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The impact of a 12-day outdoor learning project on life skills development in adolescents in Scotland

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ABSTRACT

This research investigated the effectiveness of a 12-day outdoor learning project on adolescents' life skills development. In total, 180 participants with a mean age of 14.3 (±0.5) years took part in the outdoor learning project and completed the Life Skills Scale for Outdoor Learning (LSSOL) at pre-intervention, post-intervention, and at six-months post-intervention. A control group of 39 students with a mean age of 14.3 (±0.5) years completed the LSSOL at the same pre- and post-intervention timepoints. MANOVA results indicated a statistically significant improvement in life skills in the intervention group from pre- to post-intervention, but not in the control group. With the exception of goal setting, all life skills showed significant improvements. At a six-months post-intervention, all life skills, except goal setting, remained above the pre-intervention levels. Overall, the small positive effect on adolescents' life skills development from the project supports the inclusion of outdoor learning in the school curricula.

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KEYWORDS
Life skills; outdoor learning; adolescents

Introduction

In recent years, outdoor learning has received significant attention from government, policymakers, and teacher education institutions in Scotland. A wave of recent national educational policy and research advocates for teachers in Scotland to incorporate outdoor learning and education for sustainability into their practice (Christie et al., 2019; Mannion et al., 2015; White et al., 2023). Driving this aspiration is the goal that 'learning relating to sustainable development, global citizenship, and outdoor learning is experienced in a transformative way by every learner in every school across Scotland' (Scottish Government, 2012, p. 7). The message from the Scottish Government and the General Teaching Council Scotland (GTCS) is clear: outdoor learning should be embedded into the educational experiences of all Scottish children (Christie et al., 2016). While policy support is robust, the practical application of outdoor learning within schools varies (Mannion et al., 2015), and the extent to which these policies translate to measurable outcomes in student development remains an area for future research.

Outdoor environment has been the setting for learning across most of human history (Nicol & Waite, 2020), and indoor classrooms have only become the norm with the advent of 19th century mass schooling (Mann et al., 2021). Donaldson and Donaldson (1958) define outdoor learning as an immersive experience that involves 'learning for, with, and about the

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natural environment' (p. 17). Expanding on this, Mann et al. (2022) identify a range of settings, from school gardens to wilderness expeditions, which are crucial for promoting an active connection with nature. However, outdoor learning is not limited to passive experiences in nature. Instead, it encompasses a range of dynamic activities including kayaking, sailing, hiking, and rock climbing, which not only engage students but also foster personal and social skills development (Nicol, 2002). Such environments present unique challenges that encourage students to venture beyond their usual boundaries, thereby facilitating personal development through experiential learning approaches (Priest & Gass, 1997; Schoel et al., 1988).

A wealth of research underscores the manifold benefits of outdoor learning, including improvements in health, wellbeing, creativity, and cognitive development (Barton et al., 2015; Mygind, 2007; Rickinson et al., 2004). Outdoor learning projects connected to the school curriculum, whether as a one-time occurrence (e.g. a 12-day outdoor learning project) or throughout the year can also contribute to broader educational goals, such as promoting environmental awareness and sustainability (Broom, 2017), fostering a sense of community, and social responsibility (Rickinson et al., 2004; Wells & Lekies, 2006). Additionally, this hands-on approach to learning has been shown to enhance problem-solving, communication skills, and teamwork, which are essential life skills that may not be fully addressed in traditional classroom settings (Hattie et al., 1997; Neill, 2008). The positive influence of outdoor learning on life skills is increasingly supported by evidence which suggests significant benefits to adolescents' overall life outcomes (Blaine & Akhurst, 2022; R. A. Scrutton, 2015; Sibthorp, 2003; Sproule et al., 2013).

In the area of youth development, Positive Youth Development (PYD) is fundamentally grounded in a strength-based and relationships-centred approach that focuses on developing young people holistically (Holt et al., 2017). Sport in particular has been considered an ideal context for enhancing PYD, as it provides opportunities for young people to cultivate their psychological, social, emotional, physical, and intellectual skills (Bateman et al., 2020; Holt et al., 2017). Like sport, outdoor learning presents young people with a dynamic and engaging learning environment in which PYD may occur. At the centre of PYD is the notion of life skills, which aims to promote desirable competencies or outcomes in young people (Gould & Carson, 2008). Life skills are defined as functional skills that individuals develop in one context such as sport or school and then transfer to other context such as the home, the community, or the workplace (Williams et al., 2022). Examples of life skills include teamwork, goal setting, social skills, problem solving, emotional skills, leadership, time management, and communication skills (L. D. Cronin & Allen, 2017). Recent research suggests that mastering life skills is linked to greater well-being, academic outcomes, and occupational success (Cotterill & Brown, 2018; Steptoe & Wardle, 2017).

In the domain of life skills development, several researchers (Bean et al., 2018; Gould & Carson, 2008; Pierce et al., 2018) have proposed various sports-based models that offer structured frameworks for understanding and fostering these essential skills. Models proposed by Gould and Carson (2008) and Pierce et al. (2017) have emphasised factors such as the inherent demands of the sport, programme design, coach characteristics, teaching strategies, the social environment, and the utility of life skills as contributing to the development of life skills within sport. Other models, including those presented by Bean et al. (2018), Holt et al. (2017) and Turnnidge et al. (2014), have suggested that life skills can be developed implicitly and explicitly through sport. Implicit life skills development occurs when the sport's context is well-structured, and coaches, parents, and peers create a positive developmental climate (Bean et al., 2018; Holt et al., 2017). On the other hand, explicit life skills development involves a deliberate focus on discussing and practising life skills in the sport (Bean et al., 2018; Holt et al., 2017). Additionally, the current paper draws on Ronkainen et al. (2021) non-instrumental value perspective: learner-led informal processes, uncertainty of life and learning, and those types of learning that are not necessarily marketable (useful, productive) but could contribute to developing critical awareness and openness to experience (and thus have value in human life). This approach aligns with

outdoor learning researchers (Gurholt & Sanderud, 2016) who use existential concepts to describe meaningful learning experiences in nature, and emphasise exploration and openness to new experiences over structured outcome-driven activities. Despite these conceptual advances in sport research, there remains a scarcity of theory-driven models that explain the processes by which young people develop a range of life skills through outdoor learning.

