Visitor Risk Perception & Messaging Influence

New Zealand Search And Rescue (NZSAR):

Research Programme Report 2020

Department of Conservation
Te Papa Atawhai

New Zealand Government

Cover: DOC/MSC collaborative visitor safety signage, Gertrude Saddle Route trail entrance. Photo: Jeff Dalley

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Department of Conservation
Te Papa Atawhai

NEW ZEALAND
SEARCH AND RESCUE
Rapu Whakarauora Aotearoa

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1 Executive Summary

1.1 Research Overview

On behalf of New Zealand Search and Rescue, the Department of Conservation undertook to design and implement a programme of research into:

- Visitors' perceptions of risk at a selection of sites on Public Conservation Lands; and
- The influence of risk-related messaging both at, and removed from, those sites.

Recent DOC visitor accident investigations and research findings indicated that visitors' understanding of risks at place, and their decision-making regarding those risks, were contributing to accidents.

The purpose of the Visitor Risk Perception and Messaging Influence Research Programme was to:

- Gain greater understanding of visitors' perception of risks at place, and how much risk they think they are exposed to;
- Identify where visitors get their information from, and what influence that information has on visitors' risk-related decision-making.

The Programme's findings are intended to inform subsequent initiatives aimed at reducing backcountry incidents and accidents involving visitors, especially international visitors.

1.2 Research Design

Surveys were undertaken at a total of seven sites distributed across seven National Parks. The sites were selected by NZSAR based on their history of incidents and accidents, as well as their known preference with international visitors.

Intercept surveying of hikers was undertaken at trail heads using paired 'Pre-hike' and 'Post-hike' questionnaires, and supporting graphic material. The target population was all hikers at each site, and the sample frame all hikers over 18 years of age. Hikers were surveyed both entering and exiting the sites using the 'next available respondent' sampling technique.

A total of 58 days of surveying was completed during the 2018/19 and 2019/20 summer seasons, yielding 1,423 completed questionnaires, comprising 898 'Pre-hike' and 525 'Post-hike'. Demographic profiles were gathered for a total of 2,889 hikers. Questionnaires were subsequently digitised for the purpose of secure data curation, quality assurance and analysis.

1.3 Results

All results have been segmented based on nationality into *'International'* hikers and *'New Zealand'* hikers.

Results are presented in four sections:

1. Respondent Demographic Profiles
2. Respondent Psychographic Profiles
3. Respondent Sociographic Profiles
4. Respondent Risk Profiles

1.3.2 Summary of Demographic Profiles

- Overall, the sex and age profiles of New Zealand and International respondents were broadly similar.

Sex

- Male hikers predominated across all research trails, with the differential very similar across both New Zealand and International groupings, and nearly double that typically recorded on easier front-country short walks.

Age

- The distribution across all age brackets differed significantly between New Zealand and International hikers, with Internationals being younger on average.
- The 20-29 age bracket was predominant for both New Zealand and International hikers, but much more so for the latter.
- Overall, more than two thirds of all hikers were aged under 30 and more than three quarters under 40.

Nationality

- Hikers' nationality distribution was approximately 1:4 New Zealand/International, with the latter grouping comprising almost entirely Western countries, especially Europe.
- Internationals predominated at the most popular, high-profile trails, whereas New Zealanders predominated at the more demanding trails.

Normal Country of Residence

- The distribution of hikers' normal country of residence closely paralleled that of nationality.

1.3.3 Summary of Psychographic Profiles

- Overall, there are notable differences between the psychographics of New Zealand and International respondents across a range of variables.

Group Size:

- Distribution across group sizes was significantly different between groupings. Internationals were far more likely than New Zealanders to choose to hike either solo or in pairs, with four out of five Internationals hiking in groups of one or two.
- International hikers were almost exclusively hiking with other Internationals likely to be similarly lacking in skills and experience in hazard and risk management in the New Zealand back country.

Group Type

- For both International and New Zealand hikers, over half of all groups of two or more were *'Family/couple'* group type, followed closely by *'Friends'*.
- Familiarity and social cohesion between group members can typically be expected to be greater for *'Family/couple'*, and may manifest in different behaviours relating to risk-taking and responding to misadventure.

Decision Horizon

- New Zealander hikers tended toward longer decision horizons than International hikers. The ratio of 'immediate' to 'short/medium' term decisions was approximately 1:4 for New Zealanders, compared with 1:3 for Internationals, the latter more likely to be acting within greater time constraints.
- Each decision horizon has potentially positive and negative implications for risk management. Typically, decisions made in the immediate-term are more spontaneous and opportunistic, whereas those over the short/medium-term are more planned and committed.
- Day-hikes have shorter decision horizons than multiday hikes. The greater the popularity and status of a hike, the longer the decision horizon tends to be.

Information Sources Used

- New Zealand and International hikers both used an average of three different sources of trail information.
- Of twelve sources of information used, the top three were the same for both New Zealand and International hikers: *'Family/friends'*, *'DOC website'* and *'People I met who have done the hike'*.
- Combined use of all six 'official' sources of trail information was very similar to that of the six 'unofficial' sources, both for New Zealand and International hikers.
- Use of each of three information channels was also very similar across International and New Zealand hikers, with F2F sources accounting for approximately half of all use, followed by digital and print.
- Overall, use of unofficial F2F sources predominated for both hiker groupings.
- Combined use of DOC's three official information channels *('DOC website', 'DOC Visitor Centres', 'DOC brochure')* accounted for just over a third of total use of all sources by both New Zealand and International hikers.
- More than half of International hikers visited the DOC Visitor Centre (DOC VC) nearest the trail prior to undertaking the hike, compared with only a third of New Zealand hikers.
- Hikers who had previously hiked the trail were less inclined to visit compared to first-time hikers. Less than half of both hiker groupings sourced information about the hike when visiting the associated DOC VC.

1.3.4 Summary of Sociographic Profiles

- Overall, there is a high-level of consistency between New Zealand and International respondents across most questions, indicating that hiker sociographic characteristics are broadly universal.

Use of Social Media/User Generated Content (UGC)

- Both International and New Zealand hikers use of social media platforms as sources of trail information ranked in the bottom half of the twelve sources used.
- *'Facebook'*, *'YouTube'* and *'Instagram'* were the top three social media sites used by both hiker groupings.
- The distribution in use of six unofficial apps was the same for both hiker groupings, with *'Campermate'* highly dominant, followed by *'Rankers'*.
- International hiker use of *'Campermate'* was more than 13 times higher than New Zealand, and *'Rankers'* use three times higher.
- New Zealand hikers' use of the official *'MetService'* app was four times higher than that of International.
- All five generic types of social media users were represented amongst hikers using *'Social media sites'* and *'Mobile information apps'*, with the digital footprint of many including contributions of UGC.
- Apps built around *'Commercial tourism operators'* marketing content supplemented by unofficial UGC were preferred by International hikers but received minimal use by New Zealand hikers.
- Moderation of UGC is typically largely left to users and contributors.

Information Sources Trusted

- New Zealand and International hikers rated trust in 10 of the 12 information sources essentially identically, with ratings for all information sources falling on or above the scale mid-point.
- Only *'DOC website'* and *'DOC Visitor Centres'* rated *'Trust totally'* by both New Zealand and International hikers, with *'MSC website'* also receiving the highest rating from New Zealand hikers.
- Both International and New Zealand hikers' rated their trust in *'Family/friends'* very close to *'Trust totally'*, and far higher than all other unofficial sources.
- For official sources, both hiker groupings reported significantly more trust in *'DOC Visitor Centres'* and *'DOC website'* than *'i-Site Visitor Information Centres'* and other *'Official websites'* respectively.
- International hikers rated their trust in *'Mobile apps'* significantly higher than New Zealand hikers.
- All three DOC sources – and channels - of information were very highly trusted by both International and New Zealand hikers. This has significant operational implications regarding maintaining the currency and accuracy of DOC information, especially for DOC VCs.
- Overall, reported degrees of trust in information sources generally did not correspond to the reported levels of use by either hiker grouping.

1.3.5 Summary of Risk Profiles

- Overall there is a high-level of consistency between New Zealand and International hikers across all questions, reinforcing the observation that hiker characteristics are broadly universal.

Backcountry Familiarity

- Prior experience of hiking in the New Zealand backcountry was very high for New Zealand hikers.
- The large majority of International hikers reported prior experience, indicating they are hiking more than once while in New Zealand.
- One in five International hikers reported no familiarity with the New Zealand backcountry, a level of inexperience nearly three times higher than New Zealand hikers.
- Of hikers reporting *'No'* familiarity with the New Zealand backcountry, a quarter of New Zealand respondents and more than a third of Internationals were hiking solo.

Site Familiarity

- Just over half of New Zealand hikers were undertaking the trail for the first time, compared with nearly all Internationals.
- For International and New Zealand hikers who had previously visited the site, the distribution across the different previous visit intervals was very similar, the most common interval being *'Within last 5 years'*.
- Repeat visitation is a strong indication that hikers' previous trail experience was sufficiently unproblematic and rewarding to warrant repetition and/or introduce someone else to the trail.
- The dynamic nature of the New Zealand backcountry is such that familiarity with a trail may not necessarily translate into enhanced risk management by hikers, and may work to the contrary.
- Most International hikers will never return to the trail, yet can be expected to become sources of unofficial information via F2F and/or digital channels.

Group Familiarity

- Group familiarity was very similar for New Zealand and International hikers.
- Approximately one quarter of those hiking in groups of two or more had no previous hiking experience with their companions.
- Of hikers with no familiarity with companions, one in six New Zealand hikers and one in ten Internationals rated their own skill levels as *'No skills'* or *'Beginner'*.
- Familiarity with companions does not necessarily equate to an understanding of others' competencies regarding hazard assessment, risk management and dealing with adversity.
- Of those hiking alone, nearly one in five had not previously hiked alone.
- The proportion of all International hikers undertaking their first solo hike on the research trails was nearly double that of all New Zealand hikers.
- Approximately one fifth of New Zealand hikers and more than a quarter of International hikers chose to hike solo, with many preferring to do so.

Risk Preferences

- New Zealand and International hikers shared a very strong preference to *'Avoid'* risk, while also sharing a slight preference to *'Encounter'* some risk.
- Hikers often hold *'Avoid'* and *'Encounter'* perspectives simultaneously, and risk preferences can be represented as a function of the two.

- Hikers acknowledge there is a 'baseline' level of risk associated with hiking in the backcountry, and encountering this level of risk is acceptable relative to the benefits obtained.

Skill Self-Assessment

- Overall, New Zealand and International hikers' skill self-assessments were distributed similarly across the scale, with *'Intermediate'* and *'Advanced'* skill levels together accounting for over three quarters of both hiker groupings.
- The average skill level of International hikers is significantly higher than that of New Zealand hikers, potentially translating to a greater 'margin for error' on the trail.
- Nearly half of New Zealand hikers assessed their skill level as *'Intermediate'* while the same proportion of Internationals assessed their skill level as *'Advanced'*.
- In general, the self-assessments strongly indicate that both New Zealand and International hikers are choosing to undertake trails appropriate for their competencies.

Frequency of Activity

- Under half of New Zealand and nearly three quarters of International hikers undertook more than five hikes in the previous 12 months.
- On average, International hikers are likely to be more experienced, skilled and physically fit than the average New Zealand hiker.

History of Misadventure

- The proportion of New Zealand and International hikers who had previously suffered misadventure were essentially identical across all three types of misadventure.
- Becoming *'Lost'* was by far the most common misadventure.
- For both hiker groupings, the rate of being *'Lost'* was nearly nine times greater than the rate for being *'Seriously injured'*, indicating that the large majority of *'Lost'* incidents do not result in hikers needing to be *'Rescued'*.
- Of hikers who had previously suffered a misadventure, nearly one third of New Zealand hikers had suffered multiple misadventures, compared with just over one tenth of Internationals.
- Overall, there is a baseline level of misadventure for the population of hikers who undertake more challenging trails.
- Established assumptions driving ongoing investment in the design and delivery of initiatives seeking to reduce the rate of serious incidents and accidents can be expected to generate diminishing returns.

