on the river?	32 (78.05)	58 (76.32)	45 (73.77)	50 (83.33)	33 (71.74)	14 (100)	76 (73.08)	34 (89.47)	47 (75.81)	N/A	N/A	80.17
Have you used anything you learned on your trip since you've returned?	31 (75.61)	62 (81.58)	43 (70.49)	51 (85.00)	32 (69.57)	14 (100)	75 (72.12)	34 (89.47)	46 (74.19)	N/A	N/A	79.78
<i>Do you think you will continue to participate in community service after your experience with GCY?</i>	32 (78.05)	62 (81.58)	44 (72.13)	50 (83.33)	31 (67.39)	14 (100)	74 (71.15)	N/A	47 (75.81)	N/A	N/A	78.68
Did your GCY experience improve your ability to persevere in challenging or uncomfortable situations?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	79 (100)	50 (100)	100.00
<i>Do you feel that you learned and grew in the areas of: (Environmental Awareness)</i>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	79 (100)	50 (100)	100.00
<i>Do you feel that you learned and grew in the areas of: (Leadership)</i>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	79 (100)	50 (100)	100.00

<i>Do you feel that you learned and grew in the areas of: (Teamwork)</i>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	79 (100)	50 (100)	100.00
<i>Do you feel that you learned and grew in the areas of: (Personal Growth)</i>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	79 (100)	50 (100)	100.00
<i>Do you feel that you learned and grew in the areas of: (Cultural Awareness)</i>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	79 (100)	50 (100)	100.00
Would you do another GCY trip?	32 (78.05)	63 (82.89)	44 (72.13)	51 (85.00)	32 (69.57)	14 (100)	75 (72.12)	N/A	47 (75.81)	79 (100)	50 (100)	83.56
Would you recommend GCY to a friend?	32 (78.05)	61 (80.26)	45 (73.77)	51 (85.00)	32 (69.57)	14 (100)	76 (73.08)	34 (89.47)	47 (75.81)	79 (100)	50 (100)	84.09
May we use your responses in publications?	32 (78.05)	61 (80.26)	44 (72.13)	50 (83.33)	31 (67.39)	14 (100)	75 (72.12)	N/A	47 (75.81)	79 (100)	50 (100)	82.91
Average by Year (%)	83.36	86.11	76.41	89.07	80.07	100.00	78.96	93.86	83.34	97.63	100.00	

Note. Yearly survey iterations were completed at GCY internally. Response rates are displayed by survey item and year. Total survey responses from youth by year are listed at the top of the table to assist in determining exact counts of missingness. Accumulated average response rates are displayed in the right-most column for survey items and bottom row for year. *Italicized survey items* were examined as outcomes of interest.

Table 5*GCY Open-Ended Survey Items by Year, Responses Rates, and Missingness*

Survey Item	2010 <i>n</i> = 41	2011 <i>n</i> = 76	2012 <i>n</i> = 61	2013 <i>n</i> = 60	2014 <i>n</i> = 46	2015 <i>n</i> = 14	2016 <i>n</i> = 103	2017 <i>n</i> = 39	2018 <i>n</i> = 62	2019 <i>n</i> = 79	2021 <i>n</i> = 50	Average (%)
Please share any feedback you have about the pre-trip components	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	42 (53.16)	30 (60.00)	56.58
Do you feel your safety needs were met?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	49 (62.03)	33 (66.00)	64.02
Did you learn something new on your river trip that you can use in your daily life?	20 (48.78)	N/A	15 (24.59)	26 (43.33)	9 (19.57)	14 (100)	27 (25.96)	5 (12.82)	10 (16.13)	79 (100)	50 (100)	49.12
Did you discover anything new about yourself on your river trip?	22 (53.66)	29 (38.16)	18 (29.51)	24 (40.00)	12 (26.09)	14 (100)	27 (25.96)	5 (12.82)	9 (14.52)	79 (100)	50 (100)	49.16
Did the guides add to the educational and leadership aspects of your trip?	20 (48.78)	N/A	20 (32.79)	27 (45.00)	12 (26.09)	14 (100)	27 (25.96)	7 (17.95)	12 (19.35)	N/A	N/A	39.49
What were some of your favorite activities that you did on the expedition?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	79 (100)	50 (100)	100.00
Have you used anything you learned on your trip since you've returned?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7 (17.95)	9 (14.52)	N/A	N/A	16.24
Were you comfortable communicating with your trip coordinator and the guides?	N/A	30 (39.47)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	78 (98.73)	50 (100)	79.40
Did your GCY experience improve your ability to persevere in challenging or uncomfortable situations?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	52 (65.82)	34 (68.00)	66.91
What impact has your Grand Canyon Youth trip made in your daily life? Please describe.	N/A	49 (64.47)	36 (59.02)	43 (71.67)	25 (54.35)	14 (100)	60 (57.69)	28 (71.79)	41 (66.13)	N/A	N/A	68.14
Do you have any recommendations to improve the Grand Canyon Youth program?	21 (51.22)	39 (51.32)	26 (42.62)	35 (58.33)	25 (54.35)	10 (71.43)	48 (48.15)	N/A	24 (38.71)	51 (64.56)	34 (68.00)	54.87
Could you share some trip highlights with us?	30 (73.17)	51 (67.11)	36 (59.02)	44 (73.33)	25 (54.35)	13 (92.86)	62 (59.62)	22 (56.41)	40 (64.52)	79 (100)	50 (100)	72.76
Do you have anything else that you would like to share with us or comment on?	19 (46.34)	33 (43.42)	23 (37.70)	28 (46.67)	19 (41.30)	9 (64.29)	37 (35.58)	N/A	26 (41.94)	50 (63.29)	33 (66.00)	48.65
Average by Year	53.66	50.66	40.75	54.05	39.44	89.80	39.85	31.62	34.48	80.76	82.80	

Note. All open-ended responses were considered for PYD model categorization. Accumulated average response rates are displayed in the right-most column for survey items and bottom row for year. Some survey items may appear repeated from Table 12; for these items both quantitative and open-ended responses were queried to youth.

Table 6*Youth Participant Overall Demographic Descriptive Statistics and Missing Data*

	First Name	Last Name	Trip Name	Trip Location	Sex	Ethnicity	Birth Date	Age at Trip	City	State/Province	Country
Total/All Data (<i>n</i> = 1257)											
Count	1031	1025	1000	681	713	683	715	594	698	676	671
(%)	(82.0)	(81.5)	(79.6)	(54.2)	(56.7)	(54.3)	(56.9)	(47.3)	(55.5)	(53.8)	(53.4)
Individual Expeditions (<i>n</i> = 756)											
Count	752	750	756	665	687	661	689	579	683	660	655
(%)	(99.5)	(99.2)	(100)	(88)	(90.9)	(84.4)	(91.1)	(76.6)	(90.3)	(87.3)	(86.6)
Group/Custom Expeditions (<i>n</i> = 244)											
Count	241	239	244	24	24	21	24	15	13	14	14
(%)	(98.8)	(98)	(100)	(9.8)	(9.8)	(8.6)	(9.8)	(6.1)	(5.3)	(5.7)	(5.7)

Note. A total of 835 entries in the data were from unique youth participants. Entries with all demographic data missing were 257 (*n* = 257).

Table 7*Youth Participant Descriptive Statistics: Ethnicity*

Ethnicity (absolute $n = 1257$)	Count n (%)
Missing	575 (45.74)
Caucasian	500 (39.78)
Hispanic/Latino	80 (6.36)
Native American	63 (5.01)
Asian	45 (3.58)
African American	24 (1.91)
Other	17 (1.43)
Pacific Islander	8 (0.64)
Prefer Not To Say	4 (0.32)

Note. Distribution of youth ethnicities displayed here may not be fully representative of all GCY youth participants due to the considerable amount of missingness. Absolute n is all youth participants with all ethnicity combinations and permutations counted; count and proportions shown here are aggregated by unique values. All percentage points are rounded to the second decimal place.

Table 8*Youth Participant Descriptive Statistics: Sex*

Sex (absolute $n = 1257$)	Count n (%)
Missing	545 (43.4)
Male	365 (29.0)
Female	345 (27.5)
Not Listed	2 (0.2)

Note. Absolute n is all youth participants with all ethnicity combinations and permutations counted; count and proportions shown here are aggregated by unique values. All percentage points are rounded to the second decimal place.

Table 9*Youth Participant Descriptive Statistics: State/Province of Origin*

State of Origin (<i>n</i> = 1257)	Count <i>n</i> (%)	State of Origin (cont.)	Count (cont.)
Missing	581 (45.22)	Utah	5 (0.40)
Arizona	487 (37.74)	Florida	4 (0.32)
California	40 (3.18)	New Jersey	4 (0.32)
Colorado	36 (2.86)	Virginia	4 (0.32)
New Mexico	14 (1.11)	Arkansas	3 (0.24)
Illinois	12 (0.95)	Massachusetts	3 (0.24)
Texas	8 (0.64)	Tennessee	3 (0.24)
Washington	8 (0.64)	Georgia	2 (0.16)
Maryland	7 (0.56)	Minnesota	2 (0.16)
Ohio	7 (0.56)	Oklahoma	2 (0.16)
Oregon	7 (0.56)	Wisconsin	2 (0.16)
Louisiana	5 (0.40)		

Note. Absolute *n* is all youth participants with all ethnicity combinations and permutations counted; count and proportions shown here are aggregated by unique values.

All percentage points are rounded to the second decimal place.

States with *n*=1 not shown in table: Alaska; Kentucky; Michigan; New Hampshire; New York; North Carolina; North Dakota; Pennsylvania; South Carolina; Ontario (Canada); British Columbia (Canada).

Table 10*Youth Open-Ended Response Categorization to PYD Model Factors*

	Total Item <i>n</i>	Competence	Confidence	Connection	Character	Caring	Contribution	Other
Total Item <i>n</i> (%)	2581	462 (17.82)	276 (10.65)	725 (28.01)	113 (4.38)	48 (1.86)	70 (2.71)	1271 (49.24)
2010	145	56 (38.62)	18 (12.41)	59 (40.69)	9 (6.21)	5 (5.52)	8 (5.52)	45 (31.03)
2011	262	41 (15.65)	27 (10.31)	63 (24.05)	3 (1.15)	0 (0)	6 (2.29)	138 (52.67)
2012	167	32 (19.16)	18 (10.78)	60 (35.93)	18 (10.78)	1 (0.60)	10 (5.99)	61 (36.53)
2013	227	51 (22.47)	44 (19.38)	57 (25.11)	17 (7.49)	4 (1.76)	5 (2.20)	83 (36.56)
2014	102	11 (10.78)	17 (16.67)	13 (12.75)	3 (2.94)	1 (0.98)	2 (1.96)	67 (65.69)
2015	81	21 (25.93)	7 (8.64)	25 (30.86)	5 (6.17)	1 (1.23)	4 (4.94)	32 (39.51)
2016	284	40 (14.08)	23 (8.10)	75 (26.41)	12 (4.23)	5 (1.76)	7 (2.46)	151 (53.17)
2017	78	19 (24.36)	4 (5.13)	17 (21.79)	2 (2.56)	1 (1.28)	1 (1.28)	43 (55.13)
2018	175	18 (10.29)	12 (6.86)	54 (30.86)	4 (2.29)	5 (2.86)	2 (1.14)	93 (53.14)
2019	646	103 (15.94)	60 (9.29)	181 (28.02)	19 (2.94)	11 (1.70)	17 (2.63)	343 (53.10)
2021	414	70 (16.91)	46 (11.11)	121 (29.23)	21 (5.07)	14 (3.38)	8 (1.93)	215 (51.93)
Cohen's Kappa Ratings [†]								
		0.941	0.954	0.976	0.856	1.000	0.923	0.985
Individual Expeditions (IE) Only [‡]								
All years	1354	261 (19.28)	156 (11.52)	383 (28.29)	62 (4.58)	34 (2.51)	38 (2.81)	656 (48.45)
Group/Custom Expeditions Only [‡]								
All years	1227	199 (16.2)	120 (9.78)	342 (27.87)	51 (4.16)	14 (1.14)	32 (2.61)	617 (50.29)
Additional Hypothesized Model Factors Expanded from <i>Other</i>								
		Gratitude	Connection to Place	Respect for Nature	Self-Care	Humility	Recommendations	Other
All years	1271	130 (10.20)	268 (21.04)	26 (2.04)	47 (3.69)	28 (2.20)	87 (6.83)	712 (55.89)

Note. Categorization frequencies by model factor will not sum to total open-ended responses reported by year because responses were multi-coded.

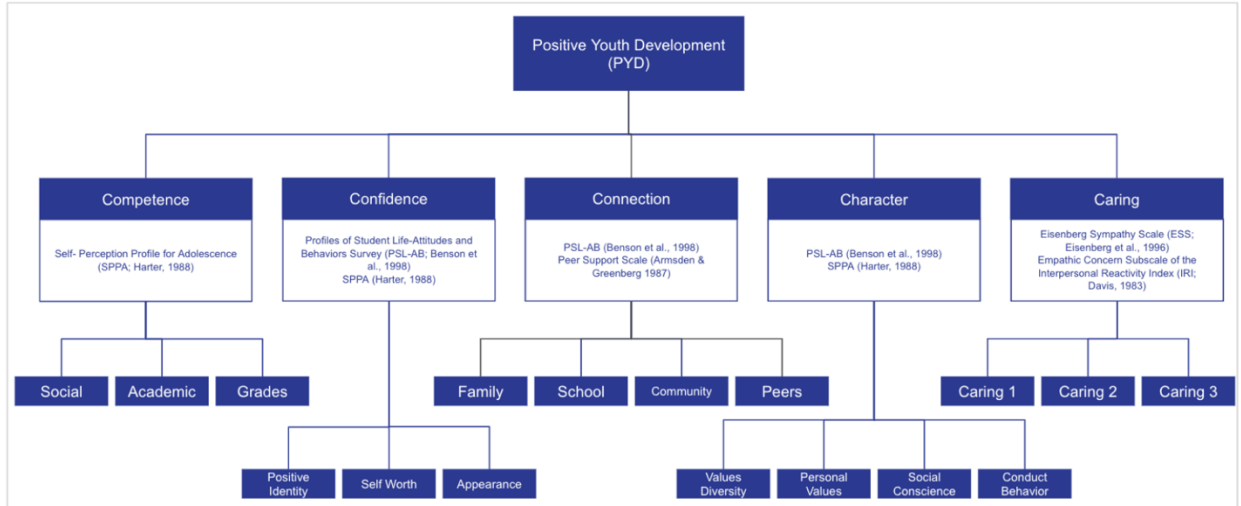
† Cohen's Kappa was calculated from a random 10 sample of all youth open-ended responses corresponding to both Individual and Group Expeditions. Cohen's Kappa of 1.00 was achieved in *Caring* due to a small number of responses categorized as relevant to *Caring*. Cohen's Kappa for all youth responses that were relevant to *Other* was 0.985.

‡ Breakdowns between response categorizations between Individual and Group/Expeditions by year, and the additional hypothesized factors, are summarized here with years aggregated because proportions of youth open-ended responses between Individual and Group/Custom Expeditions were roughly equal in total and across years.