The body of literature highlighting the role of sport and physical education (PE) in life skills development is expansive (Camiré et al., 2012; L. Cronin et al., 2023; Pierce et al., 2017). Sport, as a widely embraced activity among youth, presents a fertile ground for learning and growth. This idea is further emphasised when we consider the social, emotional, and collaborative facets of sports, which inherently offer developmental avenues for young people (Danish et al., 2004). Indeed, these sporting contexts, with their well-defined structures and explicit rules, can naturally cultivate essential life skills. Within the context of PE, the structured nature of PE lessons allows educators to not only impart physical skills, but also essential life skills that are beneficial beyond the classroom. PE classes require students to interact, negotiate, cooperate, and sometimes lead. Such experiences offer a practical way of developing a wide range of life skills such as communication skills, resilience, teamwork, and leadership (L. Cronin et al., 2023). While existing research on life skills development within outdoor learning contexts remains sparse, particularly when contrasted with the extensive body of research of sport and PE, this gap presents unique opportunities. The parallels between the active engagement and experiential facets prevalent in sport, PE, and outdoor learning highlight the potential for synergy of effective practices. By drawing on established methodologies and findings from the domains of youth sport and PE, researchers could enrich the pedagogical strategies applied in outdoor learning projects. This approach could illuminate the ways in which outdoor learning contributes to life skills development, thereby offering new insights and enhancing educational practices. The distinctive nature of this research area, coupled with its potential for interdisciplinary innovation, highlights its uniqueness and the value it may hold for educational research.

Like sport and PE, targeted outdoor learning projects have consistently demonstrated positive outcomes. Outdoor learning projects are structured activities conducted in natural settings that aim to promote personal and social development through experiential learning (Mann et al., 2022). The Journey Outdoor Adventure Education (OAE) programme (Blaine & Akhurst, 2020), was designed as a comprehensive developmental initiative aimed at fostering personal, physical, intellectual, social, and spiritual growth over a 21-day period. Engaging learners in group activities such as canoeing, cycling, running, and hiking, research on this programme (Blaine & Akhurst, 2020) found notable improvements in adolescents' psychosocial outcomes, particularly in life effectiveness and resilience. Life effectiveness, as defined by Neill (2008), refers to a person's capacity to adapt, survive, and thrive, demonstrating a breadth of development comparable to that achieved through life skills. Similarly, the Catalyst programme (Bowen & Neill, 2016), targets youth facing challenging circumstances. Conducted by an Australian non-profit organisation, this programme spans 15 days across 10–12 weeks and incorporates adventure-based counselling with experiential learning. Significant improvements were found in life effectiveness, psychological well-being, and a reduction in delinquent behaviours as a result of this programme (Bowen & Neill, 2016). Additionally, literature suggests that students with initially less developed life skills could exhibit more substantial progress (Cullinane & Montacute, 2017). This finding highlights the potential of outdoor learning projects to act as equalisers in the development of life skills, offering greater opportunities for growth. Adding to this body of evidence, Sproule et al. (2013) and Allison et al. (2015) examined an established 12-day outdoor learning programme for secondary students. This annual initiative engages an entire year group/form (e.g. third form) in a diverse array of activities, including mountain biking, ice climbing, and hiking, and offers both autonomy and a stimulating learning environment. Findings from these studies indicated that offering students a range of choices and challenges not only heightened their interest in learning but also had lasting educational benefits. Notably, the programme was effective in promoting autonomous motivation and competence, leading to perceived improvements in students' problem-solving and collaborative skills. In line with these

findings, this current study investigates the same outdoor learning project, with a focus on the development of a wider range of eight different life skills in adolescents.

Despite the growing popularity of outdoor learning projects to promote life skills development, little research has been conducted to investigate the effectiveness of outdoor learning projects for developing adolescents' life skills. Firstly, while a substantial body of research exists on life skills development through sport and PE (L. D. Cronin & Allen, 2017; L. Cronin et al., 2023; Gould & Carson, 2008; Pierce et al., 2017, 2018), empirical investigations into the role of outdoor learning in promoting life skills development are comparatively scarce. This represents an opportunity for further investigations to better understand the potential of outdoor learning as a tool for promoting life skills development. As one of the pioneers in outdoor learning (Higgins, 2002), Scotland surprisingly lacks extensive published quantitative research on this topic, underscoring a pressing need for empirical studies into outdoor learning contexts (R. A. Scrutton, 2015).

Furthermore, some scholars have expressed concerns regarding the robustness of evidence derived from the quantitative domain. For example, Neill (2008) highlighted common issues and limitations in quantitative research in outdoor learning, such as the use of inappropriate self-report questionnaires, insufficient statistical power, excessive reliance on inferential statistics, an absence of control and comparison groups, a lack of longitudinal data, and insufficient exploration of independent variables. Furthermore, R. Scrutton and Beames (2015) examined recent studies that employed quantitative methods to measure personal and social development (PSD) in outdoor learning and found limitations in research designs, including small sample sizes, weak validity and reliability evidence for the instruments used, and a lack of control groups within studies. Such limitations could potentially affect the robustness of the findings and their applicability to broader populations. Moreover, according to L. D. Cronin and Allen (2017), adolescents' perceptions of life skills development through sports may not change significantly in the short term; whereas, over a longer period, life skills development would be expected to increase. This suggests that young people may require time to cultivate and apply these life skills, emphasising the importance of investigating the long-term effect of life skills development. Addressing the key limitations highlighted above, the present study aims to address the following research questions:

(1) To what extent does a 12-day outdoor learning project (i.e. the intervention) enhance life skills development in adolescents?
(2) What are the immediate (post-intervention) and longer-term (six-month follow-up) effects of a 12-day outdoor learning project on life skills development in adolescents?
(3) How do potential confounding variables, such as gender, age, and project difficulty, influence the outcomes of a 12-day outdoor learning project?
(4) How does participation in an outdoor learning project affect the development of life skills among students with higher versus lower initial life skills scores?

Methodology

Research design

In this study, a quasi-experimental design was employed to investigate the relationship between a 12-day outdoor learning project and life skills development in adolescents. A quasi-experimental design resembles a true experimental design but lacks the element of random assignment of participants to different groups (Gopalan et al., 2020; Reichardt, 2009). Instead, subjects are assigned to groups based on non-random criteria, which includes factors such as age, gender, socioeconomic backgrounds. A non-equivalent control group design, as described by Maciejewski (2020), was chosen for this study, and involved selecting a control group that is similar to the intervention group in all relevant aspects except for the exposure to the outdoor learning project. The use of this design allowed for the determination of whether the intervention had a significant effect on life skills

development while accounting for the possible influence of extraneous variables (e.g. participant characteristics and environmental factors).