Preparedness

- Overall, hikers' pre- and post-hike self-assessments of preparedness relative to nine statements were very similar for both International and New Zealand hikers.
- Pre- and post-hike distribution of ratings of agreement with the statements was also very similar across both hiker groupings.
- Almost all statement ratings fell within, or very close to, the 'ideal' *'Agree totally'* range.
- The consistency of pre- and post-hike ratings across preparedness statements and both hiker groupings strongly indicates the large majority of hikers understand the demands of the trails they are undertaking, and choosing trails appropriate for their competencies.

- Generic risk messaging from official sources, likely reinforced by unofficial sources, is positively contributing to hikers adopting appropriate risk-mitigating behaviours.
- With the exception of a few minor injuries, virtually all respondents' hiking experiences unfolded as expected and without any adverse events.
- Agreement with one statement - *'I have/had everything I need/ed to survive a night in the open'* - rated significantly lower than all other statements, and also experienced a strongly negative shift between pre- and post-hike agreement ratings.
- There is a stark difference in the mindset of hikers undertaking day hikes with those undertaking multi-day hikes, such that day-hikers have a significantly reduced probability of surviving an unexpected night in the open.

Safety Management

- Ten safety management statements were sequenced and differentiated into 'Belief', 'Attitude' and 'Behaviour'.
- Eight statements reported meaningful differences between pre-hike and post-hike agreement ratings for at least one hiker grouping.
- The agreement ratings of the two 'Belief' statements were very similar across International and New Zealand hikers.
- Ratings of 'Belief' statements were essentially unchanged post-hike from pre-hike, indicating hikers' beliefs about the relationship between safety and the presence of people were not challenged by their trail experience.
- For two 'Attitude' statements, New Zealand hikers' pre-hike ratings were effectively unchanged post-hike, whereas International hikers experienced slight shifts.
- The two other 'Attitude' statement ratings were markedly different post-hike for both hiker groupings.
- Attitude towards DOC *in-situ* safety messages/signs/markers declined substantially post-hike, with many hikers considering the messaging largely irrelevant to them.
- The rating differences indicate hikers' lived experiences have the potential to modify their attitudes to managing their own safety.
- Three of four 'Behaviour' statements reported significant shifts between pre-hike and post-hike ratings.
- International hikers put greater 'reliance' on DOC and companions for their safety than New Zealand hikers, and were significantly less likely to be able to rapidly alert 'emergency' services, if at all.
- The strongly positive ratings shifts for the two 'reliance' behaviour statements indicate *ex post facto* attribution: completing the hike without encountering any adversity led hikers to attribute their achievement to their own ability and effort.
- This positive ratings shift also indicates hikers felt they had greater agency over their own safety post-hike than they did pre-hike.
- Solo hikers report lower agreement ratings for the reliance statements than hikers in groups of two or more, indicating soloists are more self-reliant and moderating of their risk-taking behaviour.
- For the two 'emergency' behaviour statements, International hikers reported markedly poorer ratings for their ability to summon help or have third parties do so on their behalf, than New Zealand hikers.
- International hikers also reported a significant post-hike decline in agreement ratings pertaining to communications.

- International hikers are less inclined than New Zealand hikers to carry satellite-based communications technologies, preferring to rely on less reliable cellular coverage.
- The differences between post-hike and pre-hike ratings indicate hikers' lived experiences have the potential to modify their behaviours to better manage their own safety.
- Both International and New Zealand hikers need to make a significant shift towards 'ideal' behaviours in order to improve the success rate of SAR incidents.

Challenge Assessment

- Overall, New Zealand and International hikers rated the challenge very similarly, pre- and post-hike.
- Over half of all hikers assessed trails as *'Moderately'* challenging, both pre- and post-hike.
- The very close similarities between the scale distribution of pre- and post-hike ratings for both International and New Zealand hikers strongly indicates that the two groupings share a common frame to assess and evaluate the degree of challenge presented by a trail.
- Hikers use the same assessment frame irrespective of whether or not they are hiking alone or as a member of a group.
- The assessment frame shares sufficient commonality amongst all hikers that it can be confidently used to inform risk perception and safety messaging.

Risk Assessment

- Overall, the distribution of research trail risk assessments across the Paling Perspective Scale was very similar for both International and New Zealand hikers.
- International hikers consistently assessed the degree of risk somewhat lower than New Zealand hikers, although this difference is not indicative of more problematic outcomes.
- Nearly two thirds of New Zealand hikers assessed risk higher than the general population's 'comfort' zone (*'Zero'* to *'Low'* risk), compared with less than half of International hikers.

Injury

- Injury rates on the research trails were consistent with other DOC visitor research across a range of sites.
- On a per individual hiker basis, injuries to members of New Zealand-led groups occurred at nearly three times the rate of International-led groups.
- The reported injury rate for groups of two or more was more than four times that of solo hiking groups.
- For both New Zealand and International hikers, all injuries resulted from walking across uneven or unstable trail surfaces, comprising direct injury to leg and ankle joints from twists and rolls, and indirect injury from falls as a result of slips and trips.
- All groups were able to self-evacuate their injured members, although any and/or all of these incidences could conceivably have resulted in a SAR event.
- Injury rates may be inversely related to skill and activity levels, with more than half of injury group respondents self-rating their skill as *'Advanced'*, and nearly three quarters having hiked *'Five'* or *'More than five'* times in the previous year.
- Familiarity with the New Zealand backcountry may be a driver of injury and SAR incidents at these sites.

1.3.6 Overall Observation

Overall, there is a high-level of consistency between New Zealand and International hikers across most questions, reinforcing the observation that hiker characteristics are broadly universal.

As such, generic risk messaging is equally effective across all nationalities. Tailoring these messages for different channels, especially digital, should therefore be undertaken with caution to ensure this is not counterproductive to improving risk perception and enhancing risk mitigating behaviours.

2 Introduction

In September 2018, the Te Papa Atawhai/Department of Conservation (DOC) entered into an agreement with Rapu Whakarauora Aotearoa/New Zealand Search and Rescue (NZSAR), under the terms of which DOC undertook to design and implement a programme of research into:

- Visitors' perceptions of risk at a selection of sites on Public Conservation Lands (PCL); and
- The influence of risk-related messaging both at, and removed from, those sites.

DOC's Design & Evaluation Team (D&E) was tasked with the design and implementation of the research programme.

2.1 Research Context

There have always been incidents in the outdoors involving people who lack the skills for where they choose to go. With the growth in tourism numbers and the increasing influence of social media, there is a growing trend of more visitors with lesser skills going to DOC sites that are intended for more skilled visitors. While the overall reported accident and incident numbers on Public Conservation Lands (PCL) show slow growth (NZSAR data 2010-2017), the data also show steady growth in accidents to hikers classified as international visitors. These data are backed up by the observations of DOC staff in the field.

Recent DOC visitor accident investigations (Gertrude Saddle x2, and Rabbit Pass), the preliminary results of some survey work on Tongariro, and some earlier work at Franz Josef and Fox Glaciers, indicate that visitors' understanding of risks at place, and their decision-making regarding those risks, are contributing to accidents. Knowing more about where visitors source information on risks at place, how they perceive those risks relative to their own safety, and what influences their risk-related decision-making, should assist in the provision of more effective messaging and mitigations to reduce both the frequency and rate of accidents.

Initiatives to reduce incidents and accidents on PCL are constantly being implemented at place. These vary from the standard messaging mandated by DOC's Visitor Risk Management System, to novel interventions such as the 'Bas' signs and numbered poles on Mt Taranaki Summit Track, to the explicit warning signs at Cascade Saddle and Gertrude Valley. Off-site initiatives include the joint DOC/Tourism New Zealand 'Tiaki Promise' campaigns over the 2018/19 and subsequent summer seasons that broadcast behavioural change messages, and the New Zealand Mountain Safety Council's (MSC) on-line 'Alpine Tramping' safety videos; however, formal evaluation of these initiatives in the field is limited, and consequently their efficacy is largely unknown. Furthermore, how well these 'official' messages compete with the increasing availability of informal, unofficial messaging is equally unknown.

2.2 Purpose

The purpose of the Visitor Risk Perception and Messaging Influence Research Programme (the Programme) is to:

- Gain greater understanding of visitors' perception of risks at place, and how much risk they think they are exposed to;
- Identify where visitors get their information from, and what influence that information has on visitors' risk-related decision-making.

To achieve this, the Programme was required to gather visitor data as follows:

- Demographic, psychographic and sociographic profiles;
- Dimensions of risk-perception and evaluation;
- Identification and salience of influences on risk behaviours.

The Programme's findings are intended to inform subsequent initiatives aimed at reducing backcountry incidents and accidents involving visitors, especially international visitors.

3 Research Design

The following section describes the core elements of the Programme's research design.

3.1 Methodology

Consistent with the purpose of the Programme, the research set out to establish the degree to which a range of variables influence the at-place risk-related behaviours and decision-making of visitors to Aotearoa/New Zealand's mountains. A quantitative research methodology was therefore adopted for the research.

3.2 Research Sites

3.2.1 Sites

Surveys were undertaken at a total of seven sites distributed across seven National Parks. The survey sites were selected by NZSAR for their history of incidents and accidents, as well as their known preference with the international visitor demographic of greatest concern. The sites are listed in Table 1.

Table 1: Schedule of survey sites

DOC Track Name	National Park
Angelus Hut Route (Robert Ridge)	Nelson Lakes
Avalanche Peak Track	Arthur's Pass
Cascade Saddle Route	Mt Aspiring
Gertrude Saddle Route	Fiordland
Mt Taranaki Summit Climb	Egmont
Mueller Hut Route	Aoraki/Mt Cook
Tongariro Alpine Crossing	Tongariro

In terms of general characteristics, all sites comprise tramping/hiking trails that commence from a valley floor, and continue above the bush-line into the alpine zone to access either a saddle, ridge or peak. The trails start out as formed tramping tracks, becoming poled/marked routes in the alpine zone. All trails are considered straightforward if done in good weather, winter conditions notwithstanding.

3.3 Data Collection Methods

3.3.1 In-situ surveying

Visitor surveying was undertaken at trail heads. Survey instruments and methods deployed in the Programme comprised:

- Questionnaires – distinct 'Pre-hike' and 'Post-hike' versions;
- Graphic material (Paling Perspective Scale);
- Intercept surveying

Questionnaires

The hardcopy 'Pre-hike' and 'Post-hike' questionnaires (refer Appendix 1) were administered at each survey site by a single surveyor. One questionnaire was administered per visitor group and completed by a single respondent chosen by the group.

The questionnaires comprised both sides of a single A4 sheet and designed to be self-completed within five minutes by visitors with basic English-language skills. The surveyor was available to help respondents with interpretation of questions, and if requested to do so, was permitted to enter respondents' responses into the questionnaire on the respondent's behalf.

Graphic Material

A graphic depiction of the Paling Predictive Scale (refer Appendix 2) was used in the 'Pre-hike' survey. The Paling Scale graphically stratifies the risks of daily living based on each risk's probability of occurrence, with the scale's mid-point of zero set at one chance in one million. A selection of commonly understood risks are located on the scale to assist respondents to calibrate their perception of the risk associated with the activity of interest – in this research, that activity is a hiking trip into the alpine zone.