Figures

Figure 1

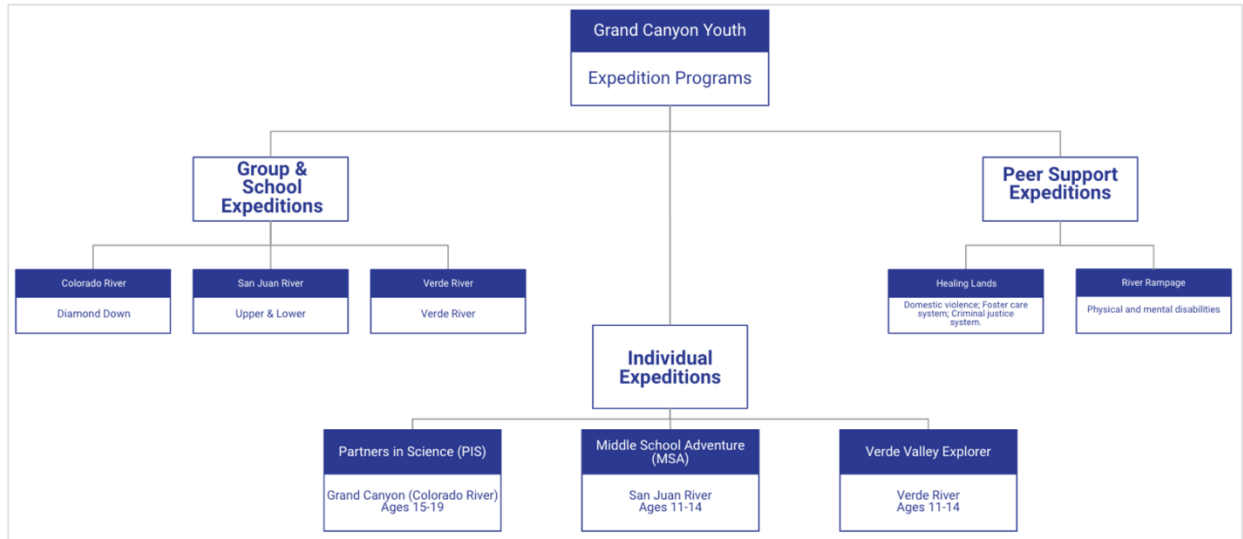
The Positive Youth Development Model



Note. For more information on the PYD model, see Lerner et al. (2005).

Figure 2

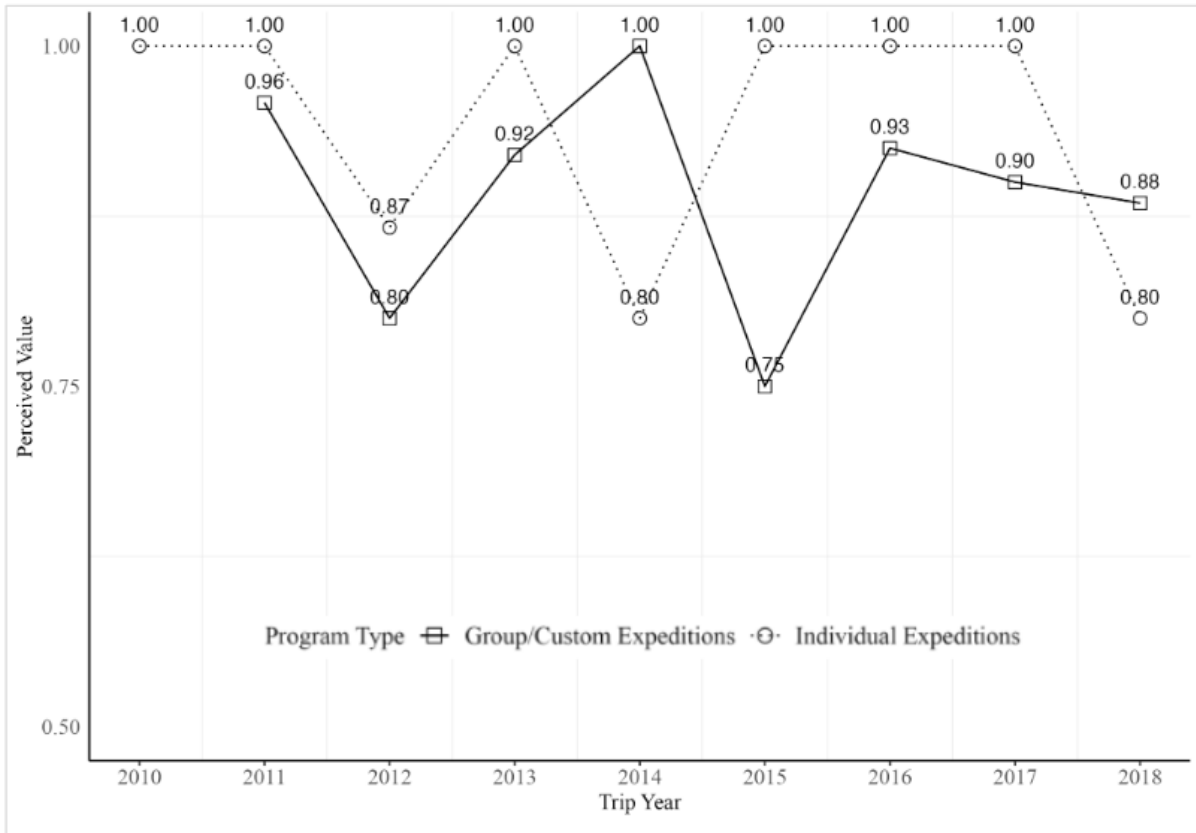
Grand Canyon Youth (GCY) Programming



Note. For more information on GCY programs, see <https://gcyouth.org/>.

Figure 3

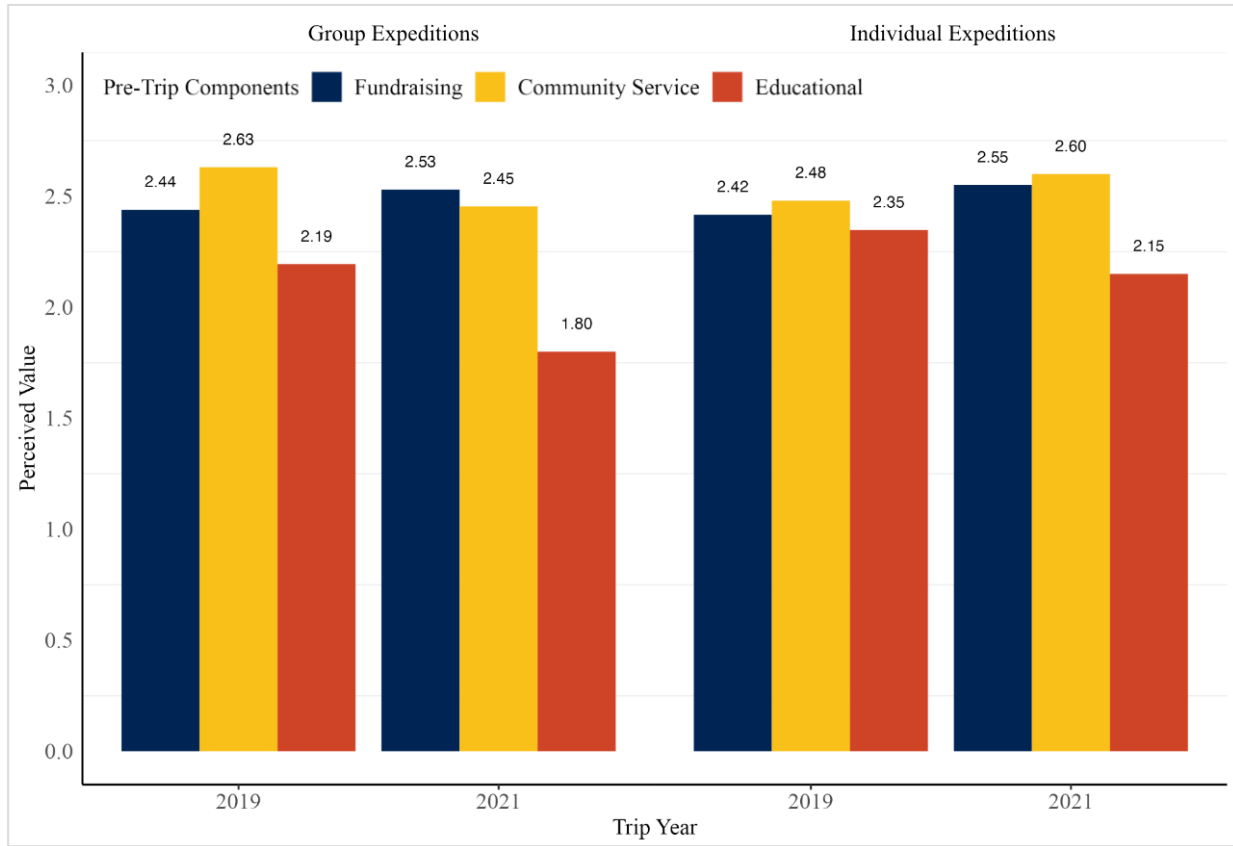
Perceived Value of Pre-Trip Components by Program Type



Note. Y-axis begins at 0.50 because no values are below 0.50.

Figure 4

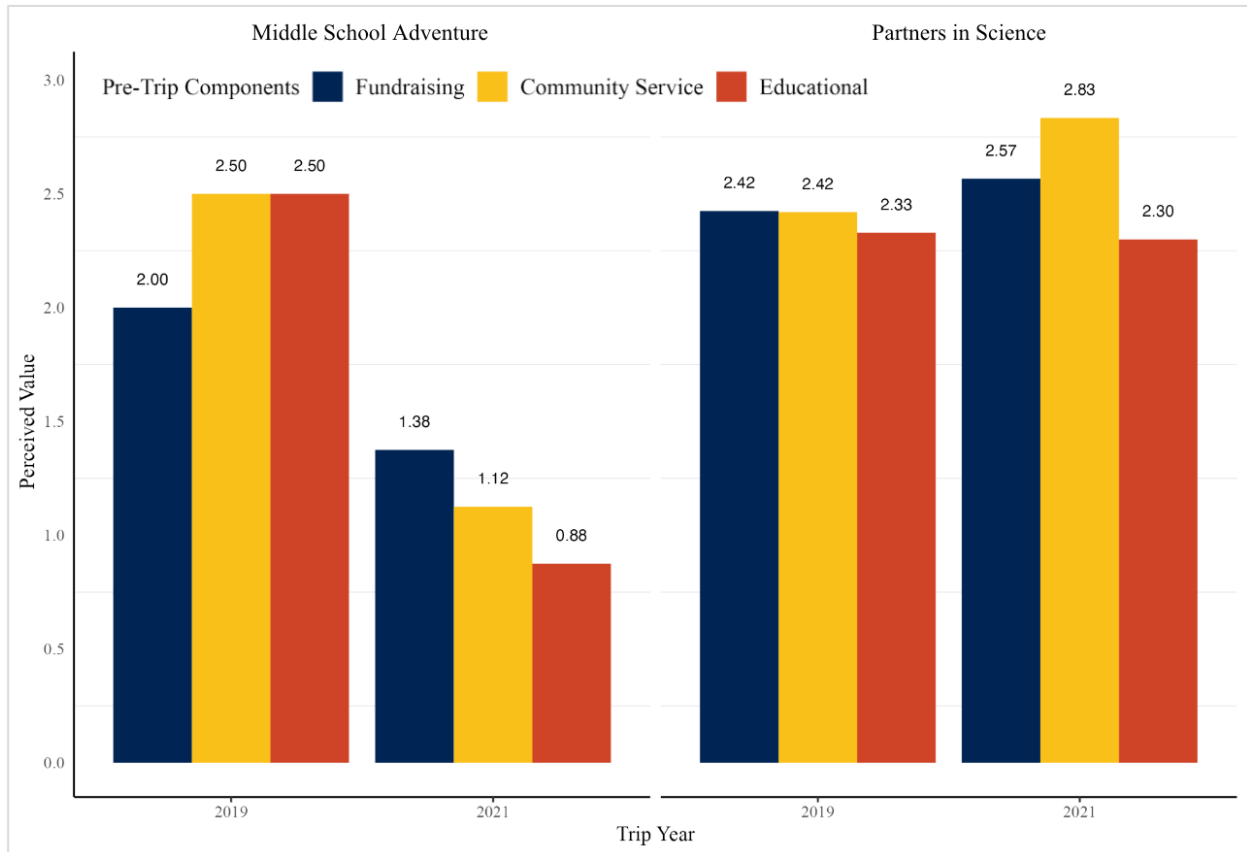
Perceived Value of Individual Pre-Trip Components by Program Type



Note. Response options ranged from 0 (*Not Valuable*) to 3 (*Very Valuable*). See Table A1 for proportions of responses (count) by response option in Appendix A.

Figure 5

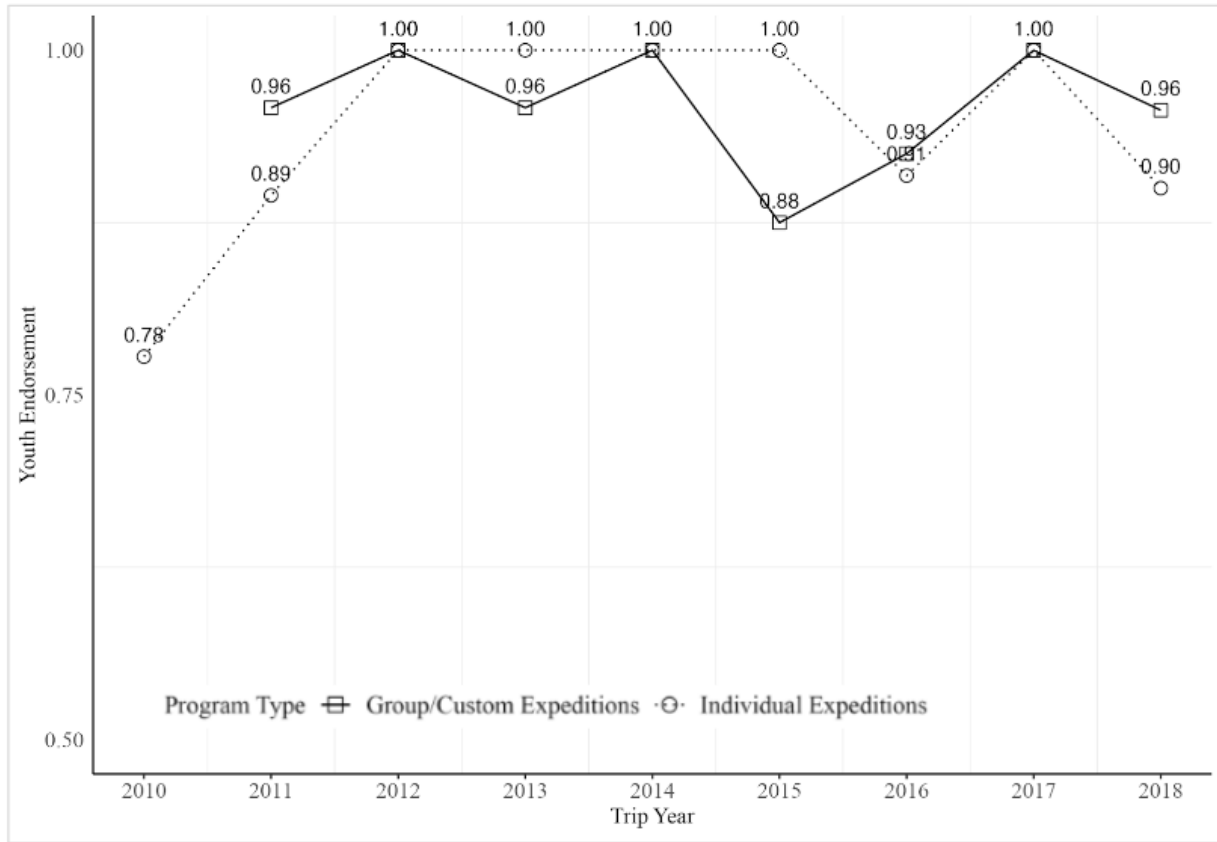
Perceived Value of Individual Pre-Trip Components by Individual Expedition Trip



Note. Response options ranged from 0 (*Not Valuable*) to 3 (*Very Valuable*).