Participants

The study included a total of 302 participants between 13–15 years of age from two secondary schools in Scotland. The intervention group comprised 252 students who participated in a 12-day outdoor learning project. Of these participants, 180 students (female = 50.6%; male = 49.4%; mean age 14.3 ± 0.5 years) completed the pre-intervention, post-intervention, and six-month retention surveys. The control group consisted of 50 students from a different school who did not participate in the 12-day outdoor learning project. Out of these, 39 (female = 56%; male = 44%; mean age = 14.3 ± 0.5 years) completed both the pre-intervention and post-intervention surveys. Of note, the participants from both schools came from similar socioeconomic backgrounds (Sproule et al., 2013), which maintained comparability between the two groups. Specifically, the schools were located in areas that were in the top 10% in terms of socioeconomic status as per the Scottish index of multiple deprivation (Scottish Government, 2020).

Project descriptions

The 12-day outdoor learning project has been part of the school's curriculum for over 60 years, with the aim of facilitating the development of life skills and adding value to the school experience (Sproule et al., 2013). Each May, after the internal school exam period, students participate in one of 18 different projects over a span of 12 days. The project selection process begins with students attending a meeting with their parents and the teachers who are in charge of the projects. The teachers present a description of each project and its physical demands, which allows students to make informed decisions. Students then fill out a form indicating their preferred difficulty level for the project they choose. The 18 projects are classified by the project manager into three levels of difficulty: medium, medium plus, and difficult, with the physical challenge increasing accordingly. For instance, difficult projects involve more high-level walking while middle projects may include birdwatching and visits to historic sites to learn about the region's wildlife. Table 1 provides a comprehensive overview of the 18 outdoor projects. Each entry details the specific activities conducted in the respective locations.

Students choose activities based on their individual preferences for the type of outdoor tasks and degree of difficulty involved. After the selection process, students are assigned to projects and groups. The allocation considers students' preferences, aiming to ensure an enjoyable experience for all. This approach encourages individuals to form new connections and be challenged outside of their existing social circles. While adjustments to assigned groups are permitted in certain cases, changes are typically minimal. Throughout the 12-day outdoor learning project, students collaborate with their peers and teachers, and are encouraged to become self-sufficient in planning and executing their projects. To foster independence, students can only use their phones in emergencies. The primary activity for all projects is walking in remote regions of Scotland, with overnight stays in various accommodations. Additionally, students can engage in other activities such as kayaking, rock climbing, ice climbing, and mountain biking based on their interests and the project requirements.

Life Skills Scale for Outdoor Learning

To evaluate potential changes in participant's life skills development, the study utilised the Life Skills Scale for Outdoor Learning (LSSOL) in an online survey format (see Appendix A). To ensure the relevance of the LSSOL to the context of outdoor learning, the scale was adapted from the well-established Life Skills Scale for Sport (LSSS; L. D. Cronin and Allen (2017). It is important to note that the LSSS has previously demonstrated good internal consistency reliability, test-retest reliability, and

Table 1. Summary of the 18 outdoor learning projects undertaken by pupils ($N = 180$) in the present study.

Location	Outdoor activities
Achmelvich/Glen Garry***	Hiking, conservation work, paddleboarding, canoeing, mountain biking
Loch Eil/Arran*	Week 1: Outward Bound outdoor centre-based activities. week 2: canoeing, conservation work, visiting historical sites, hiking
Loch Eil/Benbecula*	Week 1: Outward Bound outdoor centre-based activities. week 2: conservation work, visiting historical sites, coastal walk
Colonsay/Glencoe**	Coastal walk, conservation work, hiking
Durness***	Climbing and survival skills, sea kayaking, hiking, overnight camping expedition
Gairloch/Cairngorm***	Coastal walk, hiking, conservation work, canoeing, overnight camping expedition
Glengarry/Gairloch***	Hiking, mountain biking, canoeing, conservation work
Glen Affric/Glencoe***	Sea kayaking, overnight expedition, hiking, conservation work
Rothiemurchus/ Knoydart***	Hiking, mountain biking, overnight camping expedition, bothy (basic shelter) night, woodworking day, sea kayaking
Glen Lyon/ Roybridge**	Hiking, conservation work, overnight camping expedition, ice climbing, cycling
Glencoe/ Achmelvich***	Sea kayaking, overnight expedition, hiking
Harris*	Wildlife walk, coasteering, sea kayak, mountain biking, rock climbing
Knoydart/Ardgour***	Conservation work, bushcraft, hiking, sea kayaking, mountain biking, overnight camping expedition
Torridon/Lewis**	Hiking, surfing
Ardgour/Mull**	Hiking, conservation work, overnight camping expedition, sea kayaking, coastal walk, tourist boat trip
Northern Isles*	Nature walk, boat trip, conservation work, historical sites day, coastal walk
Kintail***	Sea kayaking, hiking, conservation work, cycling
Yorkshire Dales*	Walking, climbing/abseiling, caving, kayaking, conservation day

one asterisk (*) indicates a medium level of physical activity, two asterisks (**) denote a medium plus level of physical activity, and three asterisks (***) indicate a high level of physical activity, classified as difficult.

convergent validity in assessing life skills for youth sport participants (L. D. Cronin & Allen, 2017, 2018; Mossman & Cronin, 2019Nascimento-Junior et al., 2020).

The adaptation focused on modifying the scale's instructions. Instead of directly referencing sport-related activities and contexts, the instructions were tailored to specifically relate to outdoor learning contexts. This process involved a rigorous review by four teachers with lengthy experience in outdoor learning and three academics with extensive experience of conducting and publishing outdoor learning research. These experts conducted a thorough revision of the scale, offering targeted recommendations to ensure the content met the specific demands and objectives of outdoor learning. They proposed detailed changes to the phrasing and structure of questions to accurately reflect the experiences and skills pertinent to outdoor learning. This modification guaranteed that the LSSOL is attuned to the unique characteristics of outdoor learning, making it a suitable instrument for assessing life skills development within this context.

The LSSOL comprised eight subscales that measured various life skills, including teamwork (e.g. 'I work well within a group'), goal setting (e.g. 'I set goals so that I can stay focused on improving'), social skills (e.g. 'I am comfortable starting a conversation'), problem-solving (e.g. 'I think carefully about a problem'), emotional skills (e.g. 'I know how to deal with my emotions'), leadership (e.g. 'I know how to positively influence a group of individuals'), time management (e.g. 'I manage my time well'), and communication (e.g. 'I speak clearly to others'). Participants rated each item on a five-point Likert scale ranging from 'not at all' to 'very much,' with higher scores indicating greater life skills development. To minimise potential questionnaire familiarity bias, the order of the questions was systematically varied across multiple administrations, and the presentation sequence of the subscales was counterbalanced. Participants were clearly briefed on what was expected of them, assured of the confidentiality of their data, and informed that there were no 'right or wrong' answers to questions. They were encouraged to answer honestly and to take adequate time to reflect on each question. This approach was adopted to receive authentic and thoughtful responses, thereby enhancing the reliability of the findings.