The Scale was an adjunct to the 'Pre-hike' questionnaire, with respondents asked to evaluate the level of risk they believed they were taking at the site. The Scale was not used in conjunction with the 'Post-hike' questionnaire as the instrument was not designed to capture ex post facto perceptions of risk-taking; any use of the Scale in this way would introduce bias into the data.

Intercept Surveying

Survey respondents were recruited using the intercept method at six of the seven sites. This involved DOC-uniformed surveyors being positioned at trail heads and inviting outbound and inbound visitors to participate. To avoid distracting visitors from engaging with any signage at the trail head and thereby potentially influencing their pre-hike responses, the surveyors positioned themselves inconspicuously a short distance up the trail, typically within the first 100 metres. The exception was Cascade Saddle Route, where survey respondents were recruited via invitations posted inside Aspiring and Dart Huts (see Appendix 3).

3.4 Sampling Design

3.4.1 Target Population

The target population for the research comprised:

- All visitors to the specified survey sites.

3.4.2 Sampling Frame

The sampling frame for the target population was:

- All visitors aged 18 years or over entering or exiting the survey sites.

Visitors who responded to the 'Pre-hike' questionnaire were excluded from responding to the 'Post-hike' questionnaire – i.e., each respondent was limited to one response.

3.4.3 Sampling Technique

A probability (random) sampling technique was employed at six of the seven survey sites. This technique requires the surveyor to intercept the 'next available respondent', and typically experiences very low refusal rates when surveyors are dressed in DOC uniforms.

Angelus Hut Route

Due to unique site factors, the 'Post-hike' questionnaire was not administered at the Angelus Hut Route site. This site offers walkers five popular alternate exit routes from the primary destination of the walk, Angelus Hut. Consequently, there was little confidence that sampling from the small proportion choosing to return to the Mt Robert carpark could potentially introduce bias into the data.

Cascade Saddle Route

Due to its distance from road ends, the Cascade Saddle Route presented a particularly difficult location for surveyors to access. This, along with the small numbers undertaking the crossing each summer, made intercept surveying unviable. Instead, consistent with the predominant direction of travel, 'Pre-hike' questionnaires were left in Aspiring Hut and 'Post-hike' questionnaires at Dart Hut, with an invitation to hikers to respond. Unlike intercept surveying, this technique generates a self-selected sample that should be considered non-probabilistic in nature.

3.4.4 Sampling Frequency

Surveying was scheduled to take place from December 2018 to February 2019 and continue at each site until the target sample size was achieved. To ensure the sample represented visitation over the duration of the summer season, surveying at each site was to be undertaken over several iterations.

The eventual frequency of in-situ intercept surveying is shown in Table 2. These frequencies represent per-site averages of 3.7 survey iterations and 9.7 days visitor interception over the season.

Table 2: Survey frequency by site

Site	# Survey Iterations	Total # Days In-situ
Angelus Hut Route (Robert Ridge)	3	9
Avalanche Peak Track	6	14
Cascade Saddle Route	N/A	N/A
Gertrude Saddle Route	2	7
Mt Taranaki Summit Climb	4	12
Mueller Hut Route	3	8
Tongariro Alpine Crossing	4	8

3.4.5 Sample Size

Target Sample

The target sample size for each site was:

- Minimum of 200 fully completed questionnaires;
- Maximum of 400 fully completed questionnaires.

The sample size was capped at 400 because larger samples are subject to diminishing rates of return on data-gathering investment, given a sample of this size will yield a 5% Margin of Error (MoE) at the 95% Confidence Level (CL) - a typical benchmark for social research.

Actual Sample

Survey respondents completed a total of 1,423 'Pre-hike' and 'Post-hike' questionnaires at the seven sites, as shown in Table 3. Demographic data were gathered for each respondent, plus up to three other members of the respondent's group. On average, each questionnaire captured demographic data for 2.0 persons, yielding a combined total sample of 2,889 visitors entering and exiting all survey sites.

Table 3: 'N' respondents by site

Site	Intercept Location	'N' Pre-	'N' Post-	'N' Total
Angelus Hut Route (Robert Ridge)	Mt Robert car park	96	N/A	96
Avalanche Peak Track	Arthur's Pass Visitor Centre	169	141	310
Cascade Saddle Route	Aspiring Hut (Entry) & Dart Hut (Exit)	15	21	36
Gertrude Saddle Route	Milford Highway car park	85	68	153
Mt Taranaki Summit Climb	North Egmont car park	212	75	287
Mueller Hut Route	Sealey Tarns Track trail head	93	103	196
Tongariro Alpine Crossing	Mangatepopo & Ketetahi car parks	228	177	405
Totals		898	525	1,423

Capturing the maximum sample size depended upon the number of visitors present on survey days, the suitability of weather conditions for field work, and the availability of surveying hours. Predictably, the sites most popular with visitors yielded the highest number of responses, with Tongariro Alpine Crossing the only site to yield the maximum target of 400 responses. Two further sites (Avalanche Peak Track and Mt Taranaki Summit Climb) yielded the target minimum of 200 responses, with one other (Mueller Hut Route) very close to doing so. The remaining three sites failed to reach the target minimum sample size.

While a probabilistic sampling technique was used at the intercept survey sites, the flow of potential respondents was sufficiently spread out to enable a census to be achieved on almost all days; the exception being Tongariro Alpine Crossing. The refusal rate averaged under 2% of all intercepts.

Statistical Accuracy

Across all sites, the aggregate sample size of 1,423 yields statistical accuracy of 3.5% MoE and 99% CL. At the individual site level, levels of accuracy at 95% CL range from 5% MoE for Tongariro Alpine Crossing to 10% MoE for Angelus Hut Route.

The very small sample for Cascade Saddle Route should be considered relative to the estimated population of 300 hikers completing the crossing annually; however, as noted earlier, this sample should be regarded as non-probabilistic.

Non-sampling Error

A number of factors impacted on the consistency of sampling across the seven sites, resulting primarily in coverage errors. Generally, geographic isolation and weather were the greatest obstacles to undertaking field work, resulting in Avalanche Peak Track being the least

challenging site to sample and Cascade Saddle Route site the most. As the season progressed, the period of field work was extended beyond February to increase response numbers, requiring surveying to continue into early May at some sites; in the case of Gertrude Saddle Route, this was also done to capture the influence of changes to signage at place.

3.5 Information Management

3.5.1 Quality Assurance

To minimise errors introduced during the process of collecting and curating data, and to ensure the quality of data is known, established standardised and robust quality assurance (QA) and quality control (QC) processes were used.

Following each site visit, the completed hardcopy questionnaires were scanned to a dedicated D&E file library at the nearest DOC office and then couriered to DOC's Christchurch office for digitisation and storage. On occasions when surveyors were returning to DOC Christchurch, they delivered questionnaires, scanned them, submitted them for digitisation.

3.5.2 Data Digitisation, Curation & Security

To digitise the questionnaires, identical digital templates of the hardcopy questionnaires were first created in the web-based survey service, SurveyMonkey. D&E's data entry technicians then transcribed the data from the hardcopies to the templates to create a fully secured and curated digital data file. Access to the data file is restricted to, and controlled by, D&E technicians.

These data were later subjected to a QA audit of SurveyMonkey entries to verify transcription errors were within the prescribed tolerances. Any errors were corrected in SurveyMonkey prior to analysis commencing.

3.6 Analytical tools

A range of analytical tools have been used to deliver the various reporting formats.

3.6.1 Intercept Questionnaire

Initial statistical analysis was undertaken in SurveyMonkey, with subsequent analysis in Excel. Further specialist statistical analysis by D&E uses 'R' and 'RMarkdown' scripts in the preparation of more complex quantitative results.

3.7 Programme Quality

3.7.1 Supervision

Personnel Safety & Wellbeing

The safety and wellbeing of surveying personnel remained the responsibility of D&E at all times over the duration of the field work. A single surveyor undertook the surveying at each site; excluding Cascade Saddle as already noted.

Technical Oversight

D&E was responsible for all technical aspects of the Programme and maintained regular contact with the surveyors to provide ongoing oversight. A review of the research design was undertaken with the surveyors following the first week of surveying; no modifications to research protocols and methods were required.

3.7.2 Ethical Issues

The following four key ethics imperatives when dealing with human subjects were addressed in the research design:

- Informing respondents;
- Protecting respondents;
- Benefits to respondents;
- Ethical responsibilities to interviewer.

3.7.1 Limitations

Beyond the sampling and non-sampling errors discussed above, no other limitations likely to impact on the quality of the Programme were identified.

4 Results

The following section presents the results of the research Programme.

4.1 Interpretation

4.1.1 Segmentation

Given that International visitors have been identified as a population of concern with respect to accidents and incidents in the mountains of Aotearoa/New Zealand, all results have been segmented by *'Nationality'* to best distinguish *'International'* (Int) visitors to the sites from *'New Zealand'* (NZ) visitors.

This segmentation infers non-citizens are different from New Zealand citizens, but there are obvious inconsistencies: some New Zealand respondents may have only recently become citizens, while some non-citizens may have lived in New Zealand for many years and be very active in the mountains. While segmentation by *'Normal Country of Residence'* was considered, on balance *'Nationality'* was determined to be the most practical and ensured compatibility with multiple other data sets.

4.1.2 Metrics

Two metrics predominate throughout this report.

Percentages

The results for most questions are presented as percentages to one decimal point. The actual percentage figures are displayed within the graphic presentation of the results.

Rating Scales

Rating scales are used in several questions. These ordinal[i] scales capture respondents' assessment of the degree to which attributes or qualities are absent or present. The attribute or quality is typically presented as a proposition or statement – e.g., *'How much do you AGREE with the following statements?'*. Three different five-point (0-4) scales are used in the questionnaire, as shown in Table 4.

Table 4: Unipolar rating scales

Scale	Fully Absent	Fully Present
How much agreement?	0 = Do NOT agree at all	4 = Agree Totally
How much trust?	0 = Do NOT trust at all	4 = Trust Totally
How challenging?	0 = Not at all	4 = Extremely

In all scales, a *'0'* rating represents a total absence of agreement, trust, challenge or skill, while a *'4'* rating represents a total presence. The ratings are reported to one decimal point, and the numerical ratings are also displayed within the graphs. Some scales are reported as percentages to reveal the distribution of responses.

The rating scales used in the questionnaire are weighted[ii], with the weighting mirroring the rating scale. The consistent range, gradation, and weighting of the absence/presence scales allows meaningful comparisons to be made across a diverse set of attributes or qualities.

Note: Ratings that differ by 0.1 rating point are not considered significant as this may be due to rounding – e.g., a rating of 3.44 is rounded down to 3.4, while a rating of 3.45 is rated up to 3.5. Correspondingly, differences greater than 0.1 are considered meaningful.

Ratings at or above the mid-point of '2' can be interpreted as representing a greater presence than absence of the attribute or quality in question.

4.2 Respondent Demographic Profiles

Demographics refer to background characteristics of individuals that help define their identity according to groups within the general population.

Note: The demographic data presented below cannot be considered representative of the target population at all survey sites across a calendar year. Surveying took place in early to mid-summer at most sites, with New Zealand visitors predominant post-Christmas through to late January, and International visitors predominating either side of this period. As surveying continued into late summer/early autumn at some sites, the predominance of international visitors increased. Data therefore need to be used with the appropriate proviso.

Nevertheless, overall the demographic profile of the 1,423 survey respondents closely mirrors that of all 2,889 individuals captured by the demographic questions. As such, both *'New Zealand'* and *'International'* segments used hereafter may be regarded as representative of the populations present on the days in-situ surveying was undertaken, and more or less representative of visitors to the sites over the summer season.

4.2.1 Sex

Q1 B: Indicate Sex of group members (1st 4 persons only)

Respondents and other group members were asked to indicate their sex.

Note: Consistent with the most recent census undertaken by Statistics NZ (2018), only *'Male'* and *'Female'* options were provided.