Figure 6

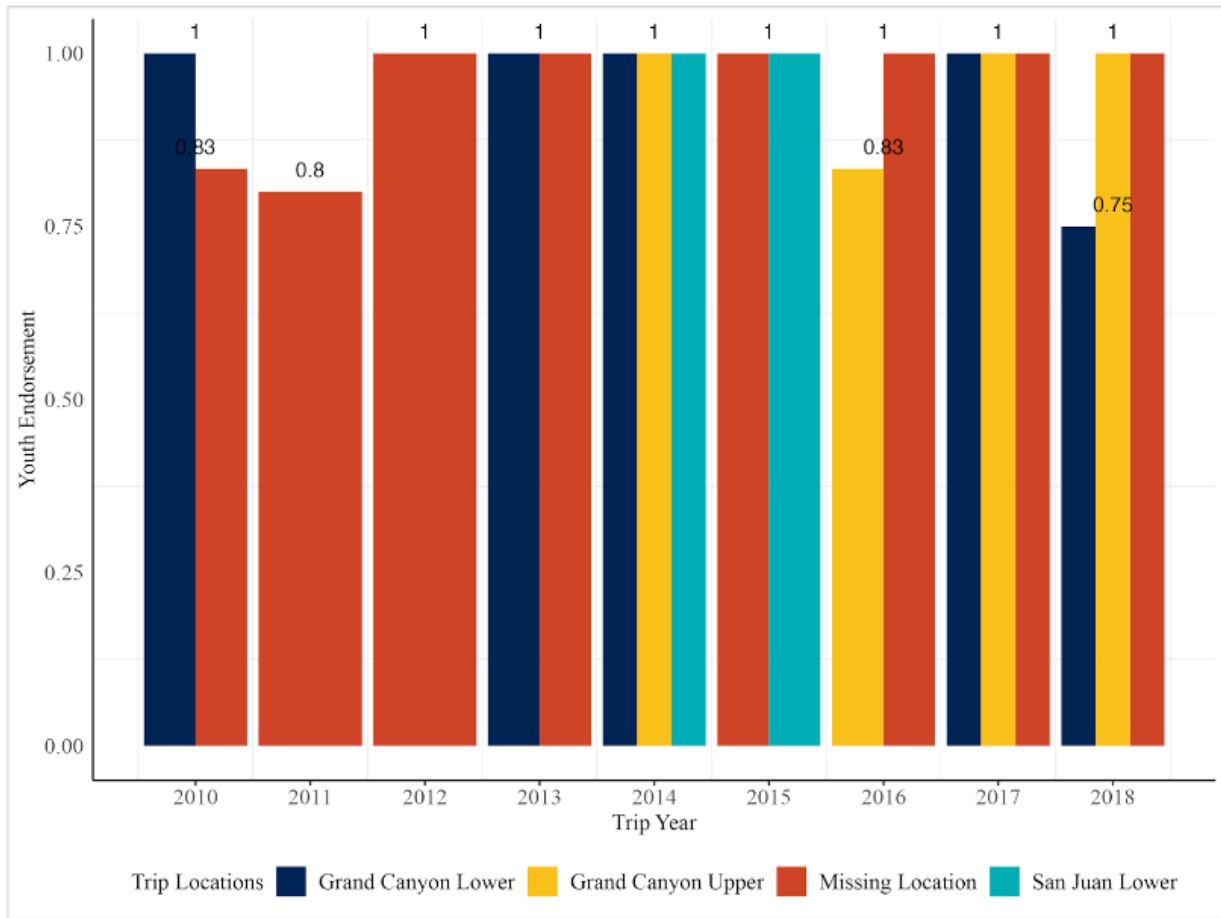
Formed Meaningful Friendship with Other Participants by Program Type



Note. Y-axis begins at 0.50 because no values are below 0.50.

Figure 7

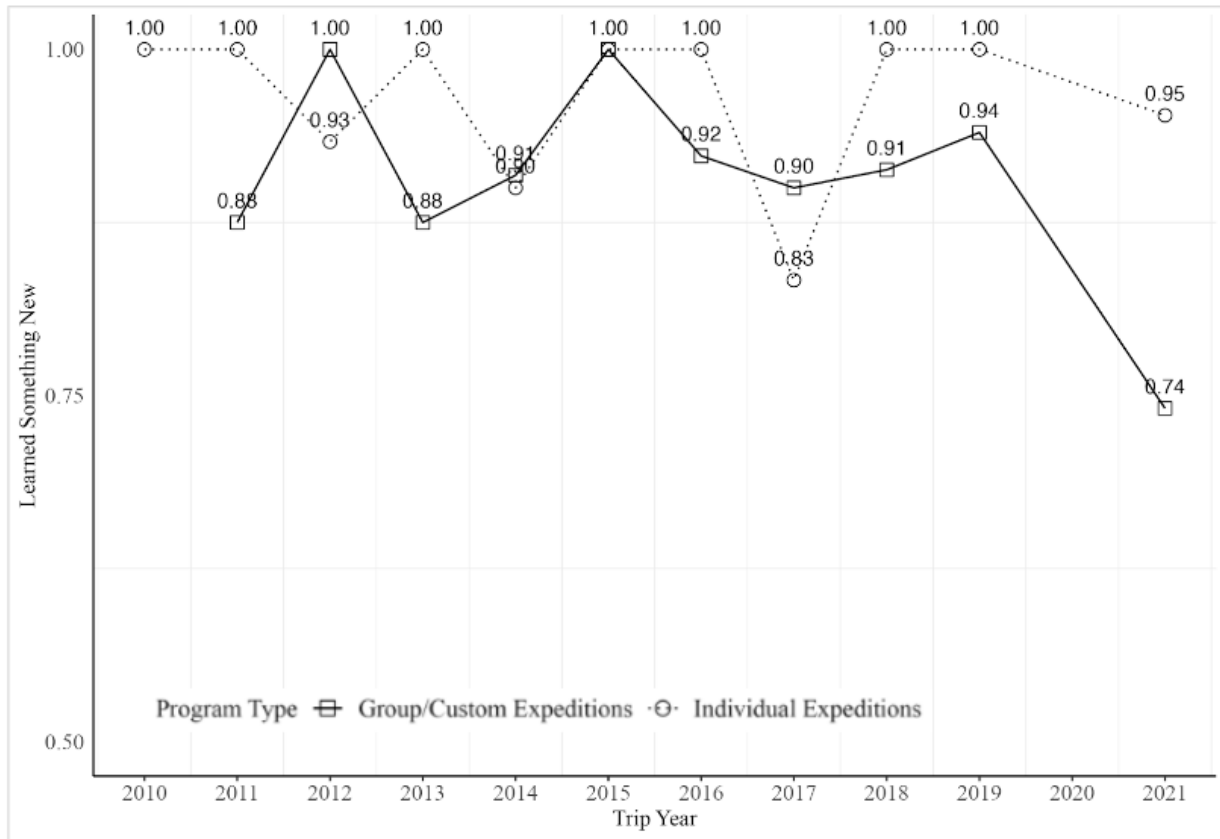
Formed Meaningful Friendships with Other Participants by Trip Location



Note. Full options of expedition locations include: Grand Canyon Full; Grand Canyon Upper; Grand Canyon Lower; San Juan Full; San Juan Upper; San Juan Lower; Verde River. Not all locations are visible due to insufficient data.

Figure 8

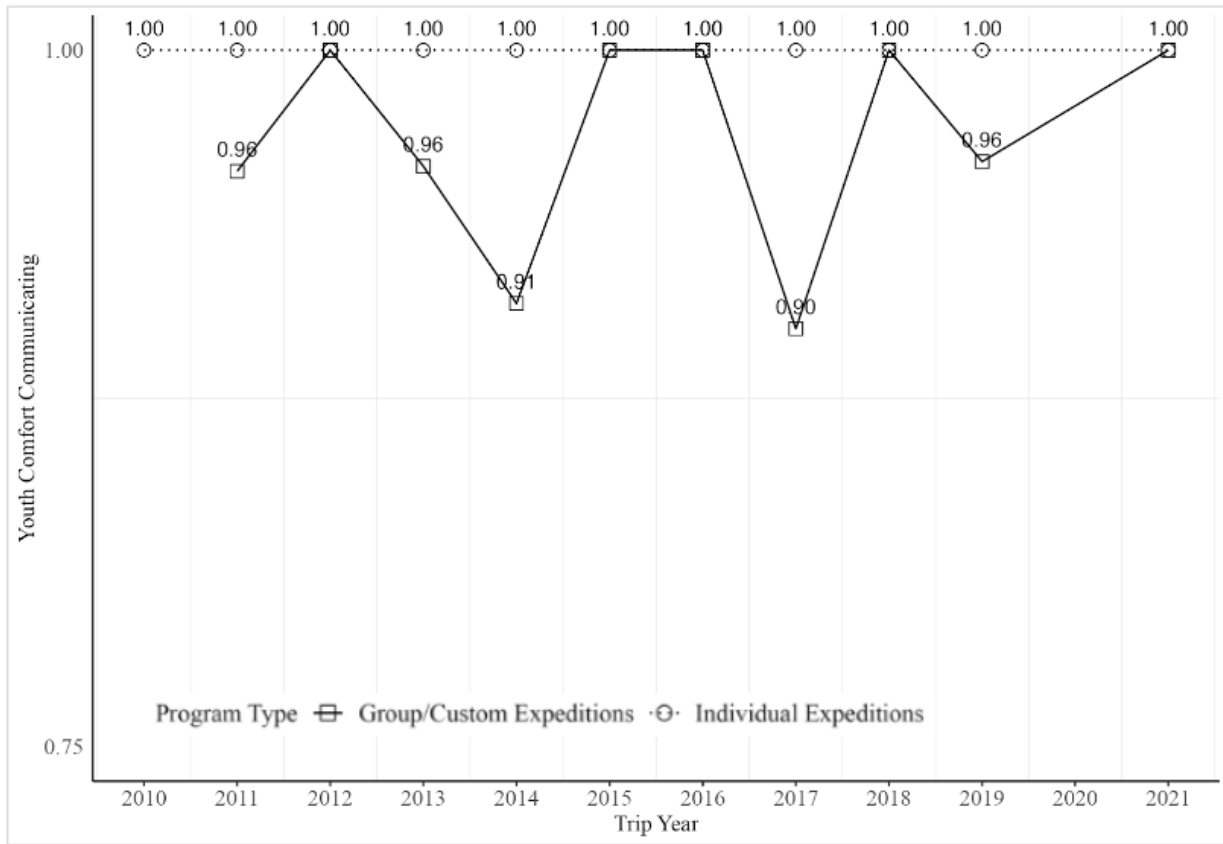
'Learned Something on Trip to Use in Daily Life' by Program Type



Note. $\chi^2(1) = 6.95, p = .008$. See Table A2 in Appendix A. Y-axis begins at 0.50 because no values are below 0.50.

Figure 9

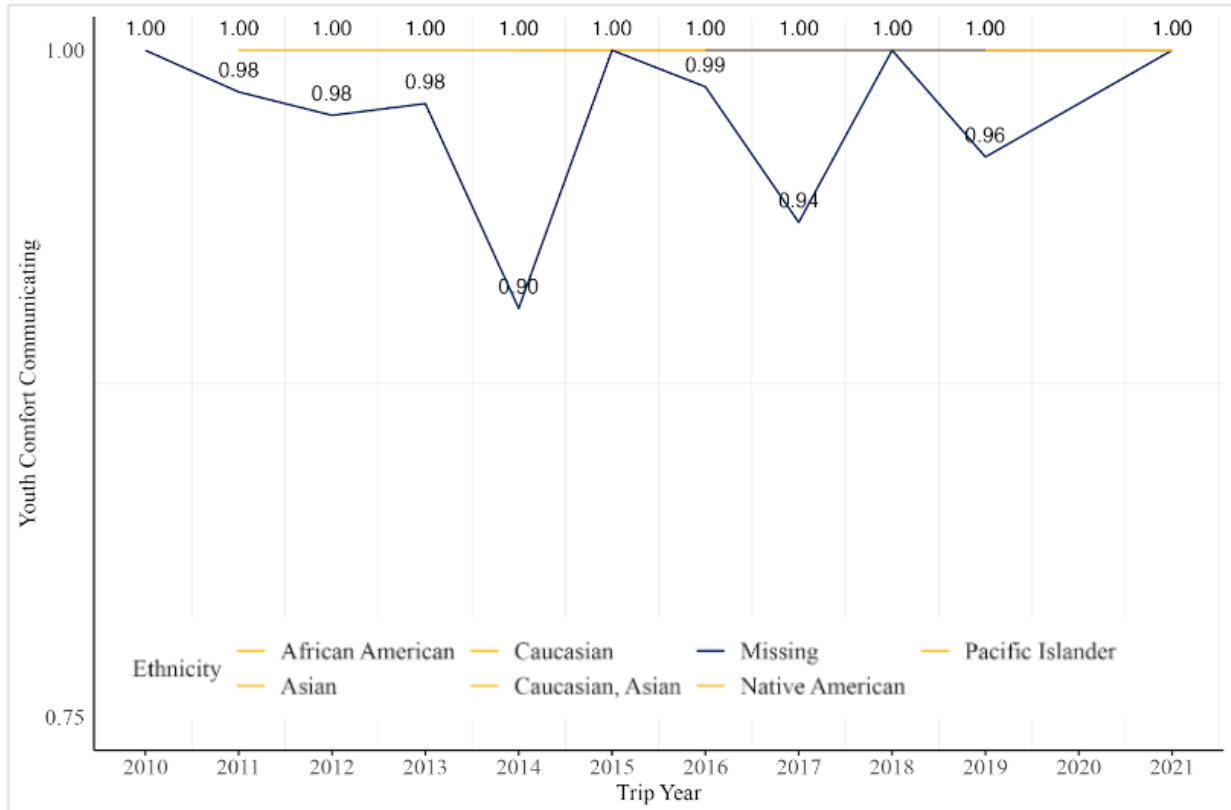
Youth Comfort Communicating with Adults on Expedition by Program Type



Note. $\chi^2 (1) = 3.83, p = .05$. See Table A2 in Appendix A. Y-axis begins at 0.75 because no values are below 0.75.