Data collection procedures and timeline

Prior to the commencement of the study, a formal meeting was conducted between the research team and the management team responsible for overseeing the 12-day outdoor learning projects. During this meeting, detailed discussions were held regarding the research process. Informed consent was obtained from various stakeholders, including the project manager, the parents/guardians of participating students, and informed assent was provided by the students themselves. Furthermore, the researcher organised an informal meeting with a PE teacher from the school to outline the research aims, design, and potential benefits associated with participation in the study.

To evaluate the changes in life skills development over time, the LSSOL was administered at multiple time points. The first baseline assessment was carried out a week prior to the projects commencing, followed by evaluations two weeks and six months after the project ended. The control group underwent data collection twice, with a gap of four to five weeks, to match the timing of data collection for the intervention group. However, no longitudinal analysis was conducted for the control group, as the extended follow-up did not align with the primary aims of the research design.

To ensure the ethical integrity of this research and ensure the privacy and anonymity of all study participants, strict confidentiality measures were implemented, including the use of anonymised data, secure data storage and restricted access, and adherence to informed consent procedures. Additionally, participants were informed that their participation was voluntary and that they could withdraw from the study at any time without any negative consequences. The study had ethical approval from the ethics committee at the first author's academic institution.

Data analysis

The present study utilised the Statistical Package for the Social Sciences (SPSS) to perform an 8×4 multivariate analysis of variance (MANOVA). This design was used to explore differences in pre-intervention (T1), post-intervention (T2), and six-months retention (T3) scores across the eight life skills, after controlling for gender, age, and project difficulty. In order to assess the significance of any observed effects, a repeated-measures analysis of variance (ANOVA) was conducted for pre-intervention, post-intervention, and six-month retention scores across the eight life skills. An alpha level (p value) of 0.05 was used for all statistical tests, and a p value < 0.05 was considered significant (Coolican, 2018).

Following the recommendations proposed by Gignac and Szodorai (2016), researchers are advised to report and interpret effect sizes in their research. To assess the practical significance of the effect size, the present study employed Cohen's d, which was then compared to other studies in the field of outdoor learning. Cohen (1988) has provided a widely accepted standard for interpreting d values, with large effects defined as $d = .80$, medium effects as $d = .50$, and small effects as $d = .20$. The effect sizes were calculated from T1 to T2 to establish whether there was a practical difference in the scores and again from T1 to T3 to ascertain if this effect was retained after six months.

Results

Changes in overall life skills development

MANOVA was conducted to investigate the effects of the 12-day outdoor learning project on overall life skills development. Figure 1 illustrates the changes in life skills development at different time points: T1, T2, and T3 for the intervention group, and T1 and T2 for the control group, with these time points serving as within-subject factors and the two groups (intervention and control) as between-subject factors. In the intervention group, there was a statistical improvement in overall life skills development between T1 and T2, $p = .01$, which involved a small effect size (Cohen's $d = 0.38$). There was no significant difference between T1 and T3 scores for overall life skills development (Cohen's $d = 0.23$, $p = .115$).

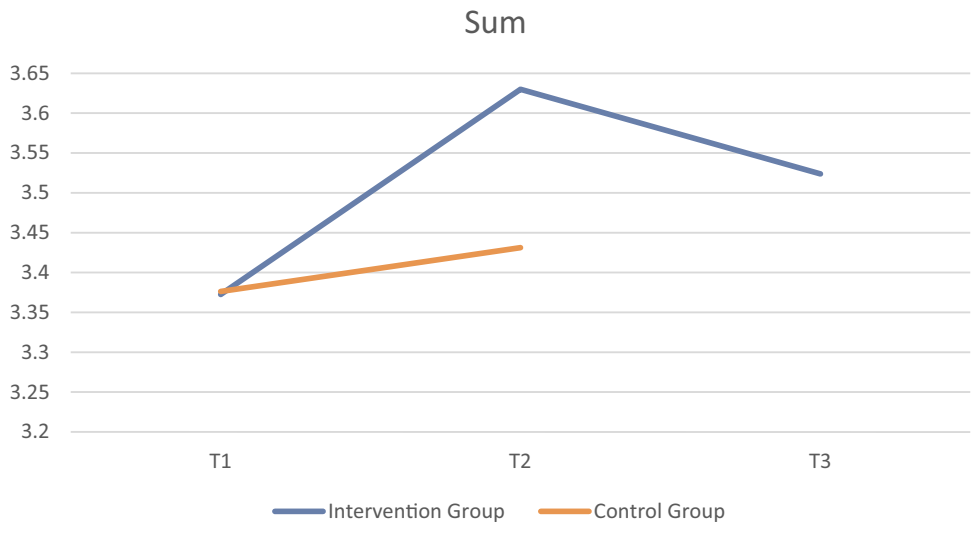

Figure 1. Overall mean scores of life skills development of the intervention ($N = 180$) and control groups ($N = 39$) at pre (T1), post (T2), and at six-months retention (T3).

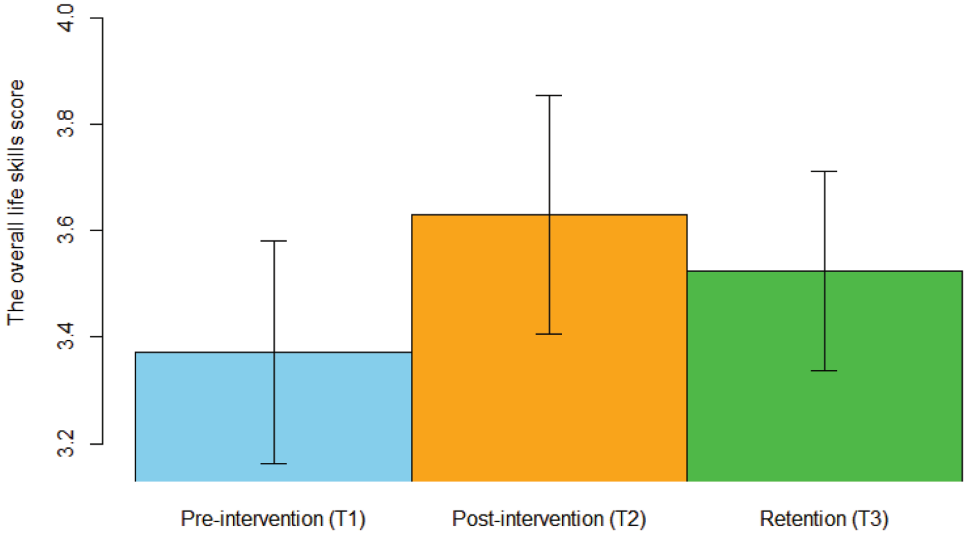

Figure 2. The overall mean scores and confidence intervals for life skills in adolescents ($N = 180$), pre (T1), post (T2) and at six-months retention (T3).