Results

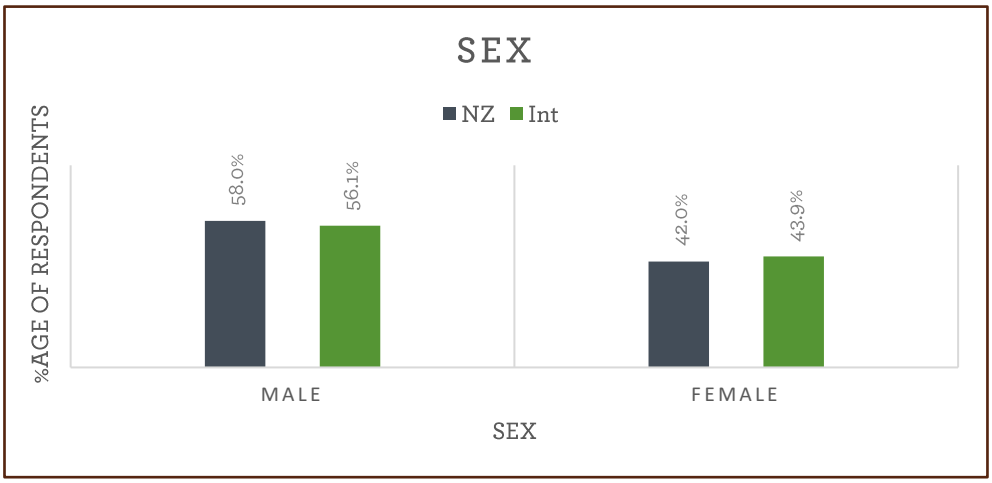

Figure 1: Respondents' sex

Male respondents outnumbered female, with the differential very similar across both nationality groupings (NZ 16%; Int 14%). Males also predominated across all group sizes, with the greatest differential being amongst solo hikers, where males constituted nearly two thirds (64.5%). Across the nearly 2,900 individuals captured by this question, males (54.1%) predominated over females (45.9%) with a differential approximately half (8%) that of respondents.

Discussion

The preponderance of males found across all sites in this survey is unremarkable. Visitor surveys conducted across a diverse range of DOC walking and hiking tracks over many years have invariably found males outnumbering females, although the differential varies according to visitor preferences. For example, the male/female differential found in this survey is nearly double that typically recorded on easier front-country short walks, suggesting that more difficult trails are slightly less preferred by females than their male counterparts.

4.2.2 Age

Q1 B: Indicate Age of group members (1st 4 persons only)

Respondents' and other group members were asked to provide their ages in years. Responses were subsequently assigned to 10-year age brackets.

Results

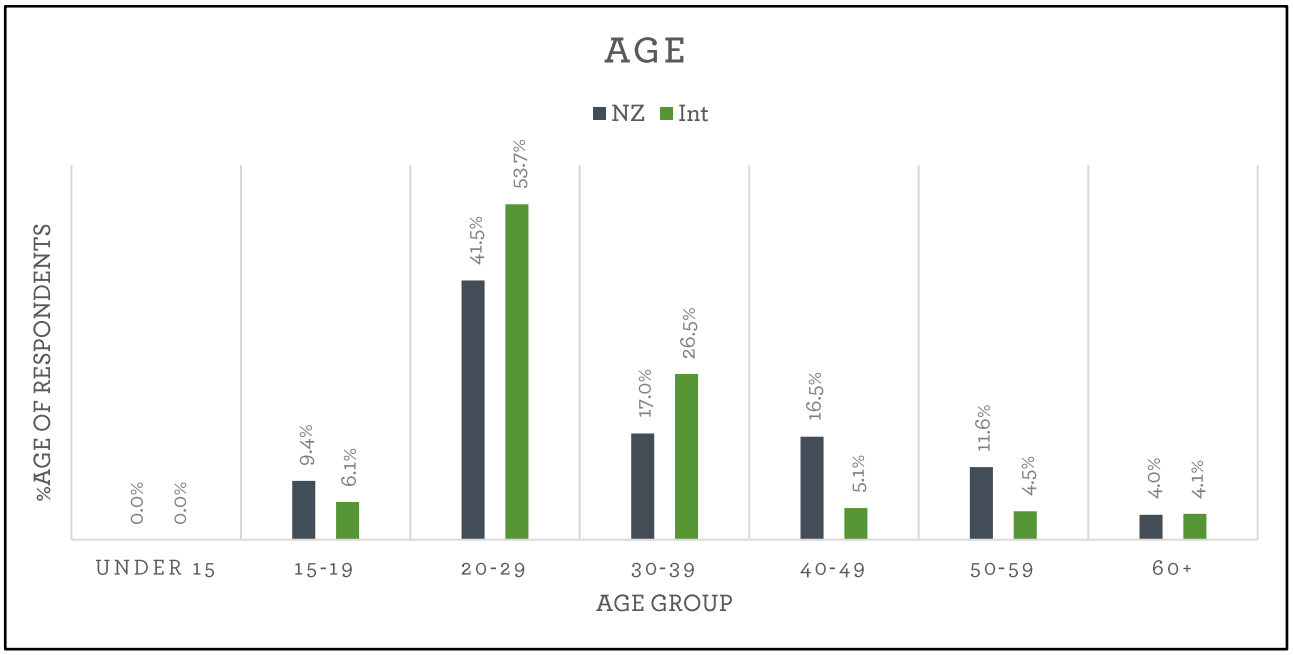

Figure 2: Respondents' age

The 20-29 age bracket dominated New Zealand (41.5%) respondents, and significantly more so International (53.7%), corresponding to over half (51.9%) of all respondents. The next most prolific age bracket was 30-39, with New Zealand respondents (17.0%) again significantly fewer than International (26.5%), corresponding to nearly a quarter (24.9%) of all respondents. Overall, more than two thirds (67.1%) of all respondents were aged under 30, and more than three quarters (83.2%) under 40. This distribution was similar across the nearly 2,900 individuals captured by this question, with almost two thirds (62.9%) of all hikers under the age of 30, and more than three quarters (84.2%) under the age of 40.

At either end of the scale, the 60+ age bracket recorded the smallest proportion of respondents for both nationality groupings (NZ 4.0; Int 4.1), corresponding to 4.1% of all individuals captured by this question, while hikers under the age of 15 constituted just 1.3% of all individuals captured. (Note: The absence of respondents in the *'Under 15'* age bracket is due to privacy requirements, which prohibit interviewing of minors without parental consent).

Discussion

Unsurprisingly, the relative difficulty of the survey trails appears to discourage both New Zealand and International visitors with more limited physical capabilities; specifically, children and the elderly. Nevertheless, the nationality distribution of respondents across age brackets differs significantly. Nearly one third (32.1%) of New Zealand respondents were aged 40 or older compared with less than one fifth (13.7%) of International. In contrast, over three quarters (80.2%) of International respondents were aged 20-39 compared with just over half of New Zealand (58.5%).

This skewing of International hikers to the under 40 age brackets is not reflective of the age distribution of all international visitors to New Zealand, with visitors aged 40 and over outnumbering visitors aged 15-39 by approximately 35%[iii]. While people increasingly prefer less demanding and more sedentary outdoor recreation as they age, the much greater proportion of New Zealanders in the 40-59 age brackets is likely due to greater levels of confidence arising from familiarity with the New Zealand backcountry; International visitors in the same age brackets appear to prefer more sedentary and controlled – i.e., less 'risky' - enjoyment of New Zealand's 'unfamiliar' wilderness. Conversely, disproportionate numbers of International hikers aged under 40 may be interpreted as a preference amongst these age brackets for more active and uncontrolled – i.e., more 'risky' – enjoyment of New Zealand's wilderness.

4.2.3 Nationality

Q1 B: Indicate Nationality of group members (1st 4 persons only)

Respondents' and other group members were asked to provide their nationality. New Zealand nationality was either by birth or by citizenship. Other nationalities were according to passport; where International respondents volunteered they held dual citizenship, they were asked for their preference.

Results

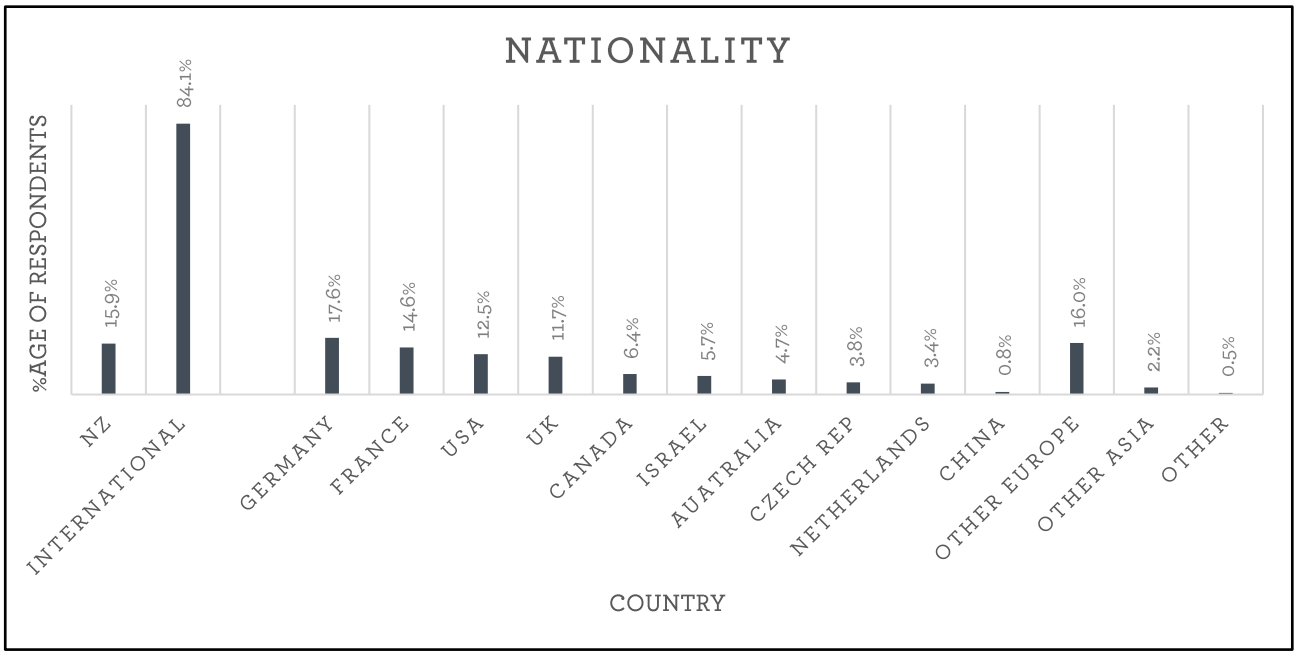

Figure 3: Respondents' nationality

Responses were collected from 49 nationalities. New Zealand was the most common respondent nationality (15.9%), with the balance being foreign nationals (84.1%). With respect to international respondents only, Germany (17.6%), France (14.6%), USA (12.5%), and the UK (11.7%) were the dominant nationalities, accounting for over half (56.4%) of all International respondents. Nationality distribution across the almost 2,900 hikers captured by this question was very similar (NZ 18.6%; Int 81.4%), the slight increase in New Zealand hikers representing International respondents who reported New Zealand members of their groups.