Figure 10

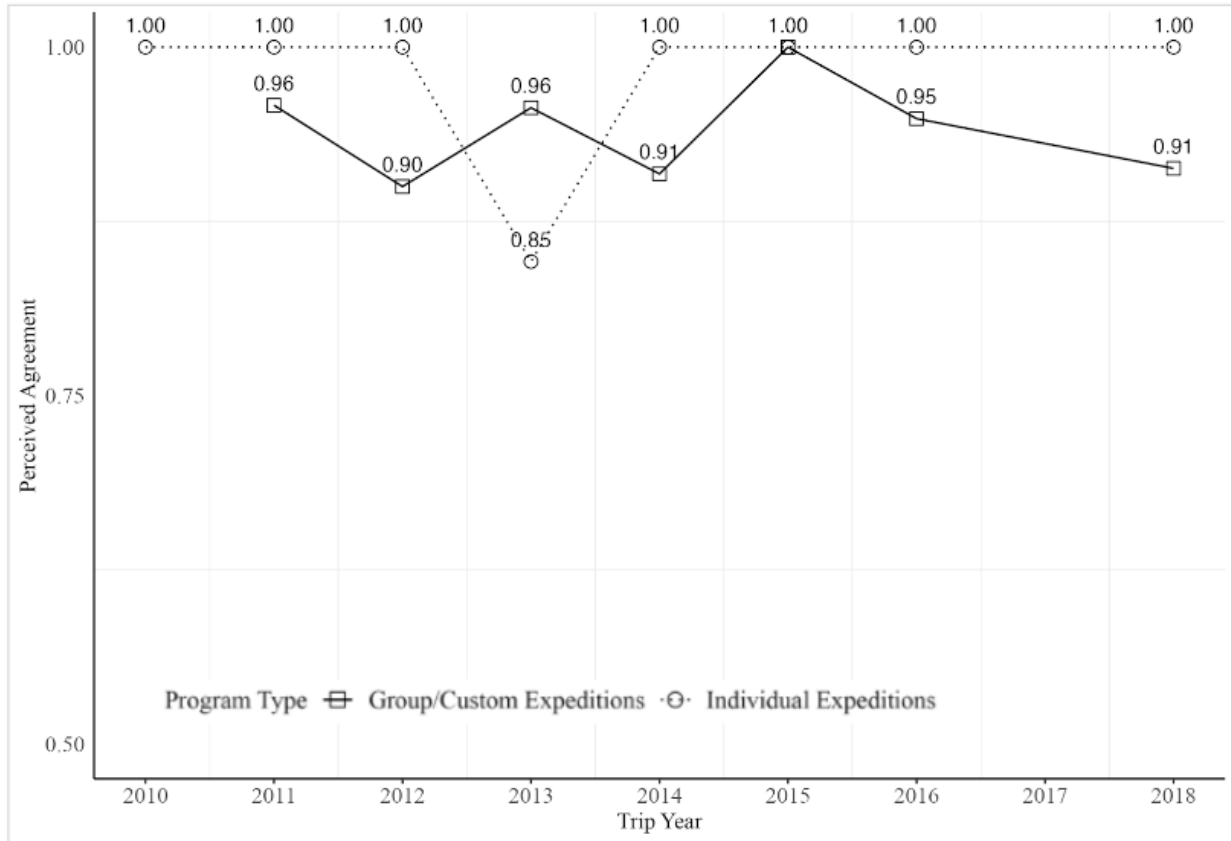
Youth Comfort Communicating with Adults on Expedition by Youth-Reported Ethnicity



Note. Y-axis begins at 0.75 because no values are below 0.75. All values except *Missing* are colored for clarity.

Figure 11

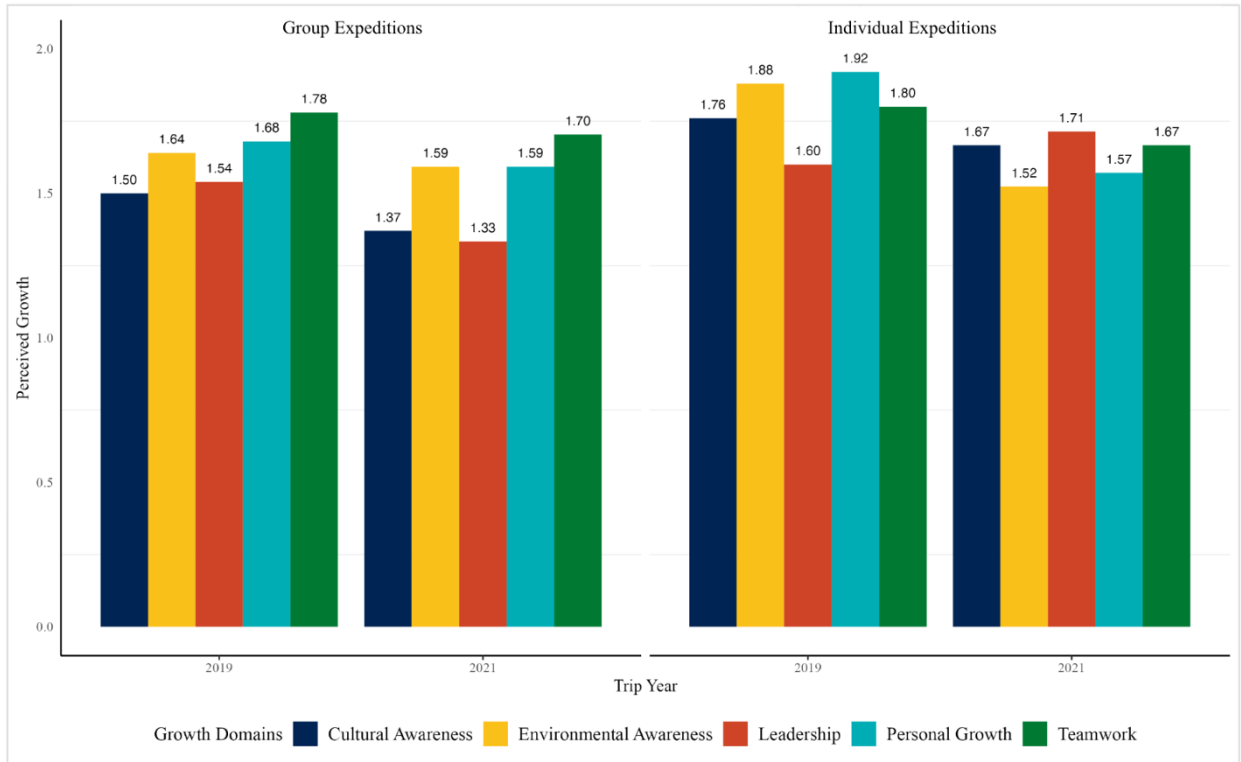
'Will Continue to Do Community Service After Expedition' by Program Type



Note. Y-axis begins at 0.50 because no values are below 0.50.

Figure 12

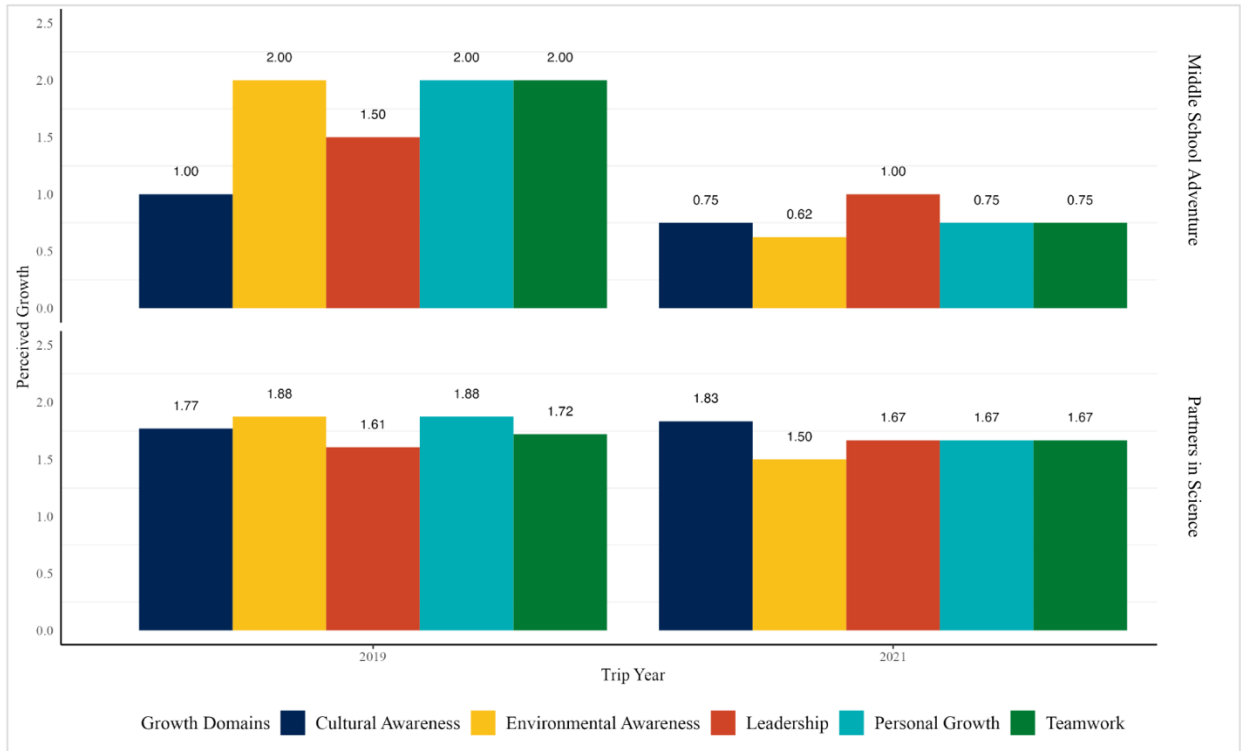
Perceived Growth in GCY Growth Domains by Program Type



Note. Response options ranged from 0 (*Did Not Grow*) to 2 (*Grew A Lot*). Chi-square test indicates a significant difference between Group and Individual Expeditions in *Cultural Awareness*, $\chi^2(2) = 7.16, p = .028$. See Table A4 in Appendix A.

Figure 13

Perceived Growth in GCY Growth Domains by Individual Expedition Trip



Note. Response options ranged from 0 (*Did Not Grow*) to 2 (*Grew A Lot*). A similar decrease in group means among 2021 MSA youth was observed for pre-trip components (Figure 5) as well as the post-trip growth domains.

Figure 14

Grand Canyon Youth Open-Ended Youth Responses Categorized to PYD Model Factors

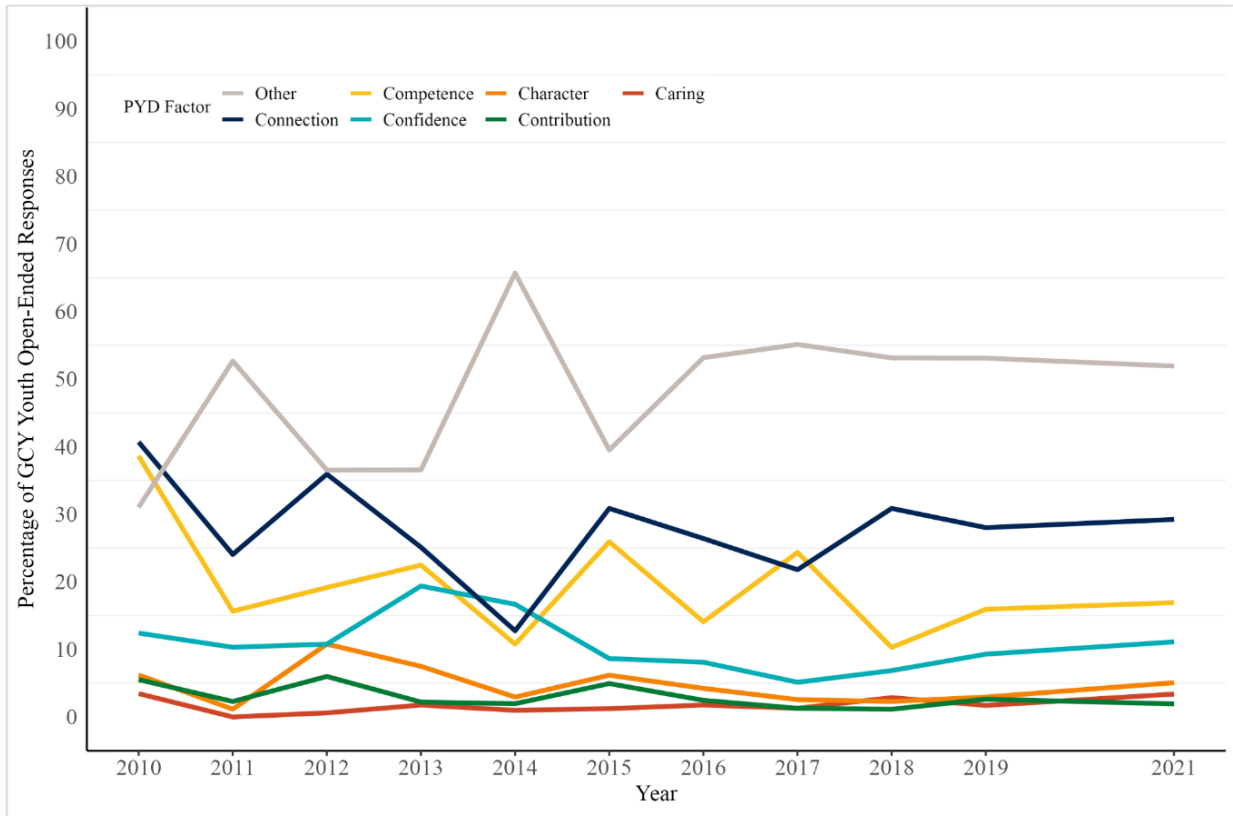
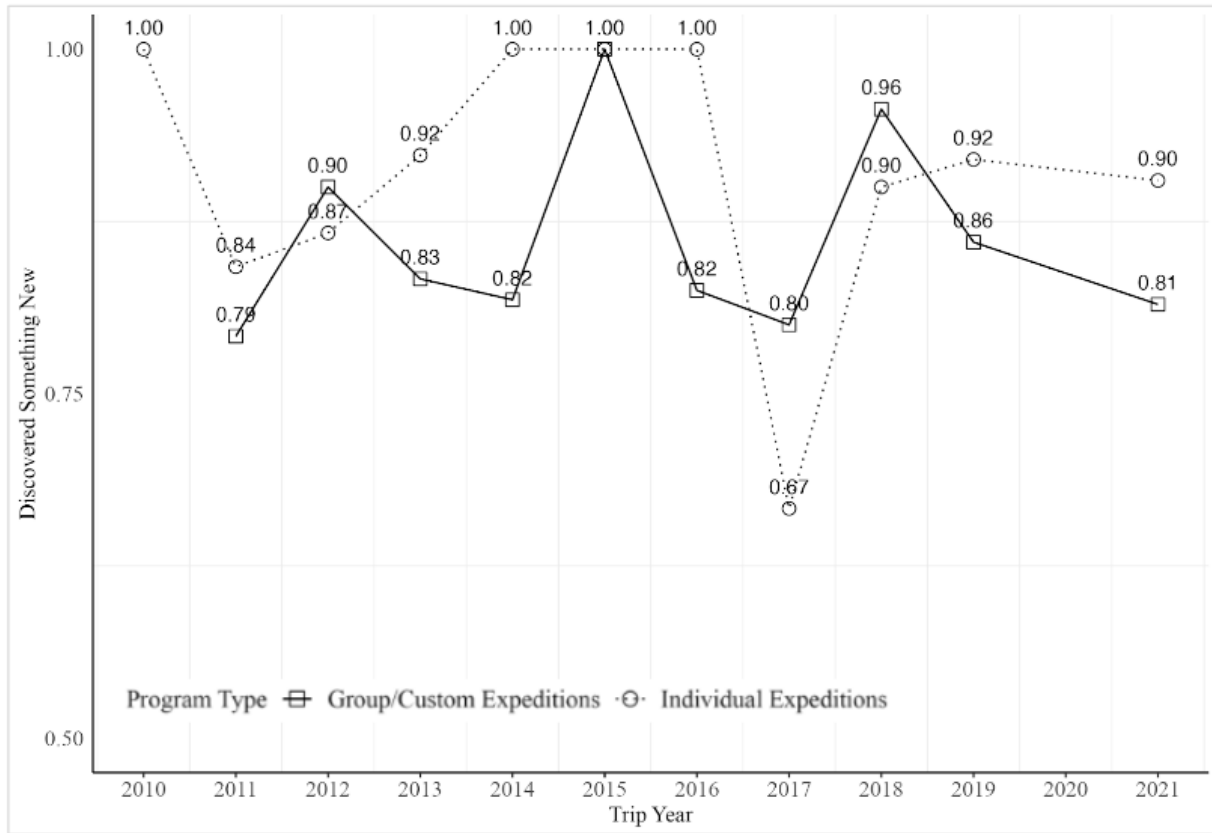


Figure 15

'Discovered Something New About Oneself' by Program Type



Note. Y-axis begins at 0.50 because no values are below 0.50.