As can be seen in Figure 2, despite a minor decline from T2 to T3, the T3 score remained higher than the T1 score, suggesting a lasting beneficial impact of the outdoor learning project. In contrast to the intervention group, the control group remained stable with no significant change in life skills development from T1 to T2 (Cohen's $d = 0.11$, $p = .698$).

Analysis of changes in each of the eight life skills

To evaluate the influence of the intervention on distinct life skills, we implemented separate ANOVA tests at various time intervals (i.e. T1 to T2, T2 to T3, and T1 to T3) in the

intervention group. A parallel analysis was conducted for the control group from T1 to T2. These analyses were performed without considering potential interaction effects with gender, age, or project difficulty, as no interaction effects were observed across time points on these variables.

T1 to T2 analysis

As can be seen in Figure 3, during the initial stage in the intervention group, significant immediate improvements were observed in multiple life skills including teamwork, social skills, problem solving, emotional skills, leadership, time management and communication. Specifically, problem solving exhibited the most significant growth, increasing by 11.9% (Cohen's $d = 0.50$, $p = .002$) and indicating a medium effect size. Social skills followed closely with a 10.4% improvement (Cohen's $d = 0.48$, $p < .001$), falling in the small effect size category. Parallel improvements were found in emotional skills, which increased by 10.4% (Cohen's $d = 0.41$, $p = .005$) and communication by 8.7% (Cohen's $d = 0.43$, $p = .008$). In contrast, goal setting had a non-significant decline of 0.5% (Cohen's $d = -0.02$, $p = .848$). Comparatively, the control group remained unchanged on their scores for the eight life skills (Cohen's $d = 0.11$, $p = .696$).

These findings collectively illustrate the varying impacts of the intervention on different life skills, with problem solving, social skills, communication, and emotional skills displaying the most substantial significant improvements, followed by teamwork, leadership, and time management with fewer significant improvements. Goal setting, on the other hand, showed a slight decline.

T2 to T3 analysis

The T2 to T3 scores for each life skill can be seen in Figure 4. A statistically significant decrease was observed in social skills as evidenced by a 5.8% decrease (Cohen's $d = -0.3$, $p = .026$), representing a small negative effect size. Communication skills experienced a non-significant decrease, diminishing by 4.4% (Cohen's $d = -0.24$, $p = .106$). Leadership (Cohen's $d = -0.17$, $p = .279$), time management (Cohen's $d = -0.01$, $p = .995$), teamwork (Cohen's $d = -0.02$, $p = .464$), emotional skills (Cohen's $d = -0.14$, $p = .411$), and problem solving (Cohen's $d = -0.18$, $p = .316$) also demonstrated non-significant marginal reductions. Goal setting remained stable and exhibited no significant change (Cohen's $d = 0$, $p = 1$). Overall, the results suggest a fading positive impact of the intervention over time.

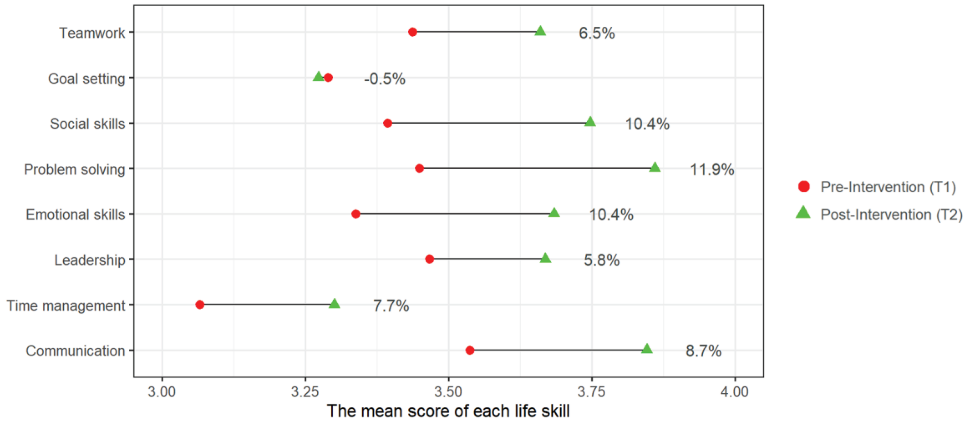

Figure 3. The percentage change in life skills items in adolescents ($N = 180$) from pre (T1) to post (T2) intervention.

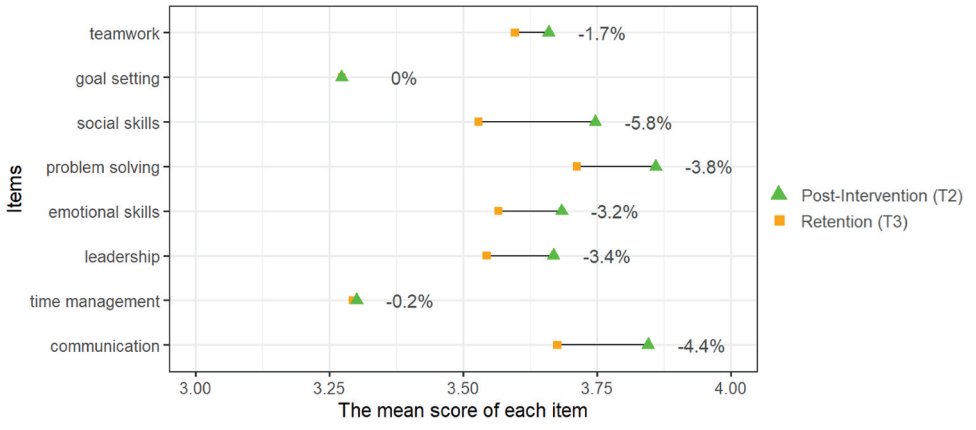

Figure 4. The percentage change in life skills items in adolescents ($N = 180$), post (T2) to six-months retention (T3) intervention.