Discussion

Notwithstanding the sampling bias arising from the reduced prevalence of New Zealand nationals following the domestic summer holiday season, German and French were the predominant nationalities amongst respondents at four sites (*Avalanche Peak Track*, *Gertrude Saddle Route*, *Mueller Hut Route and Tongariro Alpine Crossing*) with New Zealanders predominant at three (*Angelus Hut Route*, *Cascade Saddle Route*; *Taranaki Summit Climb*). This distribution is consistent with the known international popularity and profile of the respective trails, with those dominated by internationals all able to be completed as return or through hikes in a single day. In contrast, the trails dominated by New Zealand respondents are generally more demanding, comprising two overnight tramps (*Angelus Hut Route; Cascade Saddle Route*), one of which may also be completed as a return day hike (*Cascade Saddle Route*), and one return day hike (*Mt Taranaki Summit Climb*).

The distribution of international respondents differs markedly from New Zealand's international visitor arrivals. Australian respondents ranked seventh and Chinese sixteenth amongst internationals overall in the sample population; this compares with their respective rankings of first and second for the year ended June 2019[iv]. Consistent with the findings of other research, the popularity of hiking in New Zealand's 'natural' settings is far greater amongst visitors from the Western hemisphere than from the Eastern. In particular, the predisposition of European

cultures for this activity is reflected in the more than two thirds (67.1%) of all International respondents coming from this region.

4.2.4 Normal Country of Residence

Q1 B: Indicate Country of Residence of group members (1st 4 persons only)

Respondents' and other group members were asked to provide their normal country of residence. Those respondents who stated they were on prolonged travel and therefore did not currently have a normal country of residence, were asked to specify the country where they had most recently resided.

Results

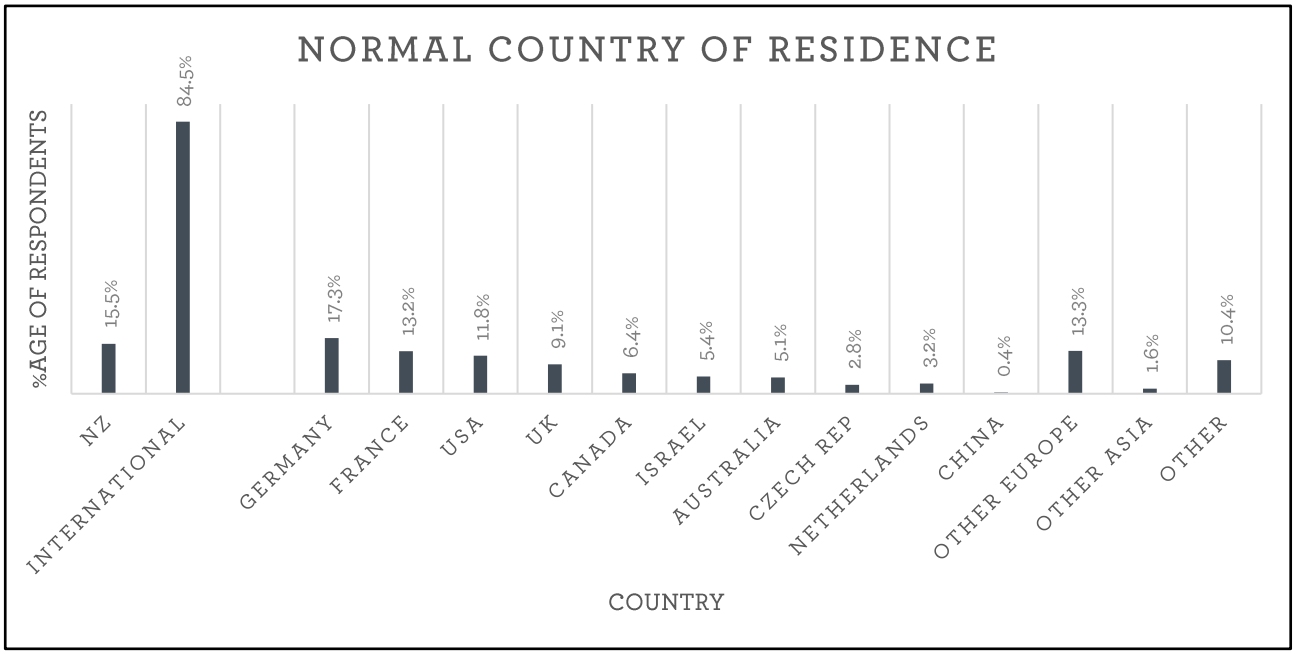

Figure 4: Respondents' normal country of residence

Respondents' normal country of residence unsurprisingly paralleled the nationality results, with the New Zealand/International distribution and country rankings virtually unchanged. The obvious exception was respondents residing in countries *'Other'* than that of their nationality, reflecting the global diaspora. Of all International respondents, 9.3% normally resided in New Zealand, while 6.7% of all New Zealand respondents normally resided overseas.

Discussion

With respect to foreign nationals normally residing in New Zealand, other DOC visitor research has found these respondents are typically younger Internationals travelling New Zealand on work or study visas and collecting the most popular walks and hikes along the way. As they do so, they can be expected to acquire New Zealand-specific skills and experience.

4.2.5 Summary of Demographic Profiles

Overall, the sex and age profiles of New Zealand and International hikers were broadly similar.

Sex

Male hikers predominated across all research trails, with the differential very similar across both New Zealand and International groupings, and nearly double that typically recorded on easier front-country short walks.

Age

The distribution across all age brackets differed significantly between New Zealand and International hikers, with Internationals being younger on average. The 20-29 age bracket was predominant for both New Zealand and International hikers, but much more so for the latter. Overall, more than two thirds of all hikers were aged under 30 and more than three quarters under 40.

Nationality

Hikers' nationality distribution was approximately 1:4 New Zealand/International, with the latter grouping comprising almost entirely Western countries, especially Europe.

Internationals predominated at the most popular, high-profile trails, whereas New Zealanders predominated at the more demanding trails.

Normal Country of Residence

The distribution of hikers' normal country of residence closely paralleled that of nationality.

4.3 Respondent Psychographic Profiles

Psychographics refer to psychological traits that drive individuals' behaviour. Traits typically include: personality; lifestyle; interests; opinions/attitudes/beliefs; and values.

4.3.1 Group Size

Q1 A: How many PEOPLE are in your tramping/hiking party/group (including you)?

Respondents were asked to record the number of individual hikers that comprised their group.

Results

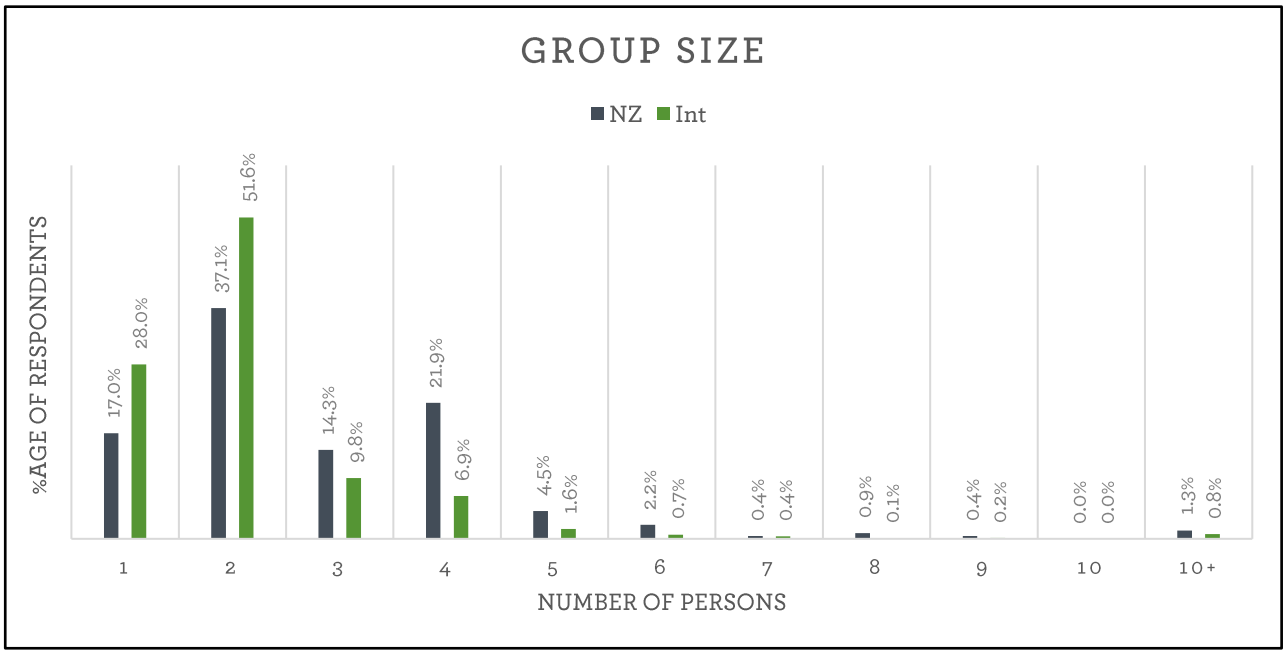

Figure 5: Size of group

Less than one fifth of New Zealand respondents were hiking in groups of *'1'* (17.0%), and just over one third (37.1%) in groups of *'2'*. This compares with more than one quarter (28.0%) of International respondents hiking in groups of *'1'* and more than half (51.6%) in groups of *'2'*. For groups of *'3'* or *'4'*, the proportion of New Zealand respondents (36.2%) was more than twice that of Internationals (16.7%).

Discussion

From a visitor safety perspective, groups sizes of one or two have significantly reduced capacity to manage misadventure on a hike when compared with larger groups. Over three quarters (79.6%) of International respondents were hiking alone or in pairs. For those international respondents hiking in groups of two or more, virtually all were accompanied by companions who were also International visitors, with New Zealand hikers comprising just 3.9 % of these groups. In contrast, International hikers comprised 34.8% of groups with New Zealand respondents. Of the nearly 2,000 (1,999) International individuals captured by the survey who were hiking in a group, New Zealand nationals constituted just 1.7% of those groups' members. This suggests that very few International hikers are benefitting from New Zealand-specific skills and experience in hazard and risk management that New Zealand nationals are more likely to have. This equally applies to familiarity with trails and the wider physical landscape in which they are located.

4.3.2 Group Type

Q1 D: What best describes the nature of your tramping/hiking party/group?

Respondents were asked to assign the most appropriate type descriptor to their group.

Results

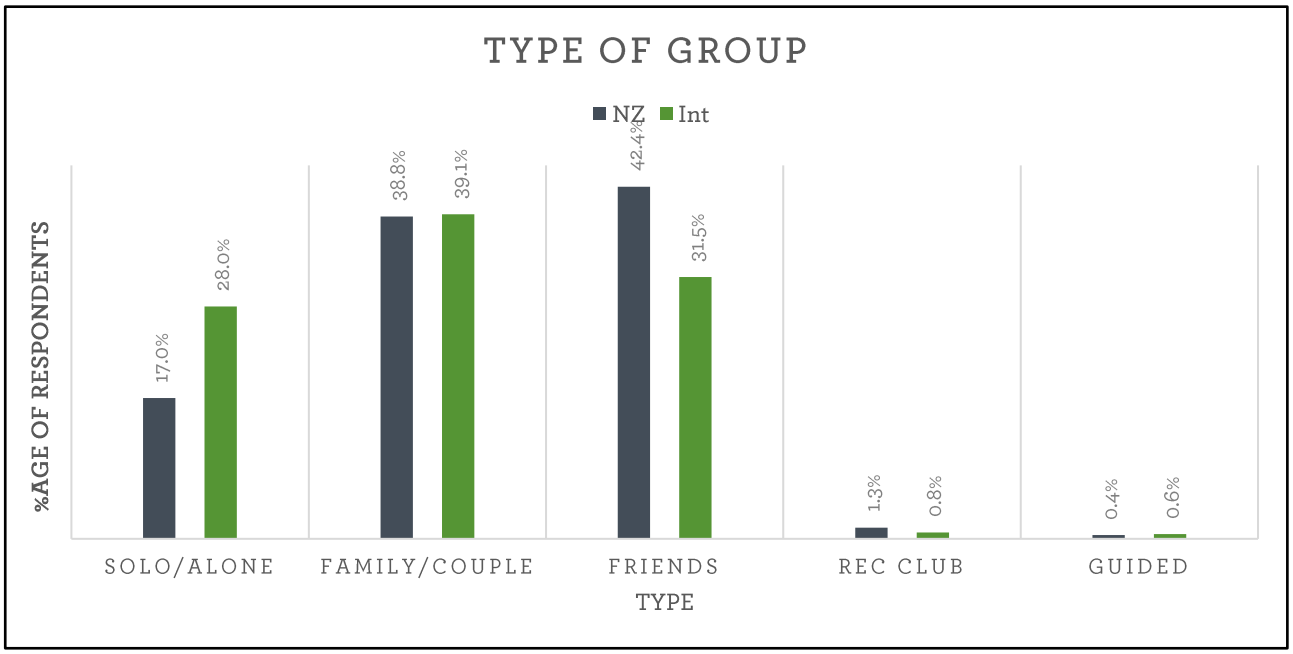

Figure 6: Type of group

Mirroring group size, one fifth of New Zealand respondents (17.0%) and more than one quarter (28.0%) of Internationals were in group type *'Solo/alone'*. Similarly, consistent with the predominance of group sizes of two, overall *'Family/couple'* was the most common group type (NZ 38.8%; Int 39.1%) amongst respondents, followed closely by *'Friends'*. Reflecting the differences in the proportion of respondents in groups of three or more, the proportion reporting *'Friends'* was significantly greater for New Zealand respondents (42.4%) than Internationals (31.5%).