Appendix A

Chi-Square Tests

Table A1

Group Comparisons Between GCY Pre-Trip Components and Program Type

Were the GCY pre-trip components a valuable part of your experience?							
	Not Valuable	Neutral	Somewhat Valuable	Very Valuable	χ^2	df	<i>p</i>
Fundraising							
Group Expeditions	0	16	15	20	3.18 _a	3	.365
Individual Expeditions	1	8	13	21			
Community Service							
Group Expeditions	1	6	16	35	3.89 _a	3	.273
Individual Expeditions	1	1	18	24			
Educational							
Group Expeditions	0	4	21	43	3.88 _a	3	.274
Individual Expeditions	2	1	13	29			

Note. Data regarding pre-trip components are from 2019 and 2021 only.

_a χ^2 results may not be reliable due to small sample size.

Table A2*Group Comparisons Between GCY Outcomes and Program Type*

	Program Type		χ^2	df	p
	Group/ Custom Expeditions	Individual Expeditions			
Do you think the pre-trip components were an important aspect of your GCY experience?					
Yes	6	90	0.65	1	.421
No	14	140			
Do you feel you learned something about the cultural and natural history of the area?					
Yes	0	96	1.94 _a	1	.163
No	3	147			
Did you form meaningful friendships with other participants on the trip?					
Yes	6	90	0.29	1	.588
No	7	143			
Did you discover anything new about yourself on your river trip?					
Yes	13	129	2.66	1	.103
No	34	193			
Did you learn something new on your expedition that you can use in your daily life?					
Yes	4	138	6.95	1	.008
No	23	203			
Do you think you will continue to participate in community service after your experience at GCY?					
Yes	2	88	1.66 _a	1	.198
No	8	130			
Were you comfortable communicating with the adults on this expedition (e.g., your lead teacher, group leader, and/or GCY guides)?					
Yes	0	142	3.83 _a	1	.05
No	6	220			

Note. _a χ^2 results may not be reliable due to small sample size.

Table A3*Group Comparisons Between GCY Outcomes and Expedition Location*

	Yes	No	χ^2	df	<i>p</i>
Did you form meaningful friendships with other participants while on the river?					
Grand Canyon Full	0	0	0.28 _a	3	.963
Grand Canyon Lower	11	1			
Grand Canyon Upper	11	1			
San Juan Lower	2	0			
San Juan Upper	0	0			
Missing Location	32	2			
State/Province of Origin	74	4	22.04 _a [†]	11	.024
Did you discover anything new about yourself on your river trip?					
Grand Canyon Full	8	0	5.81 _a	5	.325
Grand Canyon Lower	21	1			
Grand Canyon Upper	17	4			
San Juan Lower	4	0			
San Juan Upper	4	1			
Missing Location	33	2			
State/Province of Origin	87	8	20.54 _a [†]	13	.083
Did you learn something new on your expedition that you can use in your daily life?					
Grand Canyon Full	8	0	5.99 _a	5	.306
Grand Canyon Lower	20	2			
Grand Canyon Upper	21	0			
San Juan Lower	4	0			
San Juan Upper	4	1			
Missing Location	34	1			
State/Province of Origin	91	4	24.49 _a [†]	13	.027
Were you comfortable communicating with the adults on this expedition (e.g., your lead teacher, group leader, and/or GCY guides)?					
Ethnicity	543	11	2.03 _a [†]	9	.991

Note. _a χ^2 results may not be reliable due to small sample size.

[†] There are too many states/provinces to list in this table. See Table 9 for a full list and count of youth participants by state/province of origin.

‡ There are too many ethnicities to list in this table. See Table 7 for a full list and count of youth participant ethnicities (as reported by youth participants).

Table A4*Group Comparisons Between GCY Post-Trip Growth Domains and Program Type*

		Post-Trip Growth Domains			χ^2	df	p
		Learned nothing and did not grow	Learned and grew a little bit	Learned and grew a lot			
Environmental Awareness							
Group Expeditions	2	25	50	2.52 _a	2	.283	
Individual Expeditions	2	9	35				
Leadership							
Group Expeditions	2	37	38	5.83 _a	2	.054	
Individual Expeditions	2	12	32				
Teamwork							
Group Expeditions	1	17	59	3.73 _a	2	.155	
Individual Expeditions	3	6	37				
Personal Growth							
Group Expeditions	3	21	53	2.38 _a	2	.304	
Individual Expeditions	2	7	37				
Cultural Awareness							
Group Expeditions	5	32	40	7.16 _a	2	.028	
Individual Expeditions	2	9	35				

Note. Data regarding post-trip growth domains are from 2019 and 2021 only.

^a χ^2 results may not be reliable due to small sample size.

Appendix B

Sample of Youth Open-Ended Responses Categorized to PYD Model Factors

Table B1

Sample Youth Open-Ended Responses Under PYD Model Factors

Competence	Confidence	Connection	Character	Caring	Contribution
To use my team working skills in school.	I discovered an entirely new outlook on life, how to be happy with myself and always have fun with what I am doing. I also found a well of courage and enthusiasm I didn't know existed prior to the trip.	It has strengthened the bonds between my friends as well as let me get to know my teachers better, as people, not just teachers.	It showed me how incredible and beautiful some places can be. I respect and admire nature a lot more now. Also, I made new friends and learned how to work as a team better and more efficiently	Thank you so much to our river guides and especially to everyone behind the scenes who made this trip possible. I am so grateful to have been able to take this trip, as it has been a positive, life-changing experience that I will never forget. Your hard work to put this together has been much appreciated and will be cherished forever. :)	Since my time on the canyon, I have tried to incorporate the "leave no trace" tactic. Never had I been deeply bothered by the litter I saw on the ground, but when I returned from my trip I felt that I had an obligation to pick up the trash because after doing it after every camp site, it was now a routine that I could not quit and did not want to quit.
It teaches important lessons that go far beyond anything ever taught in a school.	The Grand Canyon youth trip has helped me gain confidence in myself and my passions. I was able to be myself on the trip without worrying about not fitting in because down in the canyon, different personalities and interests are encouraged and supported.	It has taught me how to work well with people and how easy it can be to make a well-functioning community in a small amount of time.	As one of only two male youth participants on the trip I feel I have had the opportunity to practice behaving maturely. This was a chance to learn to cooperate and present myself in an honest way pretty early into forming relations.	My highlights of the trip were hiking, learning skills that our river guides used, and spending time out in the open, just enjoying the outdoors. I am also very thankful for the respect our guides had for us and our beliefs.	I saw how important taking care of the environment is because I definitely would not want to lose something that beautiful
I learned that I would love to be a river guide one day. I love the community that is formed on the river and want to be part of it for more than just a few river trips.	I learn how strong and dependent I can be as a person. I learn that in situation that if I stay calm then I'll be able to think clear. I learn that stress is a big part of my life and when I was on that trip I was able to relieve that stress.	One of my most memorable things from the trip was the friendships that I made. We would stay up late and talk under the stars and share very personal things about our lives, and when we were on the boats, I felt like I became very close with all the guides when we shared our	It has inspired me to get outside more and I have been a lot more aware of how much food and water I waste and how much trash I generate.	The desert just has a way of making you a tougher person, especially with some of the medical issues we had. Having a friend in a scary and serious mini battle with the heat and dehydration is a challenging	Grand Canyon Youth trips remind me that I am so small in the grand scheme of things and with that, I am more conscious of my impacts and I am more aware of everything

life stories. One of my other favorite memories was the day we spent at the LCR wearing life jackets like a diaper and floating downstream all day.

experience where you have to step up and help how you can, even something as small as running and bringing a wet sarong can have a big impact.

Every GCY trip is a lesson in teamwork. It is a lesson in accepting people's differences and point of views. It is a lesson in working together when wind is blowing over tents and havoc wreaked. I cannot even innumerate the things I have learned on these expeditions that I will cherish forever.

A lot! Before the river trip I was getting bullied horribly at school. The river trip helped me clear my mind and even for just four days forget them. It gave me a whole new outlook on life and helped me realize they didn't matter and for that, I cannot thank you enough

To understand that everyday could be done with team work as done on the Grand Canyon trip, that you must not only trust the people you are with but they must also trust in you.

I feel like I had the opportunity to overcome a lot of my fears on this trip and I took a lot of time to sit by the river and do self-reflections. I fell in love with the Canyon and would do anything to go back to learn more about myself through nature. I really enjoyed being disconnected from any form of phone communication, media and knowing the time.

Hitting the rapids, campfire and singing at night with everyone. the hikes, the waterfalls we saw

Note. Cohen's Kappa was calculated from a random 10 sample of all youth open-ended responses corresponding to both Individual and Group Expeditions. Cohen's Kappa of 1.00 was achieved in *Caring* due to a small number of responses categorized as relevant to *Caring*. Cohen's Kappa for all youth responses that were relevant to *Other* was 0.985. See Table 10 for Cohen's Kappa values.

Table B2

Sample Youth Open-Ended Responses Under Complementary Model Factors; Original

Categorization of Other Among PYD Model Factors

Gratitude	Connection to Place	Respect for Nature	Self-Care	Humility
It made me value the things I have now even though it's more than enough	Grand Canyon Youth helps me grow into a better person plain and simple! These trips are some of my most cherished memories and connect me more personally to nature, plus I always meet awesome people.	I learned so much! A big thing I learned is that we take things for granted. For example, when we got to our last camp, I was so grateful for flat ground to sleep on because we had been sleeping on rocks and hills. I made me realize that we take things for granted (like our beds)	I learned that life is not always gonna be simple and it's very easy to get caught up in those stressful moments. Sometimes you just need to get out there and take a break from it all.	My biggest highlight from cataract canyon was the ability to be an individual ducky with technical waves and huge canyon walls. It taught me humility.
The entire trip helped me to realize the beauty of the world even more. I learned to appreciate the littlest commodities I have at home, such as having non-sandy sheets, a shower, the toilet, etc. I miss the river every single day.	I feel that I have become much more connected to nature, and the new information I learned about the area really helped me see how amazing and helpful nature can be.	So far, my trip has made me value nature in my daily life. Learning about where the water and electricity in Phoenix comes from has made me much more conscious about the impacts of my life.	I learned that sometimes you need to let the flow and current take you to where you are going. It's okay to let go.	how to slow down and let time pass you by [rather] than you wanting to speed up time.
I now recognize the importance of living in the moment and always appreciating everything around you.	It has made me appreciate the natural world around me and taught me to not take any experience for granted. I have taken the sights that I've seen and kept them with me and found my inner peace while encountering the real world.	It makes me more aware of how fragile the places are that we live in	Well, I shower a lot less than I used too. And whenever I go to the bathroom I yell "I GOTTA GET GROOVY!!!" But I have been going on hikes more often and I can actually slow down and enjoy them. I hate my technology. Now I prefer to be without my phone and Facebook. It's just a distraction that everyone gets caught up in.	to look at things in a calmer manner. to enjoy nature up close
I learned to be more grateful of the little things that I experience, because on the river, at the end of each day we would reflect on the things we were most grateful for.	My favorite part was a slower day just to look at the scenery and take it all in and to enjoy the Grand Canyon.	It taught me to respect nature more	The trip taught me some much-needed relaxation tips. With school starting soon these will be especially helpful!	If one falls off a motorized boat, one may be turned to fish chum.
I received a Shining Star Award from my Diamond Down River trip in 2015. It really helped to get me out on the river! I am so thankful for the money you shared with me and allowed me to be able to come back and see more beautiful parts of the Grand Canyon!	The trip strengthened my desire to discover new places and life outside of my hometown	[I learned that] Many cultures developed along the San Juan River.	Getting outside for more than a hour a day	I learned that being uptight is not worth the time.

Note. These factors are hypothesized factors to be applied to a revised Positive Youth Development Model that incorporates environmental contexts relevant to Grand Canyon Youth. Open-ended youth responses shown here were originally categorized as *Other* under the Positive

Youth Development Model because they were unrelated to the five original model factors (see Table 10).

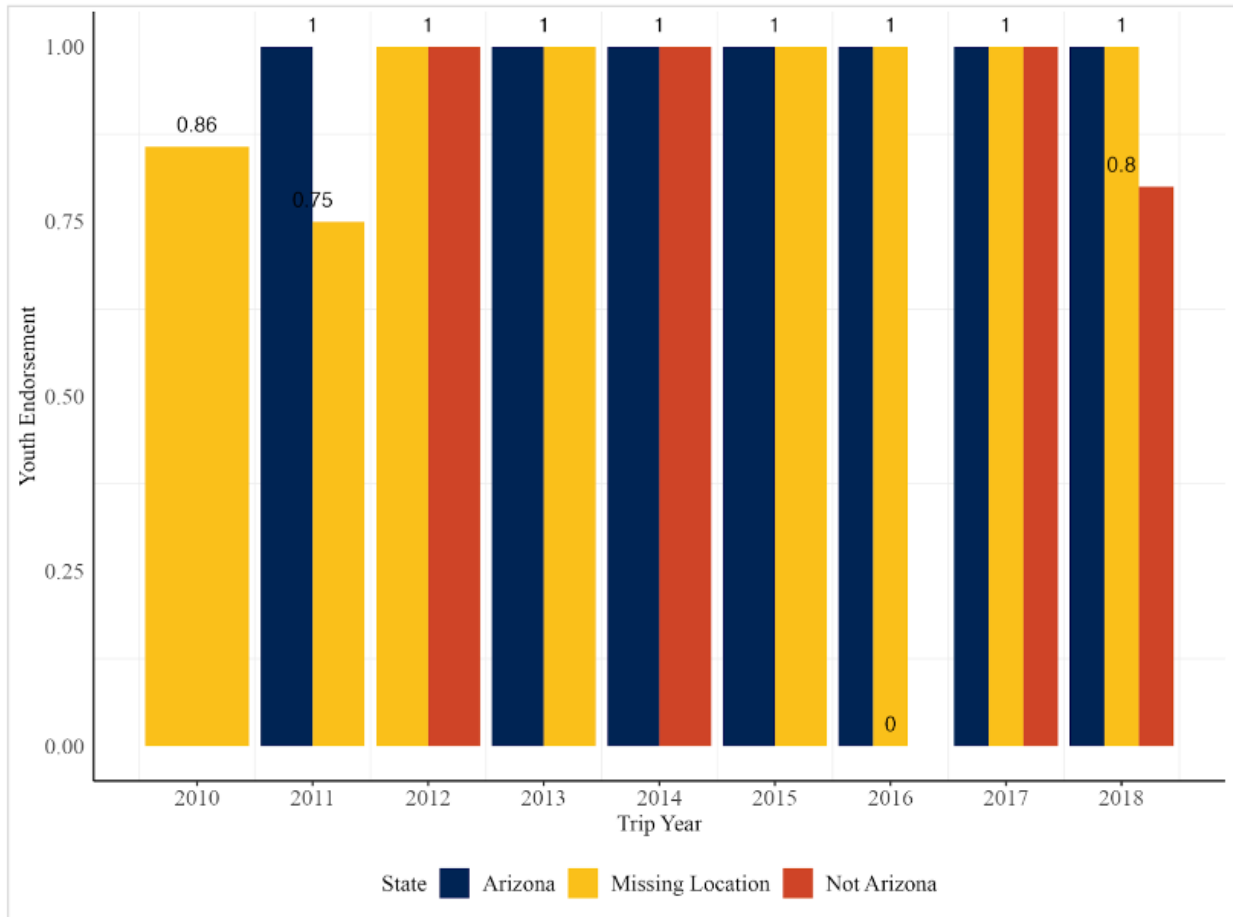
Cohen's Kappa for core PYD model *Other* was 0.985.