T1 to T3 analysis

The mean scores of T1, T2 and T3 for each life skill can be seen in Figure 5. Statistically significant improvements were found in problem solving (Cohen's $d = 0.33$, $p = .03$) and emotional skills (Cohen's $d = 0.31$, $p = .04$) respectively. Notably, emotional skills showed the largest effect size of the eight life skills over the six-month retention period. Furthermore, social skills, leadership, and communication, displayed increased effect sizes of less than 0.2, indicating no effect. Conversely, goal setting showed a slight decrease, with a Cohen's d of −0.02, suggesting a negligible effect.

Figure 6 provides a detailed comparison between two groups of pupils, differentiated based on their initial life skills scores. To create these groups, the student cohort was first ranked according to their initial scores in life skills. Then, they were divided into two distinct groups: the upper-scoring half and the lower-scoring half. The figure highlights the differential impact of the outdoor learning project on these two groups. Students in the lower-scoring half, who started with relatively lower life

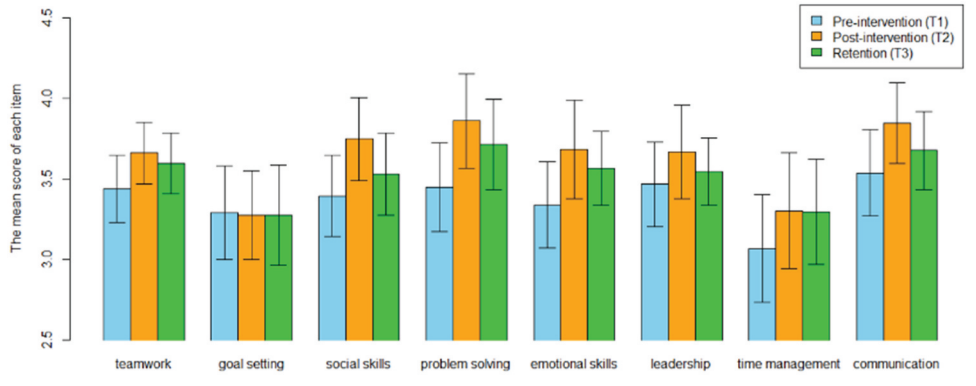

Figure 5. The mean scores and confidence interval in life skills items in adolescents ($N = 180$), pre (T1), post (T2) and six-months retention (T3) intervention.

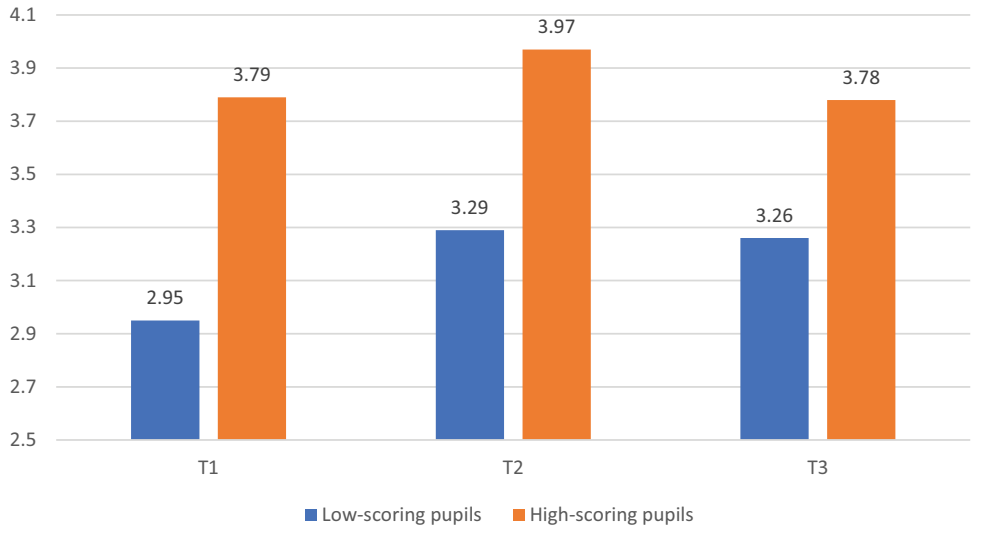

Figure 6. Overall mean score changes of life skills between lower-scoring pupils and higher-scoring pupils ($N = 180$) at pre (T1), post (T2), and six-months retention (T3) intervention.

skills, showed a significant improvement, with an 11.5% increase in their scores from T1 to T2 (Cohen's $d = 1.24$, $p = .009$). On the other hand, the upper-scoring half, which comprised students with initially higher life skills scores, exhibited a more modest improvement of 3.3% over the same period (Cohen's $d = 0.59$, $p = .03$). This suggests that the outdoor learning project may be particularly beneficial for pupils who initially have lower scores in life skills.

Discussion

This study represents the first quantitative assessment of life skills development through outdoor learning in Scotland. The findings of this study highlight the significant positive impact of the 12-day outdoor learning project on the overall development of life skills among students. In particular, the findings showed a small effect on overall life skills development in the short-term (T1 to T2), and in the long-term (T1 to T3). In comparison, the control group did not exhibit a statistically significant improvement in life skills scores from T1 to T2. This indicates that the observed improvements in life skills in the intervention group could be attributed to the intervention itself, rather than simply being a consequence of natural variation or maturation.

As we aim to contextualise the findings of our study within the broader realm of outdoor learning research, a notable challenge presents itself. Specifically, the field is marked by a limited number of studies investigating life skills development in outdoor settings. Compounding this challenge are the inconsistent definitions of terms such as 'life skills,' 'life effectiveness' and 'psychosocial skills' across studies, which makes direct comparisons and conclusive interpretations a complex endeavour. To shed light on these challenges, our study aimed to explore potential explanations for the observed disparities in life skills development within outdoor learning. Drawing upon the existing literature in outdoor learning and sport/PE, we propose various factors (e.g. programme design and implicit/explicit approach) that might account for these variations. However, it is important to acknowledge that our proposed explanations are exploratory, and future research is needed to comprehensively investigate and confirm these hypotheses.