Discussion

When the *'Solo/alone'* group type is excluded, the predominant group type for both International and New Zealand respondents was *'Family/couple'*, with proportions effectively the same (NZ 52.6%; Int 54.8%). The *'Friends'* group type also yielded similarly equal proportions (NZ 45.7%; Int 43.4%). As with group size, some assumptions can be made with respect to the implications for visitor safety of the two dominant group types. Respondents identifying their group as *'Family/couple'* are effectively characterising their relationship to group members as primary and enduring, whereas respondents identifying their group type as *'Friends'* are encompassing a much broader range of relationships, both temporally and emotionally; for example, *'Friends'* relationships may vary from life-long and highly significant to fleeting and inconsequential. In this respect, potentially the most salient difference between *'Family/couple'* groups and *'Friends'* groups are the degrees of familiarity and social cohesion between group members, and how these factors manifest in behaviours relating to risk-taking and responding to misadventure. When compared with hikers in *'Friends'* groups, it is reasonable to surmise that hikers in *'Family/couple'* groups can be expected on average to have known each other longer, and therefore have both greater awareness of the competencies, capabilities and risk preferences of group members, and greater shared commitment to each other's safety and wellbeing. The variable of group member familiarity is examined further below in *'Group Familiarity' (see 4.5.3)*.

4.3.3 Decision Horizon

Q2: When did you decide to make this trip to [site]?

Respondents were asked to indicate the timeframe within which their decision to undertake the hike was made.

Results

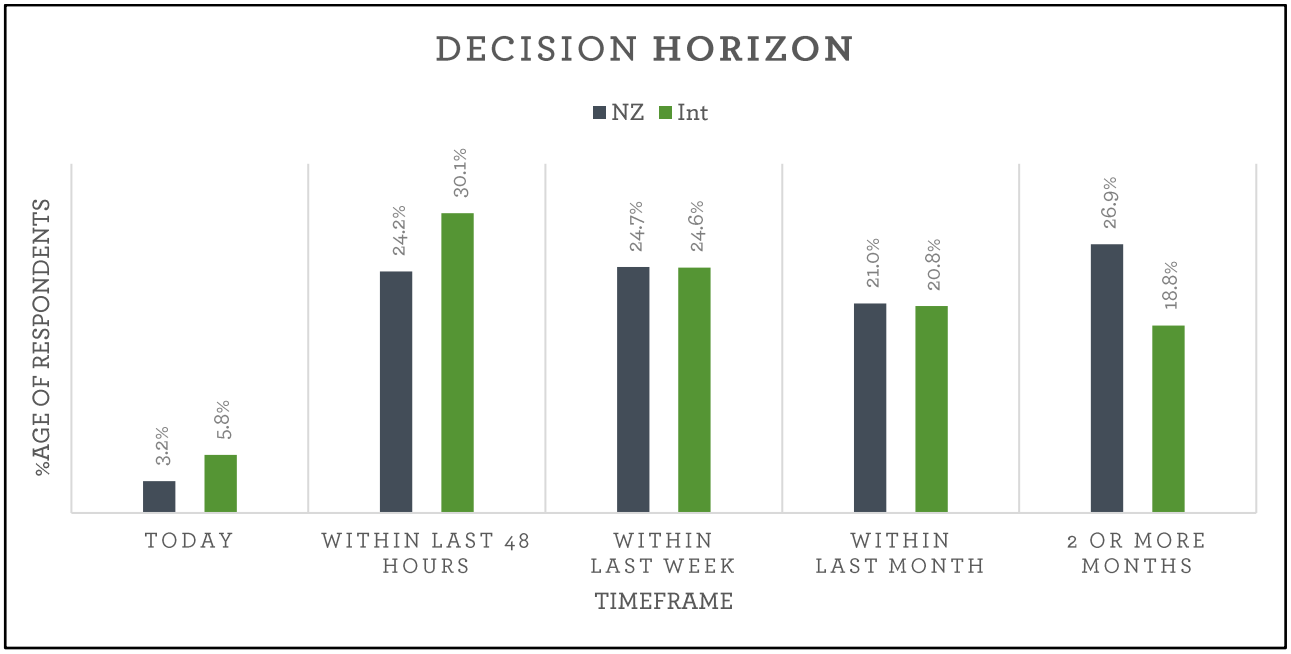

Figure 7: Respondents' temporal decision horizon

Consistent with the duration, difficulty and exposure of the trails, very few respondents committed to undertaking the hike the same day they did so; of those who did decide *'Today'*, the proportion of International (5.8%) was nearly twice that of New Zealand (3.2%). Overall, *'Within last 48 hours'* was the most reported decision horizon (NZ 24.2%; Int 30.1%), followed closely by *'Within last week'* (NZ 24.7%; 24.6%). Decision horizon timeframes can also be grouped into the immediate term *('Today'; 'Within last 48 hours')*, and the balance into the short term *('Within last week')* and medium term *('Within last month', '2 or more months')*. New Zealand respondents' ratio of immediate to short/medium-term decisions was approximately 1:4 (27.4%/72.6%), whereas Internationals was approximately 1:3 (35.9%/64.1%).

Discussion

Some travellers engage in extensive and sophisticated planning, whereas others choose to be more flexible and serendipitous in their behaviours. By asking respondents about their decision horizon to undertake a particular hike – i.e., the amount of time between their decision to undertake a hike and eventually doing so – conclusions can be drawn about the importance that particular trail holds for them and the strength of their commitment to undertake it, as well as the profile the trail enjoys more generally amongst the public. Decisions made in the immediate-term may therefore be represented as more spontaneous and opportunistic in nature, and those made over the short/medium-term as more planned and committed.

The preponderance of immediate-term decisions may also be reflective of New Zealand's unpredictable and extreme alpine weather influencing decision horizons. In the immediate-term, hikers benefit from the observable ambient weather and/or from weather forecasts when at their

most accurate, and so may choose to delay decision-making to minimise uncertainty about weather. From a visitor safety perspective, such condition-based decision-making is regarded as 'ideal' behaviour. Day-hikes can therefore be expected to have shorter decision horizons as people take advantage of weather openings, whereas multiday hikes require greater commitment and are less likely to be influenced by weather. This contrast is exemplified by the difference in the proportion of hikers deciding *'2 or more months ago'* to undertake *Avalanche Peak Track* day-hike (9.0%) and *Angelus Hut Route* multi-day hike (26.6%).

Decision-horizons can also be indicative of the relative popularity and status of the hike in the wider population. In general, highly popular 'iconic' hikes constitute attractions that have sufficient aspirational appeal to influence visitors' choices when planning travel away from their normal place of residence. Consequently, the more iconic the hike, the longer the average decision horizon will tend to be relative to less popular hikes, and the more likely users will commit to capturing the experience and organise their travels accordingly. *Tongariro Alpine Crossing* is the clearest example amongst the trails surveyed, with over one third of respondents (37.4%) deciding *'2 or more months ago'* to undertake the hike. This compares with a relatively unknown similar hike, *Taranaki Summit Climb*, with less than half as many respondents (16.2%) deciding *'2 or more months ago'*. This difference is mirrored in the proportion of International respondents committing to undertaking *Tongariro Alpine Crossing* (36.8%) and *Taranaki Summit Climb* (11.5%) *'2 or more months ago'*.

Approximately 90% of International respondents reported normally residing overseas. Assuming this is generally representative of Internationals hiking the research trails, most can be assumed to be travelling New Zealand under significantly constrained timeframes within which to accomplish their hikes. From a risk perception and messaging perspective, it is well-established that combining limited time with strong commitment to achieve a goal is not conducive to sound decision-making, and can drive an increase in risk-taking behaviours. While New Zealand residents are not immune to such goal-directed compulsions, the option to alter plans and return at a later date will be available to most, and this is likely reflected in the lower ratio of immediate decisions to short/medium-term decisions compared with Internationals.

4.3.4 Information Sources Used

Q3 B: Indicate which sources of information you used for THIS trip to [site].

Respondents were asked to select from a list of 12 sources of trail information, the source/s they used prior to, and during, their hike of the trail.

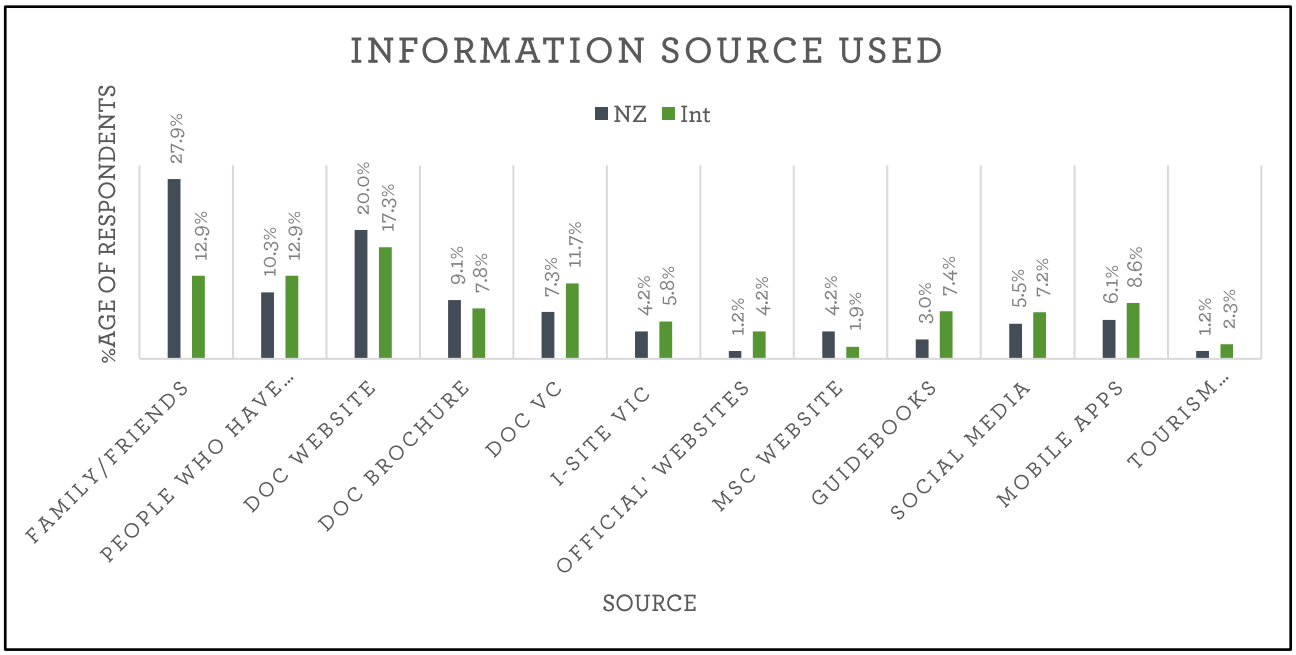

Figure 8: Sources of site information used by respondents

The top three sources of information used were the same for both respondent groups. For New Zealand respondents, *'Family/friends'* alone accounted for more than a quarter (27.9%) of total use, followed by *'DOC website'* (20.0%) and *'People I met who have done the hike'* (10.3%); together, these sources accounted for over half of all New Zealand use (58.2%). All other nine sources recorded less than 10% of total use. In comparison, International respondents' use was more evenly distributed across the same top three information sources, with *'DOC website'* (17.3%), *'Family/friends'* (12.9%), and *'People I met who have done the hike'* (12.9%) together accounting for under half (43.1%) of total use. All other sources again recorded less than 10% of total use, with the exception of *'DOC Visitor Centres'* (11.7%).