Appendix C

Examinations of Additional GCY Outcome Variables

Figure C1

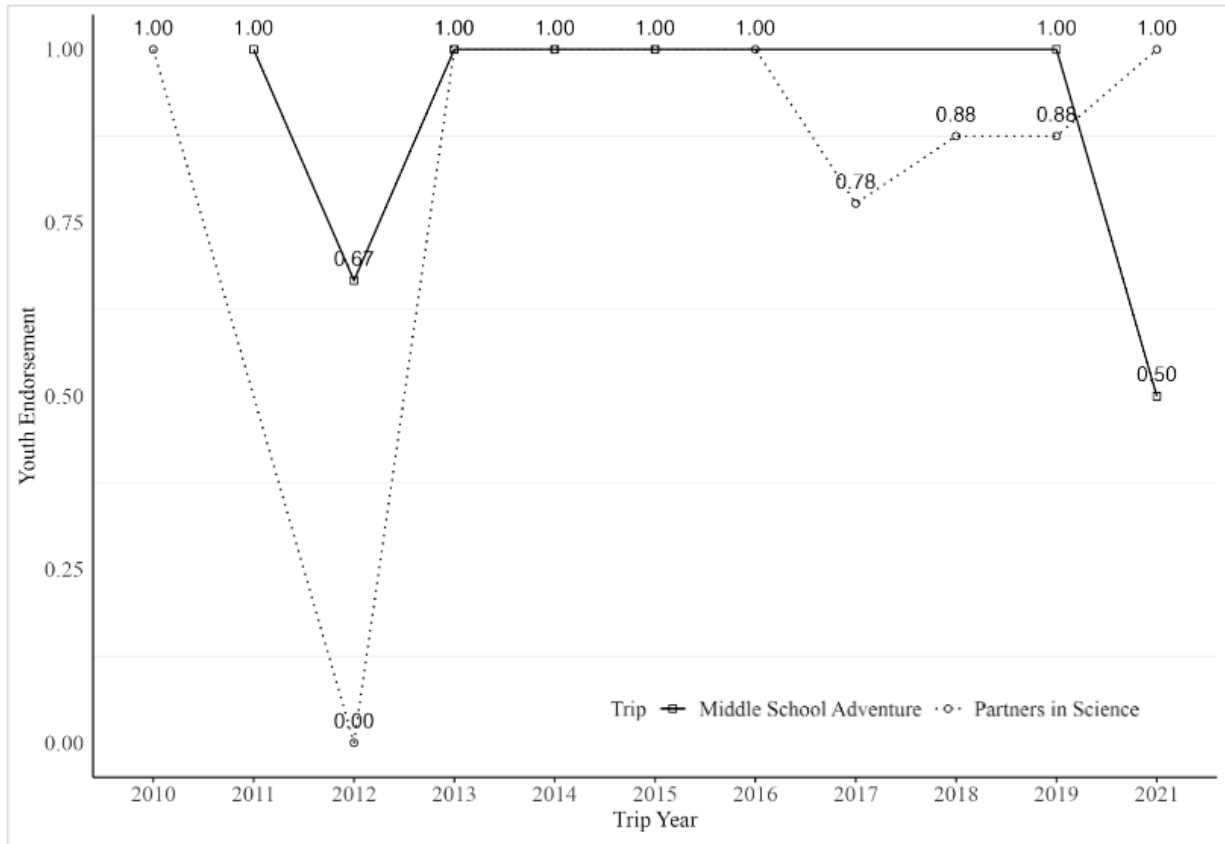
Formed Meaningful Friendships with Other Participants by State/Province of Origin



Note. $\chi^2 (11) = 22.04, p = .024$ (See Table A3 in Appendix A). Refer to Table 9 for a full summary of all state/provinces of origin reported by youth.

Figure C2

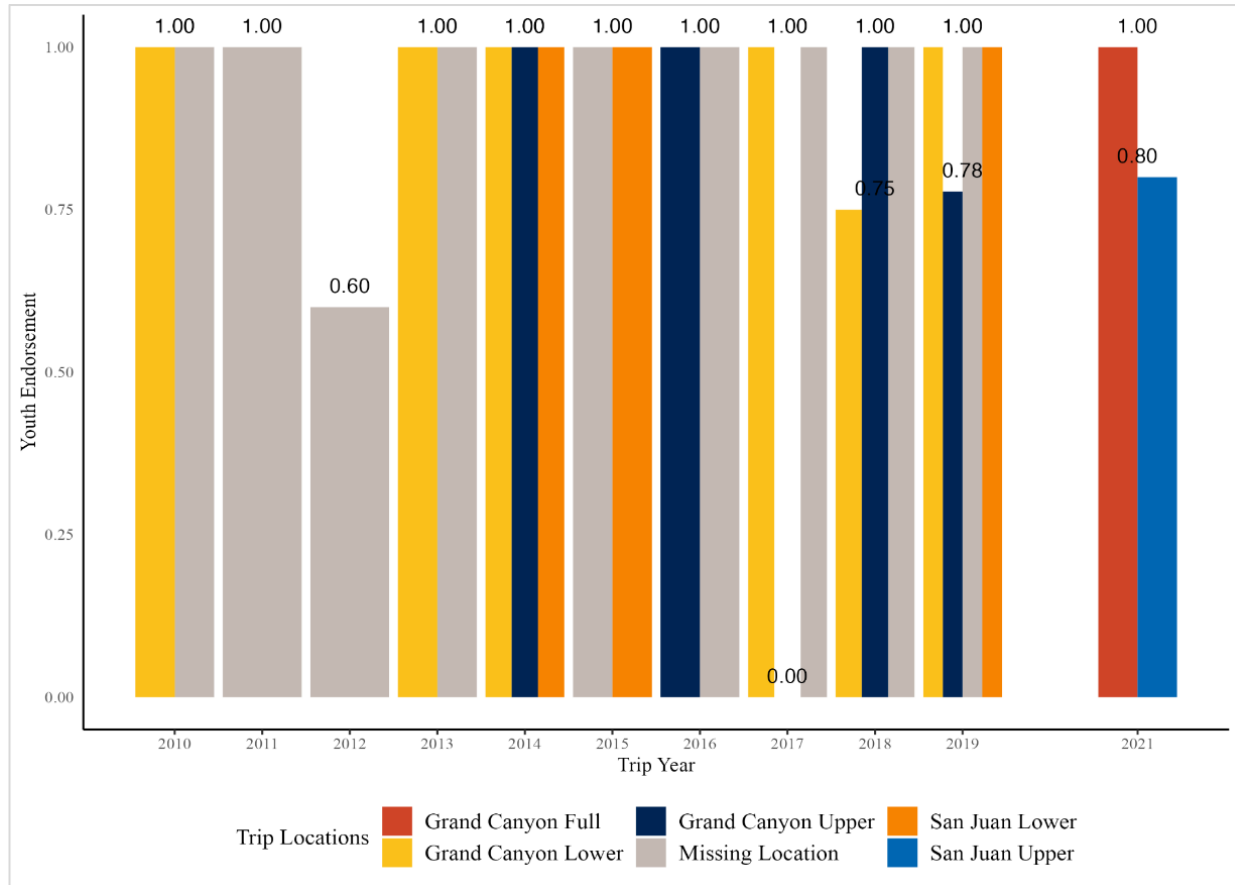
'Discovered Something New About Oneself' by Individual Expedition Trip



Note. Response count for Partners in Science youth in 2012 was one ($n = 1$).

Figure C3

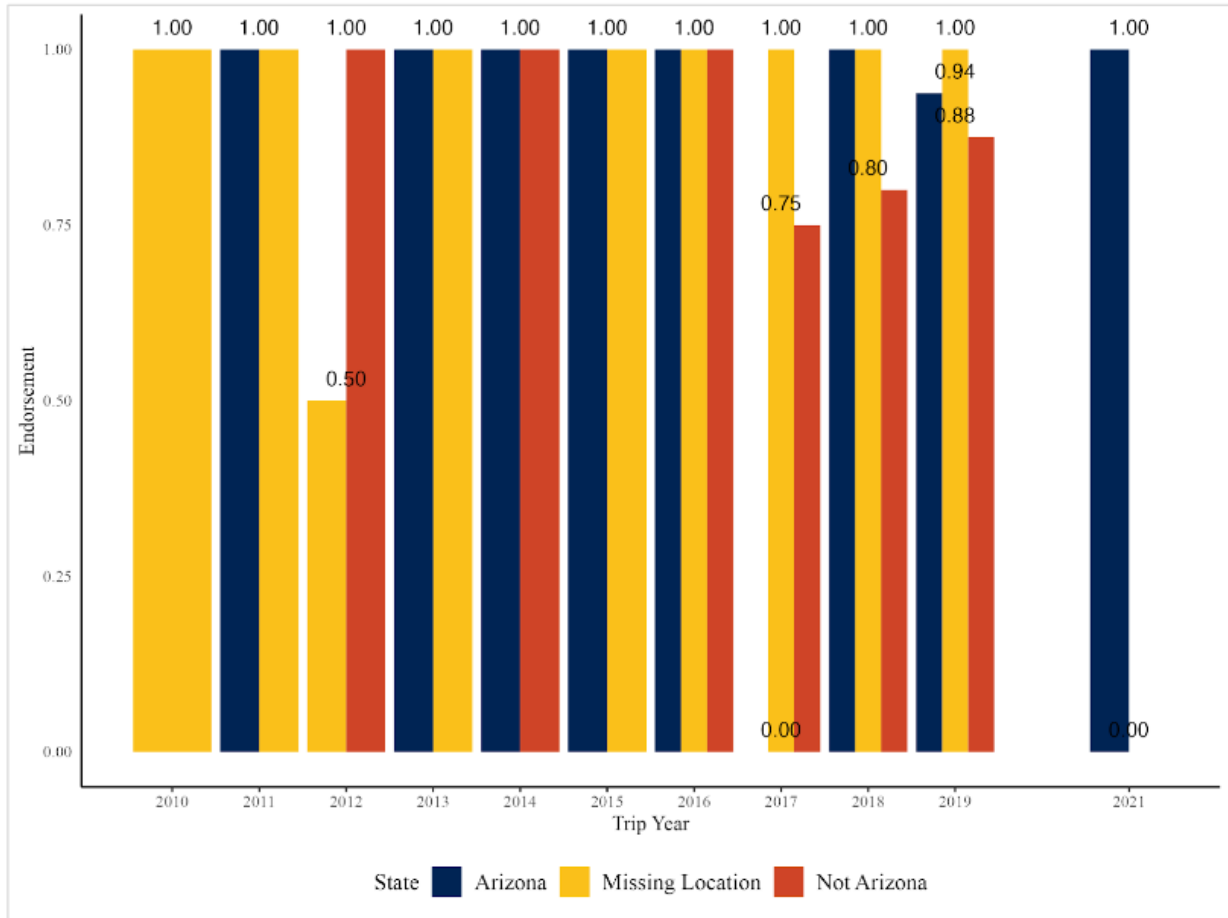
'Discovered Something New About Oneself' by Trip Location



Note. Full options of expedition locations include: Grand Canyon Full; Grand Canyon Upper; Grand Canyon Lower; San Juan Full; San Juan Upper; San Juan Lower; Verde River. Not all locations are visible due to insufficient data.

Figure C4

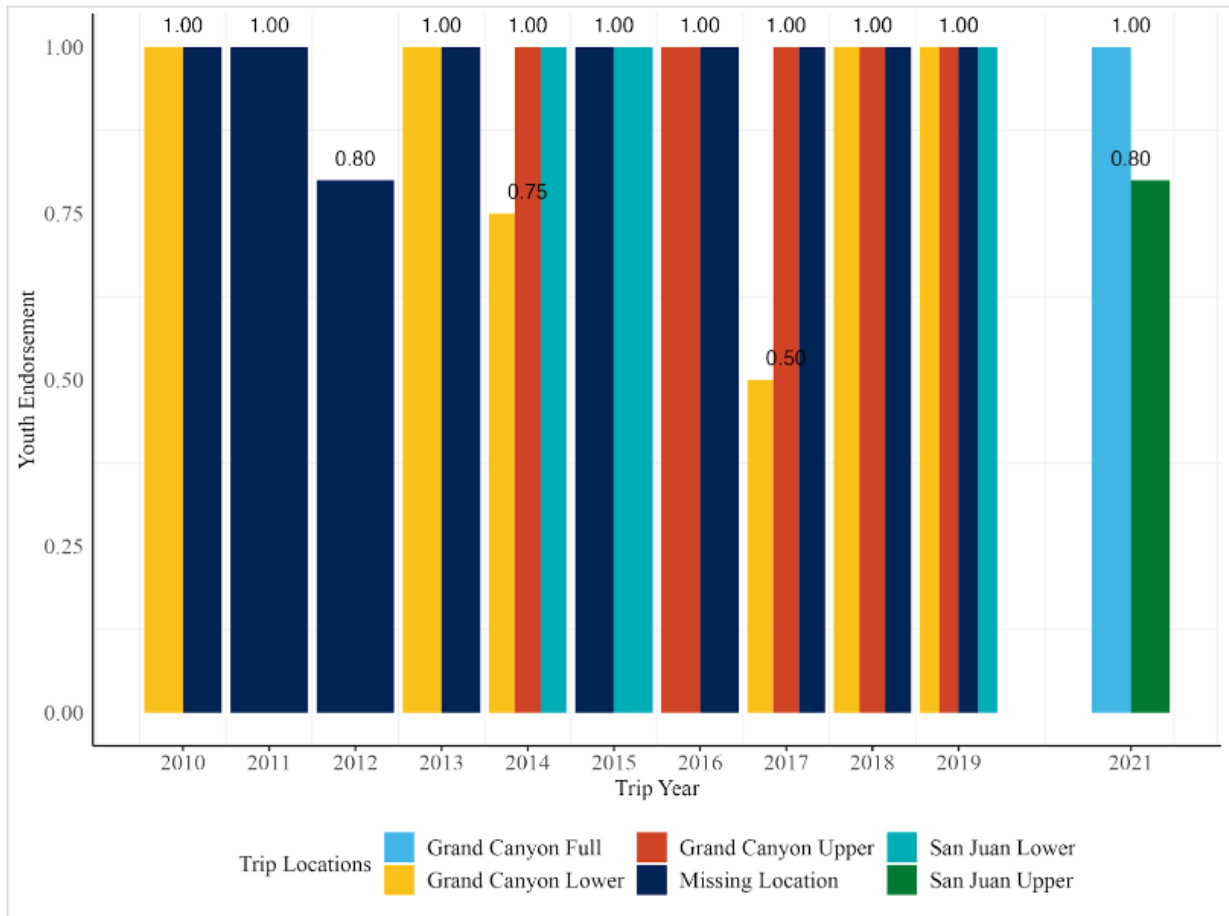
'Discovered Something New About Oneself' by State/Province of Origin



Note. Refer to Table 9 for a full summary of all state/provinces of origin reported by youth.