A notable point of reference in this domain is the 'Catalyst' programme introduced by Bowen and Neill (2016). This Outdoor Adventure Intervention (OAI) is tailored for adolescents aged 13–16,

focusing especially on those on the brink of potential adverse trajectories in their academic, vocational, and overarching life paths. The structure and duration of this programme offer a relevant comparison for our study, highlighting differences in short-term and extended impacts on participants. The immediate effects observed in our study were notably distinct from those reported in 'Catalyst,' suggesting a stronger short-term impact. However, when considering the sustained influence, our findings were more subdued. Additionally, the study conducted by Blaine and Akhurst (2020) provides another perspective on the impact of outdoor interventions. It showcased a gradual improvement in effects over a four-month period post-intervention, which diverges from the patterns observed in our research. This contrast points to the complexity inherent in outdoor learning and the potential variability in how such programmes can influence life skills over time. These differences emphasise the necessity of a comprehensive approach when assessing the impact of outdoor learning projects. It is imperative to consider how the combination of physical environment, programme design, instructors' characteristics, teaching strategies, the social environment, and the influence of peers contribute to the effectiveness of such initiatives (McKenzie, 2000). This is a particularly important point as Lloyd et al. (2018) used the term 'drag-and-drop approach' to describe when outdoor learning programmes do not consider factors such as the local place, environment and culture. As such, outdoor learning needs to be more than a 'drag-and-drop approach' when considering a pedagogy for outdoor learning to deliver meaningful outdoor learning experiences. The interplay of the above factors resonates with the frameworks seen in the sports literature, where similar multifaceted influences are acknowledged (Gould & Carson, 2008; Pierce et al., 2017). Given these observations, further exploration is warranted to investigate the specific elements that bolster the enduring benefits of outdoor learning projects on life skills development.

In our analysis of the life skills influenced by the 12-day outdoor learning projects, all life skills (i.e. teamwork, social skills, problem solving, emotional skills, leadership, time management, and communication), with the exception of goal setting, showed significant improvements after participating in the intervention from T1 to T2. Problem solving, social skills, communication, and emotional skills improved the most of the eight life skills. These improvements could be attributed to the nature of the outdoor learning project, which often necessitates collaborative efforts, decision-making, and effective communication among participants (Sproule et al., 2013). The immersive environment of the outdoors often presents unpredictable scenarios, promoting participants to actively engage their problem solving skills (Hattie et al., 1997). Furthermore, the setting outside of the traditional classroom and the absence of digital distractions, such as phones, might encourage individuals to step out of their comfort zones, fostering growth in social skills and emotional skills (Blaine & Akhurst, 2020). Further research should investigate these propositions for how young people may learn life skills through outdoor learning.

While our study demonstrated overall improvements in life skills, the slight decline in goal setting abilities warrants attention. This finding aligns with research by Bowen and Neill (2016), which noted goal setting as a lesser-improved skill in an outdoor education context for at-risk youth. Goal setting is an essential skill that forms the foundation of personal and professional development. It steers motivation, provides clarity on outcomes, and ensures focused and effective effort (Schoel et al., 1988). Moreover, the ability to set and pursue goals is intrinsically linked to self-efficacy, resilience, and long-term achievement (Crane et al., 1997).

Nonetheless, a potential rationale for the observed decline in goal setting could be the balance between implicit and explicit teaching approaches within outdoor learning projects. The sports domain has delved deeply into this distinction. There, the implicit approach refers to prioritising sport-specific skills without consciously fostering life skills. On the other hand, the explicit approach is characterised by a deliberate emphasis on nurturing and transferring life skills (Bean et al., 2018; Turnnidge et al., 2014). Drawing insights from the sport domain, where the distinction between implicit and explicit teaching is meticulously studied, we unearth valuable lessons. While sport often emphasis metrics, numbers, and tangible benchmarks, outdoor learning's vast and unpredictable

terrains might not always offer the same clarity. This discrepancy possibly elucidates the weaker emphasis on goal setting in outdoor settings compared to sport. Moreover, the inherently dynamic setting of outdoor learning may prompt instructors to favour a more flexible and adaptive pedagogical style over an outcome-driven approach. While adaptability is an invaluable skill, the underpinning structure of setting goals should not be overlooked. Given the acknowledged importance of goal setting in outdoor adventure education (Crane et al., 1997; Schoel et al., 1988), our findings underscore the imperative for educators to revisit and reinforce their approaches to teaching goal setting. Additionally, it is conceivable that the structure of the project may not permit students to set their own goals, which could explain the lower baseline proficiency in goal setting. This highlights another compelling reason to intentionally focus on developing goal setting skills during such educational opportunities. Future studies should further investigate these possible explanations for findings of this nature.

The 12-day outdoor learning project displayed varying levels of impact on students, which correlated with their initial score for the life skills. The student cohort was ranked according to their initial life skills scores then divided into two distinct groups. The upper half, representing the higher-scoring students, which demonstrated lesser improvements in life skills from T1 to T2. Conversely, the lower-scoring half saw more pronounced improvements in life skills within the same timeframe. This pattern indicates more substantial benefits for students beginning with less developed life skills, potentially due to their greater room for improvements within the duration of the project. On the other hand, those with initially more advanced skills may experience a 'ceiling effect' (Camire et al., 2020; R. A. Scrutton, 2015), where the scope for further developments is limited because they have already attained a level of mastery in certain life skills prior to the project.

The significance of such outdoor learning experiences is underscored in our current times. Amid the COVID-19 pandemic, and with growing concerns about youth health and unequal learning opportunities, such outdoor learning initiatives have gained prominence (Doyle, 2020; Engzell et al., 2020). It becomes even more crucial when considering that many children from disadvantaged areas may not have the same opportunities as others. The evident progress of lower-scoring students through these initiatives could bridge the skills gap between student groups. However, the accessibility of the outdoor learning project remains a concern. Despite the evident advantages of outdoor learning projects, they are not widely available to Scottish students. Only a small subset (mainly from the independent/private sector schools) of Scottish students can participate in these types of projects, raising valid concerns about equity in educational opportunities. Elizabeth Smith, a former educator who now serves as a Member of the Scottish Parliament (MSP) for the Mid Scotland and Fife region, has addressed this disparity. Her proposed legislation emphasises the importance of residential outdoor learning projects and aims to equalise access to outdoor learning projects in Scotland, targeting young individuals aged 11 to 15 within secondary schools (Scottish Parliament, 2022). This initiative aligns closely with our findings regarding the transformative effects of outdoor learning. In this regard, it is important that policy initiatives at both a national, local and school level further champion outdoor learning as a means to improving all students' life skills. Nonetheless, it is imperative to approach these findings with a degree of caution. Further research is warranted to delineate the factors influencing the varied outcomes among different student groups in the outdoor learning context. Such insights would not only refine our understanding, but would also guide the future design and implementation of the outdoor learning projects and ensure maximum benefits for all students involved.

Limitations and future directions

There are a few limitations to this study that warrant mention. Firstly, the control group comprised only 39 students, which may not sufficiently capture the diversity of responses that a larger sample might offer. Second, the study focused only on the students' perceptions of their life skills. It would be interesting to also consider the perspective of teachers/educators and parents/guardians on the

young person's life skills development. How these parties perceive the evolution of students' life skills following this type of programme would provide a complementary lens and potentially further validate or contrast the self-reported student outcomes. Additionally, it is important to acknowledge that there are some issues with using 5-point Likert scales, such as response style bias and limited variability in responses (Dawes, 2008).