Q4: (Before this trip) Did you visit/contact DOC's [nearest] VISITOR CENTRE?

Respondents were asked to indicate whether they visited or contacted the DOC Visitor Centre (DOC VC) nearest the trail prior to undertaking their hike. (Note: All survey trails are located within a National Park, and therefore have an associated DOC VC.)

Results

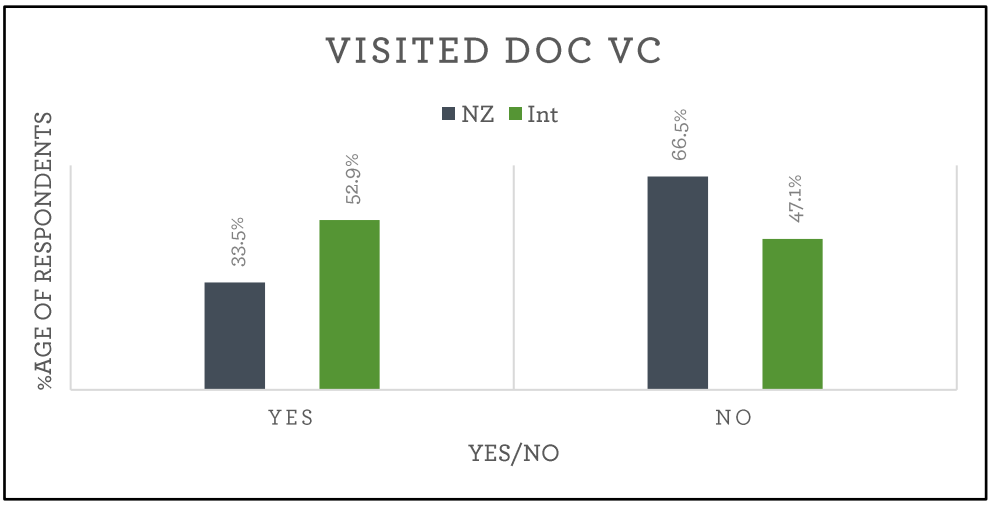

Figure 9: Respondents' use of DOC Visitor Centres

More than a half (52.9%) of International respondents visited the DOC Visitor Centre nearest the trail prior to undertaking the hike, compared with only a third (33.5%) of New Zealand respondents.

Discussion

For the purposes of discussion, the 12 sources of trail information reported here are classified in two ways: *status* and *channel*. Status refers to whether an information source is either *official* or *unofficial*. Official sources are directly or indirectly authorised to provide information at the national or regional level, whereas unofficial information sources are characterised as lacking any recognised authority. Channel refers to the communication medium used by sources to disseminate information, being either *face-to-face (F2F)*, *digital* or *print*; while some sources may use multiple channels – e.g., DOC VCs utilise all three - each source is oriented towards providing information primarily via a single channel. The status and channel assigned to each source is summarised below in Table 5.

Table 5: Status & channel of information sources

Information Source	Status		Channel		
	Official	Unofficial	F2F	Digital	Print
Family/friends		✓	✓		
People I met who have done the hike		✓	✓		
DOC website	✓			✓	
DOC brochure	✓				✓
DOC Visitor Centres	✓		✓		
i-Site Visitor Information Centres	✓		✓		
'Official' visitor/tourist websites (RTOs)	✓			✓	
MSC website	✓			✓	
Guidebooks		✓			✓
Social media sites		✓		✓	
Mobile information apps*		✓		✓	
Commercial tourism operators		✓	✓		

All respondents used multiple sources of trail information prior to undertaking their hike, with the average number of sources used being slightly greater for International respondents (3.2) than New Zealand (3.0).

With respect to status, combined use of all six official sources was very similar to that of the six unofficial sources, although use of the latter was slightly higher for both New Zealand (54.0%) and International (51.3%) respondents. With respect to channels, use of each channel was very similar for both respondent groups, F2F sources accounting for approximately half of all use (NZ 50.9%; Int 45.6%), followed by digital sources with over a third of all use (NZ 37.0%; Int 39.2%), and print sources a little over a tenth of all use (NZ 12.1%; Int 15.2%).

While the predominance of unofficial F2F sources was equally pronounced when considering the top three information sources used by each respondent group, combined use of information channels varied significantly. Within the top three sources, the ratio of unofficial F2F sources *('Family/friends'; 'People I met who have done the hike')* used to official digital sources *('DOC website')* was 2:1 for New Zealand respondents (unofficial/F2F 38.2%; official/digital 20.0%) and 1.5:1 for International (unofficial/F2F 25.8%; official/digital 17.3%). More specifically, use of each of the unofficial F2F sources varied markedly between respondent groups, with New Zealand use of *'Family/friends'* more than double that of Internationals' (NZ 27.9%; Int 12.9%), whereas International use of *'People I met who have done the hike'* was greater than New Zealand (NZ 10.3%; Int 12.9%). This difference may be explained by New Zealand respondents likely having easier access to people with direct knowledge of hikes, whereas International respondents have fewer contacts from whom to source 'first-hand' information.

Furthermore, the predominant use of unofficial F2F sources strongly suggests they provide trail information that cannot be obtained via official digital sources, despite the latter being instantly available at any time and place – internet access notwithstanding. Information distributed by official digital sources is by necessity intended to be broadcast widely and therefore must be more generic and limited in its coverage. In contrast, information obtained from unofficial F2F sources can be as granular and nuanced as the conversation allows, and in this respect can be infinitely customisable to the individual. International respondents' more limited access to unofficial F2F sources with relevant trail knowledge may also partially explain their greater use of unofficial digital sources, with combined use of *'Mobile information apps'* and *'Social media'* being over a third higher than New Zealand (NZ 11.6%; Int 16.0%). Compared with official digital sources, unofficial digital sources may be regarded as more narrowcast than official digital sources in that they are designed for, and informed by, people who share a similar 'digital footprint' and hence content may more closely approximate that obtained via the F2F channel *(see 4.4.2)*.

When considering the definitive source of official trail information, combined use of DOC's three channels *('DOC website', 'DOC Visitor Centres', 'DOC brochure')* accounted for just over a third of total use of all sources by both New Zealand (36.4%) and International (36.8%) respondents. While the combined use of DOC information sources was essentially identical for both respondent groups, use of *'DOC Visitor Centres'* (DOC VC) differed significantly, with International (11.7%) use of the source being greater than New Zealand (7.3%). It is worth noting here that such information is not exclusively available from the DOC VC most closely associated with a trail, but may also be sourced from other DOC VCs prior to journeying to the National Park in which the trail is located.

The options to source information from other DOC VCs and the DOC website may partially explain the relatively minor use of a trail's associated DOC VC to source information about that

trail: less than half of both respondent groups who reported visiting the associated DOC VC prior to undertaking their hike, sourced information about the hike when doing so (NZ 45.2%; Int 41.1%). Furthermore, respondents from both groups who had previously hiked the trail were less inclined to visit the associated DOC VC compared to first-time hikers, although the decline amongst International respondents (9.0%) was much less than New Zealand (24.8%). The above indicates the majority of respondents who visited the trail's associated DOC VC did so for purposes other than sourcing information about the trail.

These differences are noteworthy from a visitor safety messaging perspective given that DOC VCs typically possess the most comprehensive and current information on trail conditions and hazards in their area, along with deeper understanding of local weather patterns; in addition, they provide the opportunity for hikers to customise that information via F2F communication. In comparison, the currency of information on the DOC website often lags behind that of DOC VCs and is more limited in detail, while lack of information currency can be even more problematic with DOC brochures. The explanation for the comparatively low overall use of DOC VCs as a source of information, along with reduced use by repeat visitors, is likely multi-faceted and complex, but nevertheless needs to be understood if DOC VCs are to remain relevant and viable.

The above discussion strongly suggests that information obtained from unofficial F2F and digital sources plays a leading formative role in hikers' pre-hike understanding of the trail, and that this information is typically supplemented by and amalgamated with information obtained from official sources, predominantly digital. However, whether or not and how official sources and unofficial sources may moderate each other, and how hikers integrate and privilege the information they obtain from both, cannot be determined from the responses captured in this research; nevertheless, these constitute questions of fundamental importance to understanding how visitors interpret safety messaging and develop their perceptions of risk.

This discussion is revisited below in the closely associated variable *'Information sources trusted'* (*see 4.4.2*).

4.3.5 Summary of Psychographic Profiles

Overall, there are notable differences between the psychographics of New Zealand and International hikers across a range of variables.

Group Size:

Distribution across group sizes was significantly different between groupings. Internationals were far more likely than New Zealanders to choose to hike either solo or in pairs, with four out of five Internationals hiking in groups of one or two.

International hikers were almost exclusively hiking with other Internationals likely to be similarly lacking in skills and experience in hazard and risk management in the New Zealand back country.

Group Type

For both International and New Zealand hikers, over half of all groups of two or more were *'Family/couple'* group type, followed closely by *'Friends'*. Familiarity and social cohesion between group members can typically be expected to be greater for *'Family/couple'*, and may manifest in different behaviours relating to risk-taking and responding to misadventure.

Decision Horizon

New Zealander hikers tended toward longer decision horizons than International hikers. The ratio of 'immediate' to 'short/medium' term decisions was approximately 1:4 for New Zealanders, compared with 1:3 for Internationals, the latter more likely to be acting within greater time constraints. Each decision horizon has potentially positive and negative implications for risk management. Typically, decisions made in the immediate-term are more spontaneous and opportunistic, whereas those over the short/medium-term are more planned and committed. Day-hikes have shorter decision horizons than multiday hikes. The greater the popularity and status of a hike, the longer the decision horizon tends to be.

Information Sources Used

New Zealand and International hikers both used an average of three different sources of trail information. Of twelve sources of information used, the top three were the same for both New Zealand and International hikers: *'Family/friends'*, *'DOC website'* and *'People I met who have done the hike'*.

Combined use of all six 'official' sources of trail information was very similar to that of the six 'unofficial' sources, both for New Zealand and International hikers. Use of each of three information channels was also very similar across International and New Zealand hikers, with F2F sources accounting for approximately half of all use, followed by digital and print. Overall, use of unofficial F2F sources predominated for both hiker groupings.

Combined use of DOC's three official information channels *('DOC website', 'DOC Visitor Centres', 'DOC brochure')* accounted for just over a third of total use of all sources by both New Zealand and International hikers.