Figure C5

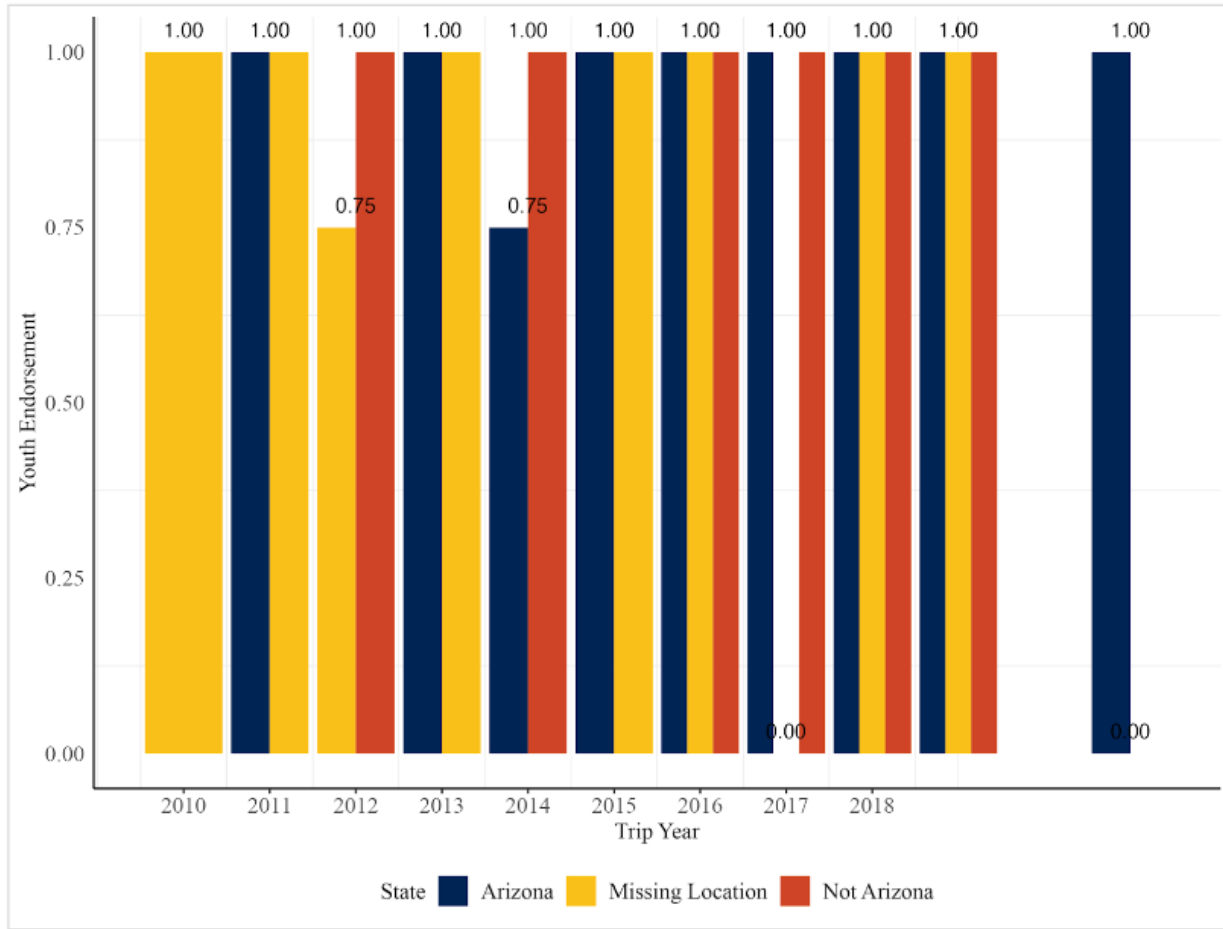
'Learned Something on Trip to Use in Daily Life' by Trip Location



Note. Full options of expedition locations include: Grand Canyon Full; Grand Canyon Upper; Grand Canyon Lower; San Juan Full; San Juan Upper; San Juan Lower; Verde River. Not all locations are visible due to insufficient data.

Figure C6

'Learned Something on Trip to Use in Daily Life' by State/Province of Origin



Note. $\chi^2 (13) = 24.49, p = .027$ (See Table A3 in Appendix A). Refer to Table 9 for a full summary of all state/provinces of origin reported by youth.

Appendix D

Proportions of Youth Response Counts to Pre-Trip Components and Post-Trip Growth Domains

Figure D1

Response Counts of the Fundraising Pre-Trip Component by Program Type

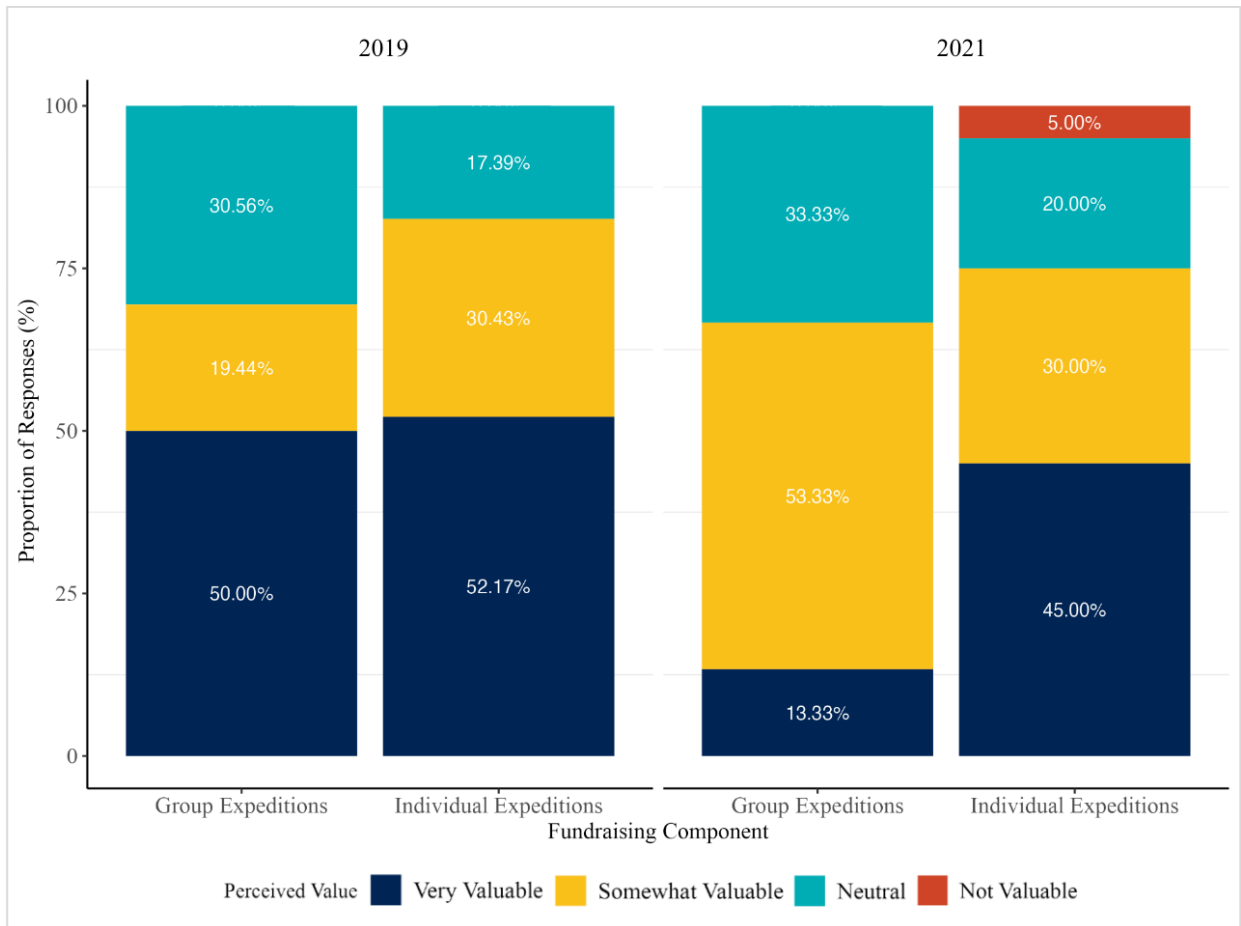


Figure D2

Response Counts of the Community Service Pre-Trip Component by Program Type

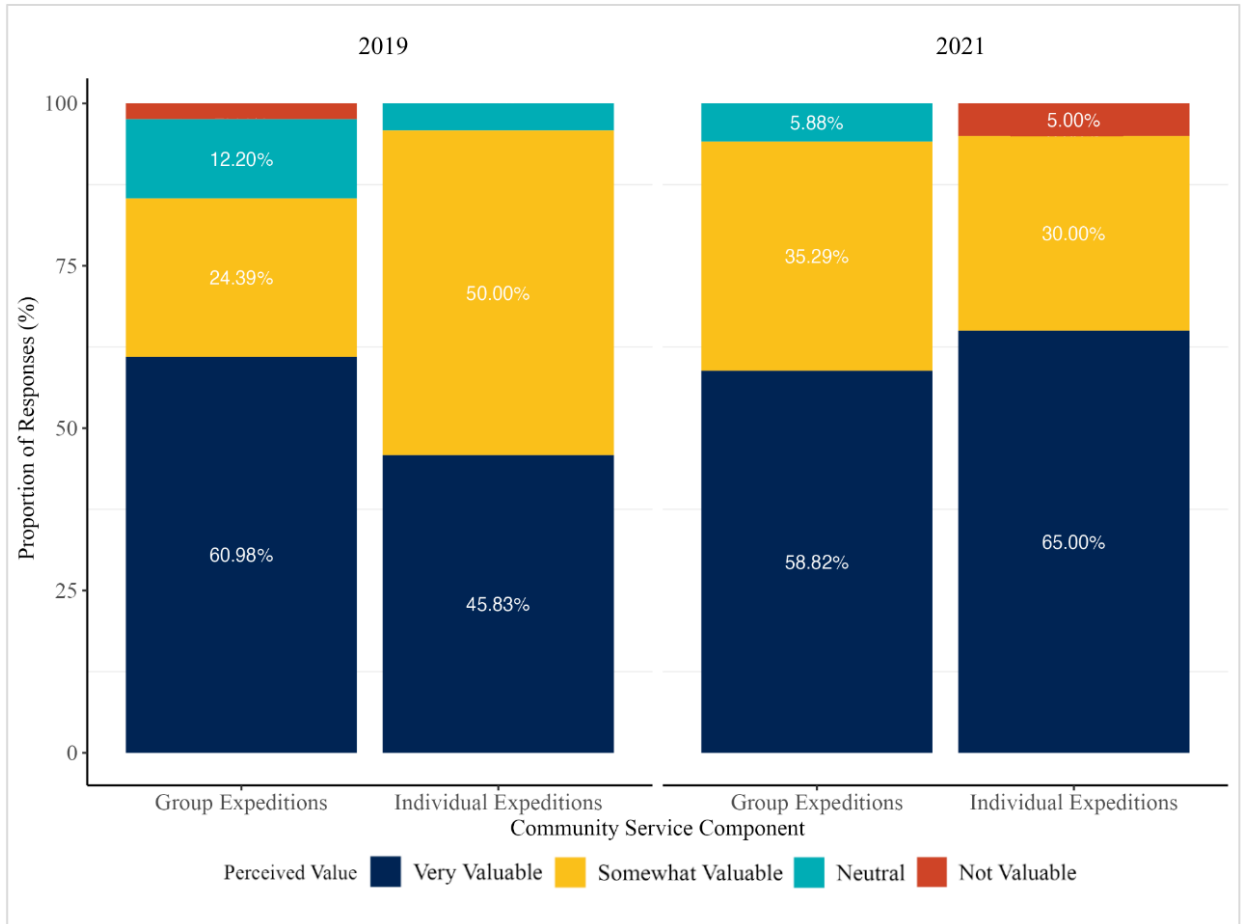


Figure D3

Response Counts of the Educational Pre-Trip Component by Program Type

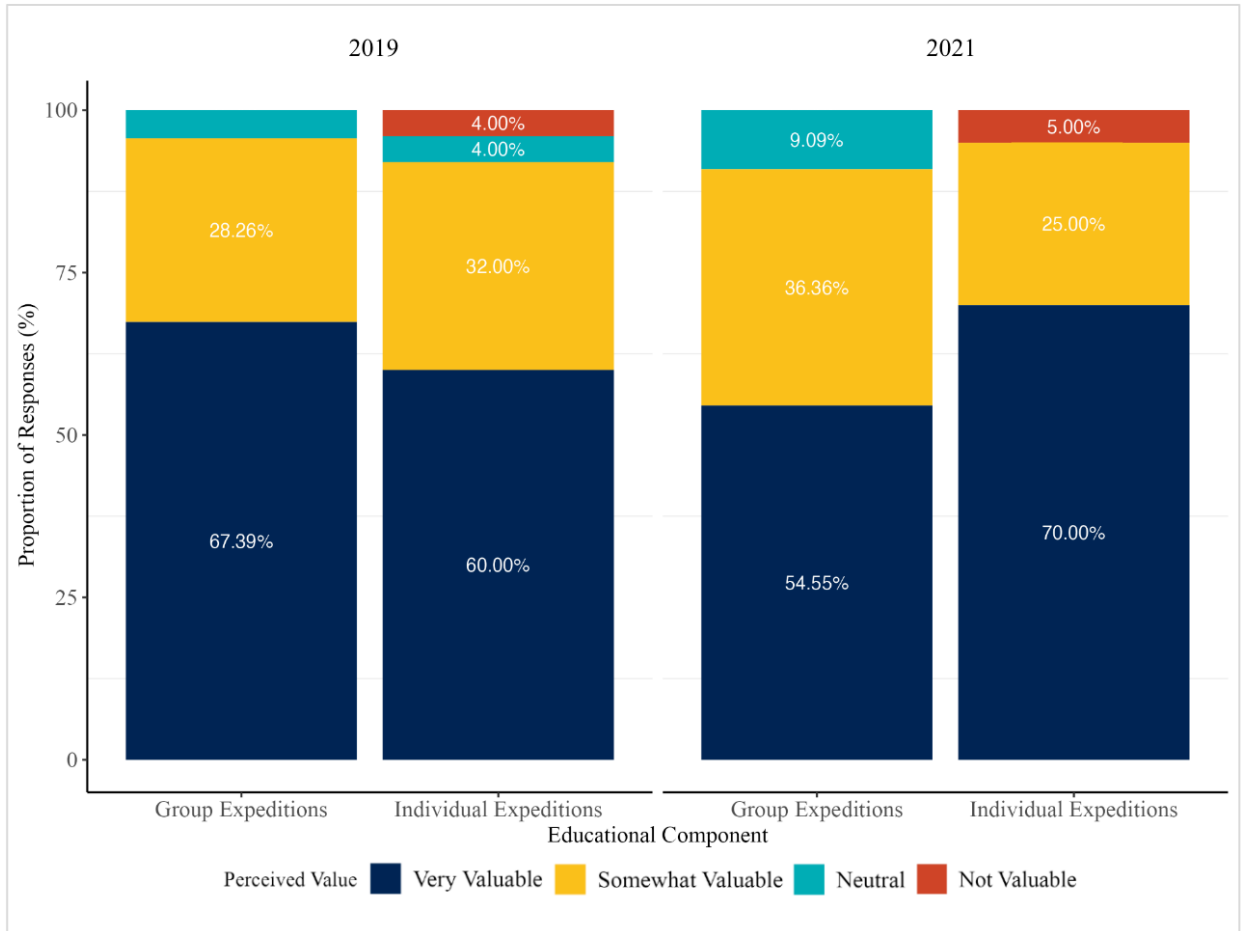


Figure D4

Response Counts of the Environmental Awareness Post-Trip Growth Domain by Program Type