While this study offers valuable insights into the impact of a 12-day outdoor learning project, it also suggests the need for further research. One such direction is to explore the outcomes of longer-duration outdoor learning projects. In particular, would the life skills benefits be more pronounced, sustained, or diverse with an extended project? Moreover, while the follow-up in this study was for six months, understanding the long-term effects of such interventions is crucial. A future study tracking the same cohort for a year or even longer would provide a richer understanding of the sustainability of the life skills improvements observed. This could further solidify the role of outdoor learning projects in the educational area, particularly if the benefits are shown to persist over extended periods.

Moreover, a qualitative perspective would be valuable in gathering the perspectives of students, which can offer nuanced insights into their experiences and the depth of their learning. The views of instructors and teachers are equally important, as their first-hand experiences can provide a contextual understanding of the participants during the projects and how life skills development may have occurred. By understanding the processes and reasons behind life skills development, we can uncover how to optimise the delivery of outdoor learning for maximum impact. This understanding will not only enhance the effectiveness of outdoor learning but also underscore its inherent value within the Scottish educational system.

Lastly, while this study was guided by various models and theories outlined in the introduction, which collectively provide a rationale for the potential impact of outdoor learning projects on the development of participants' life skills, we recognise the necessity for more focused examination. Specifically, our research has not delved deeply into any single model or theory. This gap underscores an important area for future research. Investigating specific theoretical frameworks in greater detail could yield more nuanced insights into the mechanisms through which outdoor learning experiences foster life skills. Therefore, we recommend that future studies prioritize the exploration of particular models or theories to better understand and articulate the pathways of influence within outdoor learning contexts.

Conclusion

In conclusion, this study demonstrates the positive implications of integrating outdoor learning projects in Scottish schools for enhancing student's life skills development. Notably, our research contributes to the existing literature by incorporating the use of a control group and longitudinally assessing life skills development, both of which are significant additions to the field. These methodological advancements provide a more robust understanding of the effects and sustainability of outdoor learning projects. Our findings highlight the importance of grounding pedagogical practices in robust research and serves as a call for an evidence-based approach to outdoor learning in Scotland. The results suggest that incorporating outdoor learning projects as part of curricular or extracurricular activities could lead to positive effects on students' life skills development. Furthermore, the study underscores the significance of assessing the sustained effects of interventions over time to evaluate the long-term impact on students' life skills development. Regular evaluations of projects (i.e. six months post-intervention) are critical to ensure that they continue to meet the needs of students. Overall, this research provides valuable insights that can guide the development and implementation of effective pedagogical practices and policies in schools regarding outdoor learning. Ultimately, it is hoped that future research and implementation of outdoor learning within schools will lead to future generations of young

people that are equipped with a range of life skills that allow them to lead healthy and successful lives.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Appendix A. Life Skills Scale for Outdoor Learning

Directions:

The exposure of young people to a variety of life skills experiences can lead to the development of numerous life skills. Life skills have been defined as personal assets, characteristics and skills such as goal setting, emotional control, self-esteem, and hard work ethic. These different skills can help you in life at home, school, with friends, in sport, and during outdoor activities. These questions ask about some of the skills you may use at school, at home, and in the community.

In this section, there are a number of statements. Please respond as honestly as possible. There is no one way to approach life, so there are no right or wrong answers.

Please click the number on the scale that best describes you.

Teamwork	**Not at all**	**A little**	**Some**	**A lot**	**Very much**
I work well within a group.	1	2	3	4	5
I help another group member perform a task.	1	2	3	4	5
I accept suggestions for improvement from others.	1	2	3	4	5
I work with others for the good of the group.	1	2	3	4	5
I help build group spirit.	1	2	3	4	5
I suggest to group members how they can improve their performance.	1	2	3	4	5
I change the way I perform for the benefit of the group.	1	2	3	4	5
Goal Setting	**Not at all**	**A little**	**Some**	**A lot**	**Very much**
I set goals so that I can stay focused on improving.	1	2	3	4	5
I set challenging goals.	1	2	3	4	5
I check progress towards my goals.	1	2	3	4	5
I set short-term goals in order to achieve long-termgoals.	1	2	3	4	5
I remain committed to my goals.	1	2	3	4	5
I set goals for practice.	1	2	3	4	5
I set specific goals.	1	2	3	4	5
Social Skills	**Not at all**	**A little**	**Some**	**A lot**	**Very much**
I am comfortable starting a conversation.	1	2	3	4	5
I am comfortable interacting in various social settings.	1	2	3	4	5
I help others without them asking for help.	1	2	3	4	5
I get involved in group activities.	1	2	3	4	5
I maintain close friendships.	1	2	3	4	5
Problem Solving	**Not at all**	**A little**	**Some**	**A lot**	**Very much**
I think carefully about a problem.	1	2	3	4	5
I compare each possible solution in order to find the best one.	1	2	3	4	5
I create as many possible solutions to a problem as possible.	1	2	3	4	5
I evaluate a solution to a problem.	1	2	3	4	5
Emotional Skills	**Not at all**	**A little**	**Some**	**A lot**	**Very much**
I know how to deal with my emotions.	1	2	3	4	5
I use my emotions to stay focused.	1	2	3	4	5
I understand that I behave differently when emotional.	1	2	3	4	5
I notice how I feel.	1	2	3	4	5
Leadership	**Not at all**	**A little**	**Some**	**A lot**	**Very much**
I know how to positively influence a group of individuals.	1	2	3	4	5
I organise group members to work together.	1	2	3	4	5
I know how to motivate others.	1	2	3	4	5
I help others solve their performance problems.	1	2	3	4	5
I consider the individual opinions of each group member.	1	2	3	4	5

(*Continued*)

(Continued).

I am a good role model for others.	1	2	3	4	5
I set high standards for the group.	1	2	3	4	5
I recognise other people's achievements.	1	2	3	4	5
Time Management	**Not at all**	**A little**	**Some**	**A lot**	**Very much**
I manage my time well.	1	2	3	4	5
I sssess how much time I spend on various activities.	1	2	3	4	5
I control how I use my time.	1	2	3	4	5
I set goals so that I use my time effectively.	1	2	3	4	5
Communication	**Not at all**	**A little**	**Some**	**A lot**	**Very much**
I speak clearly to others.	1	2	3	4	5
I pay attention to what someone is saying.	1	2	3	4	5
I pay attention to people's body language.	1	2	3	4	5
I communicate well with others.	1	2	3	4	5