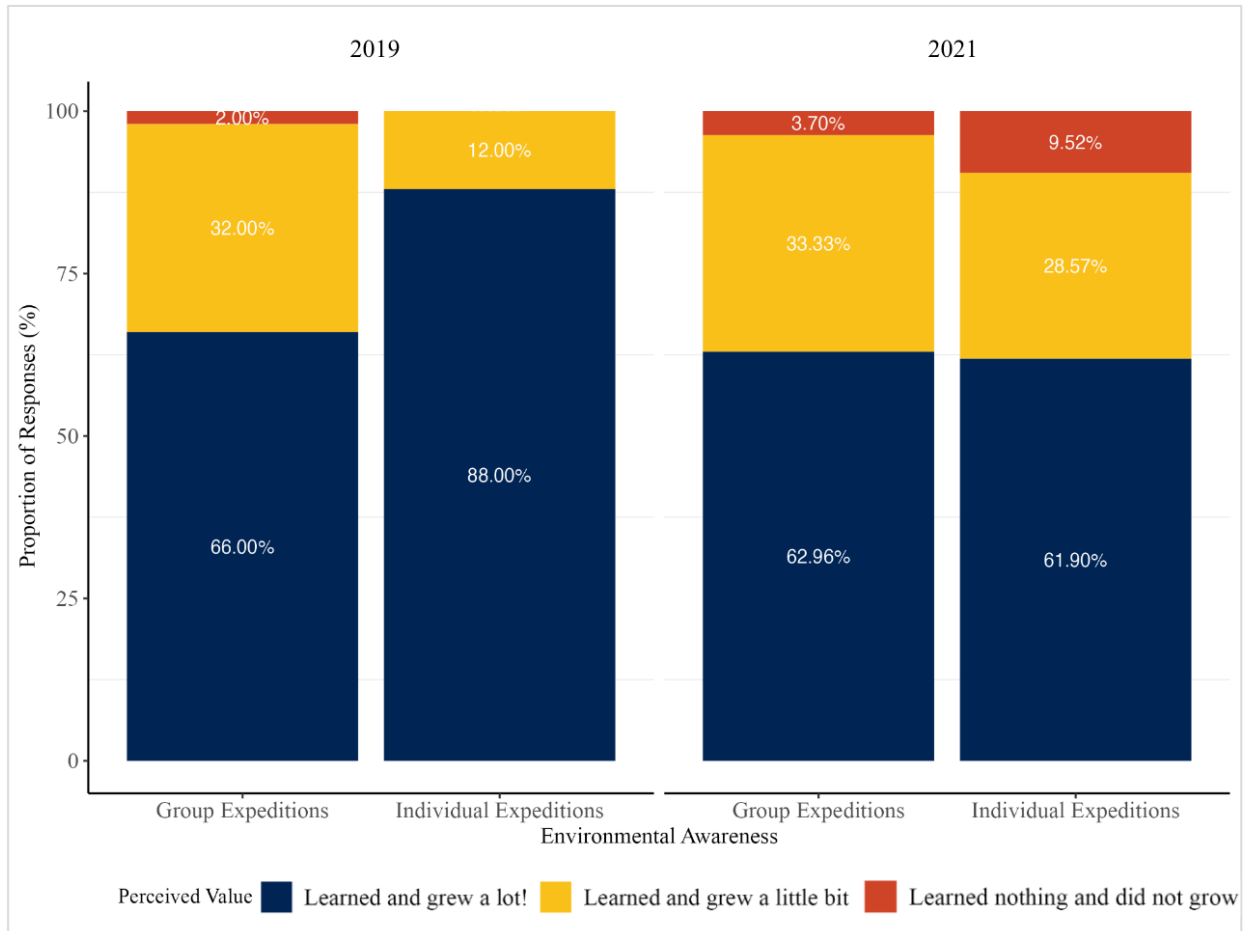


Figure D5

Response Counts of the Leadership Post-Trip Growth Domain by Program Type

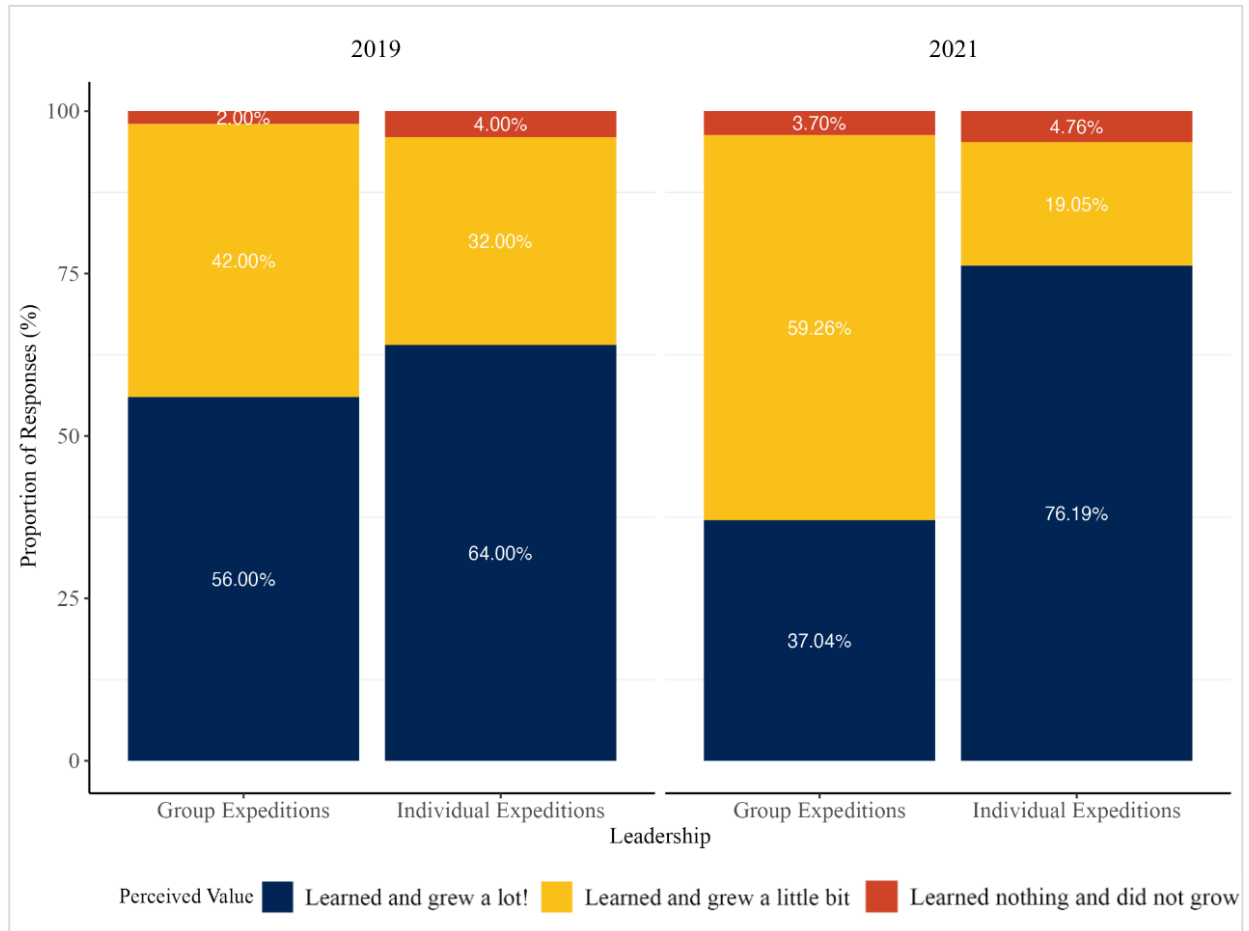


Figure D6

Response Counts of the Teamwork Post-Trip Growth Domain by Program Type

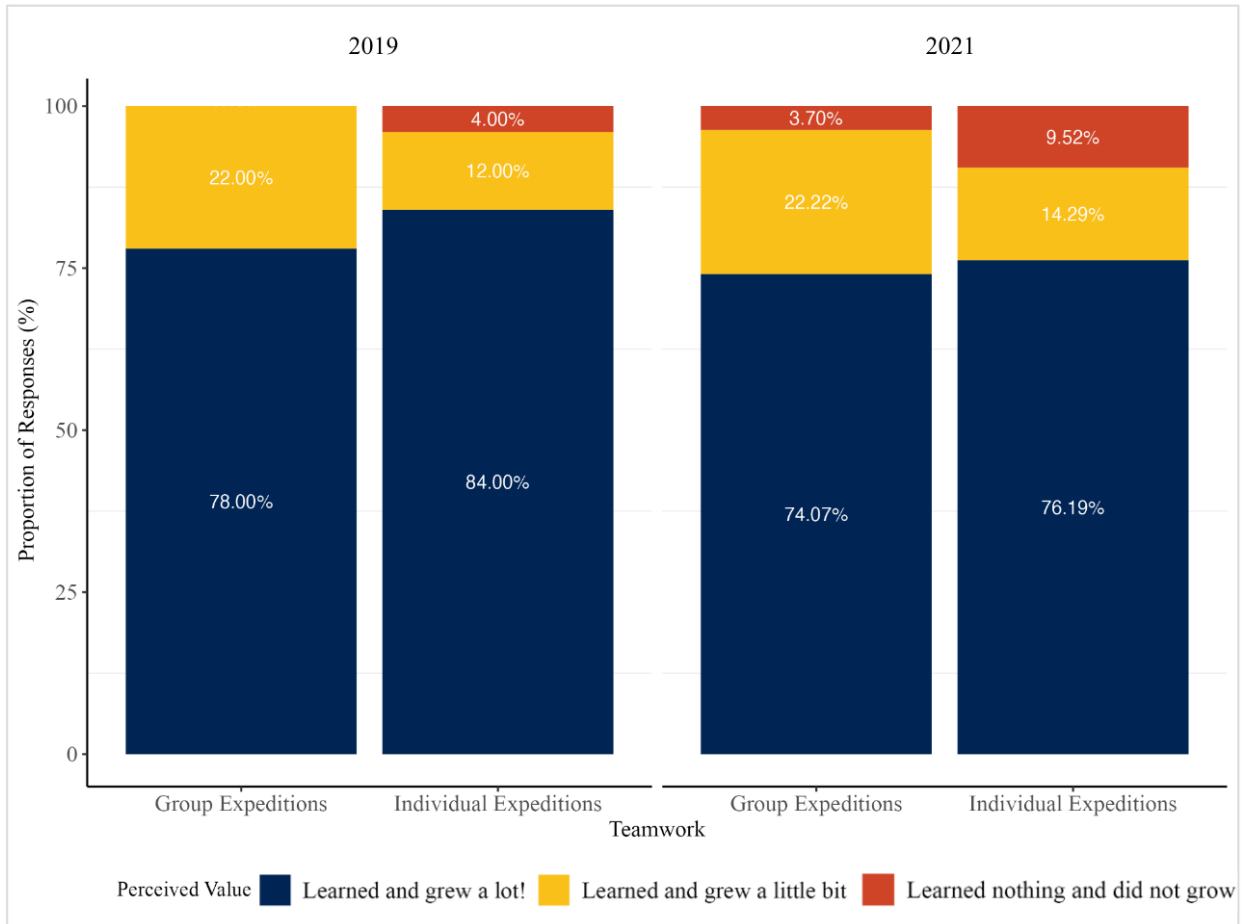


Figure D7

Response Counts of the Personal Growth Post-Trip Growth Domain by Program Type

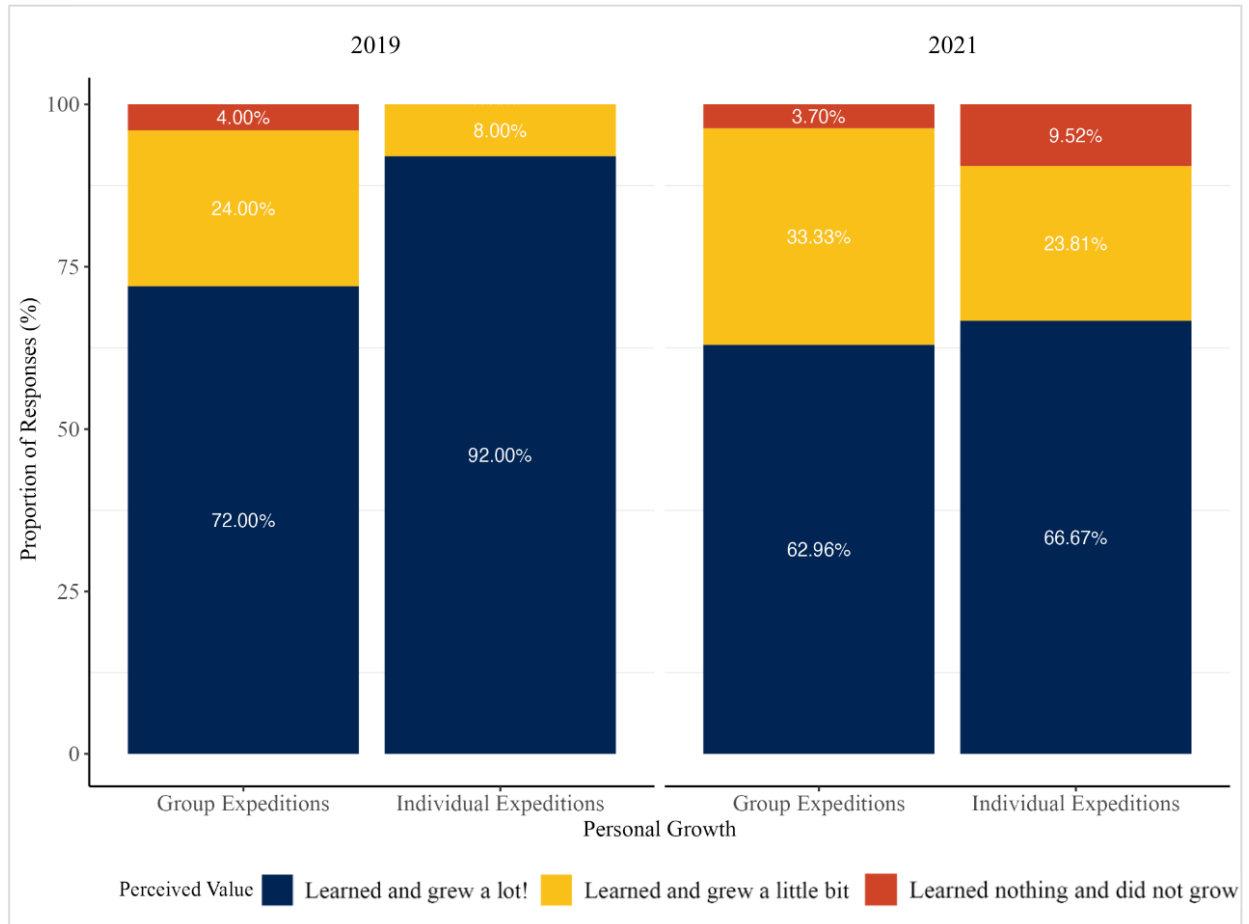


Figure D8

Response Counts of the Cultural Awareness Post-Trip Growth Domain by Program Type