More than half of International hikers visited the DOC Visitor Centre (DOC VC) nearest the trail prior to undertaking the hike, compared with only a third of New Zealand hikers. Hikers who had previously hiked the trail were less inclined to visit compared to first-time hikers. Less than half of both hiker groupings sourced information about the hike when visiting the associated DOC VC.

4.4 Respondent Sociographic Profiles

Sociographics refer to the characteristics that influence how people receive and perceive messages. These characteristics may directly relate to the groups they belong to or privilege, and shape social behaviours associated with information communication.

4.4.1 Use of Social Media/User Generated Content (UGC)

Q3 C: Indicate which social media sites you used to source information for THIS trip.

Respondents who reported they had used *'Social media sites'* were asked to identify from which of the nine globally most-used (2019) social media platforms they had sourced information for their survey hike.

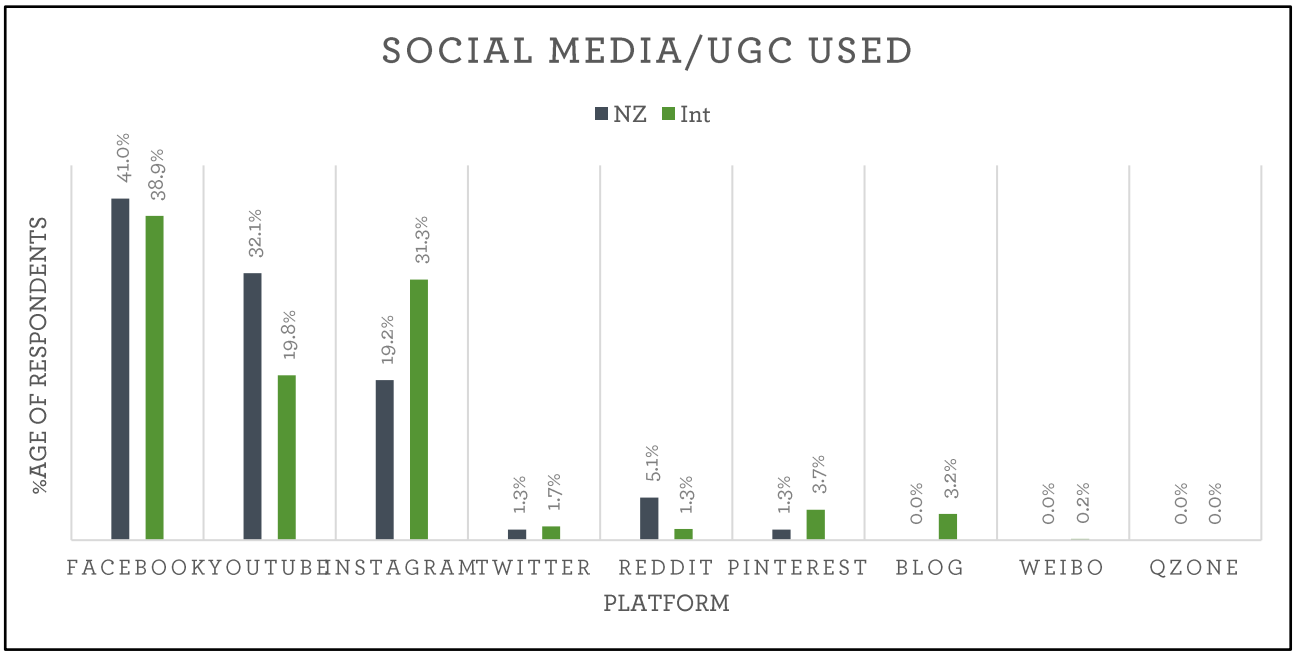

Figure 10: Respondents' use of social media to source site information

Social media use is dominated by *'Facebook'*, *'YouTube'* and *'Instagram'* for both New Zealand (92.3%) and International (90.0%) respondents.

Q3 D: Please indicate which apps you used to source information for THIS trip.

Respondents who reported they had used *'Mobile information apps'* were asked to identify from which of the seven most-used (2019) New Zealand information apps they had sourced information on their survey hike.

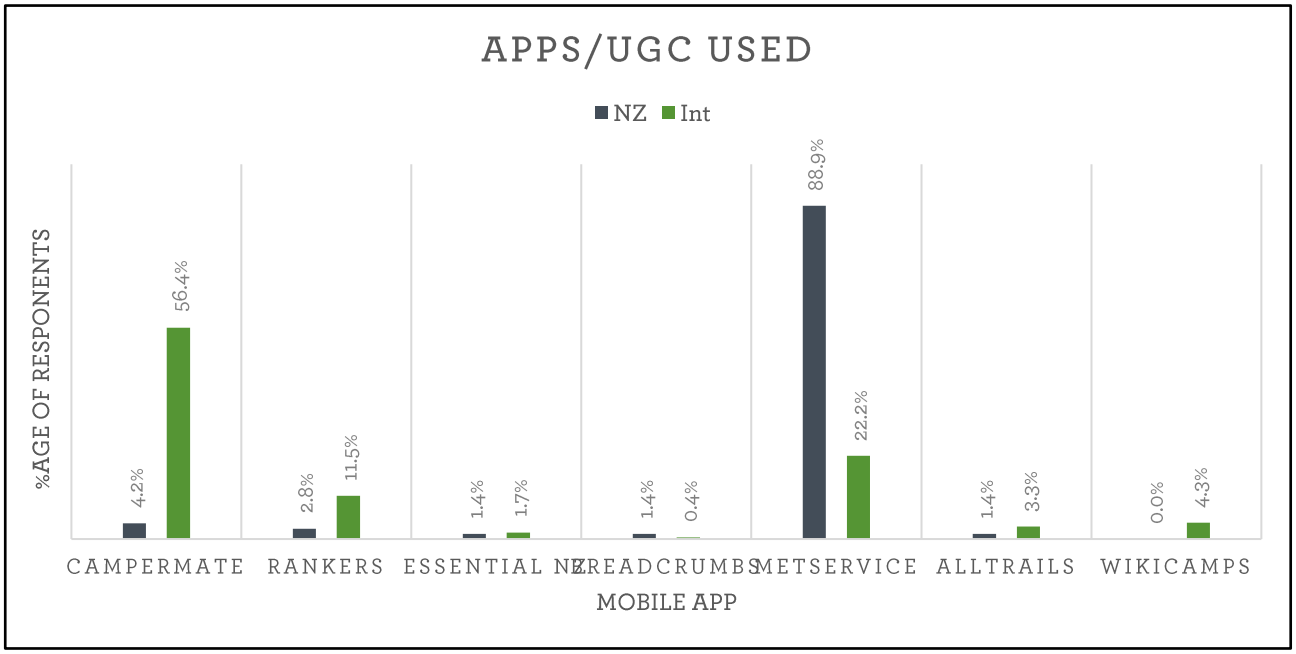

Figure 11: Respondents' use of mobile apps to source site information

The distribution in use of the six unofficial apps is essentially the same for both respondent groups, with *'Campermate'* dominant followed by *'Rankers'*, with all other apps incidental. International use of *'Campermate'* was more than 13 times higher than New Zealand (NZ 4.2%; Int 56.4%), with *'Rankers'* use three times higher (NZ 2.8%; Int 11.5%). The only official app reported, *'MetService'*, saw this pattern reversed, with New Zealand respondent's use (88.9%) four times higher than that of Internationals (22.2%). [1]

Discussion

The digital environment is highly dynamic, with new social media platforms (websites; apps) being launched onto the market on a regular basis. The mix of platforms people access and engage with, either actively or passively, constitutes their 'digital footprint', with social media users typically categorised on the basis of similarities in these footprints. Digital footprints correspond to sociographic profiles, such that the social media platforms a person prefers are indicative of the groups they belong to and privilege; how they receive and perceive the information they source from those platforms and apps; and how and to what extent the communication travels in both directions.

There is a multitude of typologies of social media users, and one is presented in Table 6 for illustrative purposes. Digital footprints can be highly complex, and it is beyond the scope of this report to substantively analyse the footprints of the two respondent groups; nevertheless, some higher-level observations can be made.

With respect to the digital footprints of respondents, it is reasonable to assume that as well as sourcing information about trails, many also contributed information/User Generated Content (UGC); it follows from that assumption that all five types of social media users – *Creators*; *Curators*; *Conversationalists*; *Joiners*; *Spectators* - are represented amongst respondents who reported using *'Social media sites'* and *'Mobile information apps'*.

Table 6: Typology of social media users

Type	Digital Footprint
Creators	Create and publish original content & social objects as a way of expressing expertise & status. Contribute to the information ecosystem.
Curators	Heavily involved in online communities through moderation, contribution, editing, etc. Contribute time, energy, & perspective to improve subject matter information.
Conversationalists	Respond to the content created by Creators. Do not create & distribute original social objects, but their activity influences others to whom they are connected.
Joiners	Actively update their status on social sites & upload/forward photos, videos, articles, etc. Behaviour sustains relevance & also demonstrates knowledge & awareness
Spectators	Consume content only. Seek to source information to support decision-making, learn from peers, or solely to entertain.

Similarly, there is a multitude of typologies for social media platforms. The nine *'Social media sites'* surveyed in this research are somewhat arbitrarily categorised below; as platforms evolve to incorporate greater functionality and accommodate user preferences the distinctions between

[1] At the time fieldwork was undertaken, MSC had yet to launch its *Plan My Walk* app, and this was therefore not included in the app options presented to respondents. *Plan My Walk* integrates data from 'official' sources (DOC; MetService) with expert advice to deliver an innovative hike planning tool designed to reduce SAR events. *Plan My Walk* is an example of how advances in mobile device technology can lead to the development of new and potentially highly effective messaging tools.

types are eroded. Suffice to say, all social media platforms are optimised for the sharing of User Generated Content (UGC) of various types, either broadly or narrowly.

Table 7: Typology of social media platforms surveyed

Type	Core Use	Sites Surveyed
Social Networking Sites (SNS)	To connect with people on-line	Facebook; Weibo; QZone
Media Sharing	To find and share media – e.g., video, photos, live video	YouTube; Instagram; Pinterest
Microblogs	To find, discuss, and share information and opinions (character-limited platforms)	Twitter, Reddit
Blogs	To publish, find, discuss, and share information and opinions, (web pages/sites)	Blog

Apps built around *'Commercial tourism operators'* marketing content supplemented by unofficial UGC - e.g., *'Campermate'*; *'Rankers'*; *'Breadcrumbs'*; etc - generally target temporary FIT visitors to New Zealand; correspondingly, these were preferred by International respondents but received minimal use by New Zealand respondents. While tourism operators have reputational and legal exposure to misleading content regarding goods and services, they typically seek to avoid increasing that exposure by representing themselves as definitive sources of visitor risk-related information. This avoidance extends to moderation of UGC, which is largely left to the users and contributors themselves. The very notable exception is the *'MetService'* app, which is a non-commercial platform for definitive official information on weather and does not host UGC.

In terms of the significance of social media platforms as sources of trail information, use by both respondent groups ranked *'Social media sites'* (NZ 7th; Int 8th) and *'Mobile information apps'* (NZ 6th; Int 5th) in the bottom half of the nine sources reported. However, it is not possible to determine the relative mix of social media user types from the data. Nevertheless, the established global trend for social media use is continuous growth across ever more platforms serving ever more niche communities. Gaining a deeper understanding of social media's role in shaping risk perception and influencing decision-making will inform messaging around risk.

4.4.2 Information Sources Trusted

Q3. A: RATE your level of TRUST in the following SOURCES of information.

Respondents were asked to rate the degree of trust they had in trail information sources available to them. The list of sources was the same as that from which respondents selected the information source/s they used prior to, and during, their hike of the survey trail.

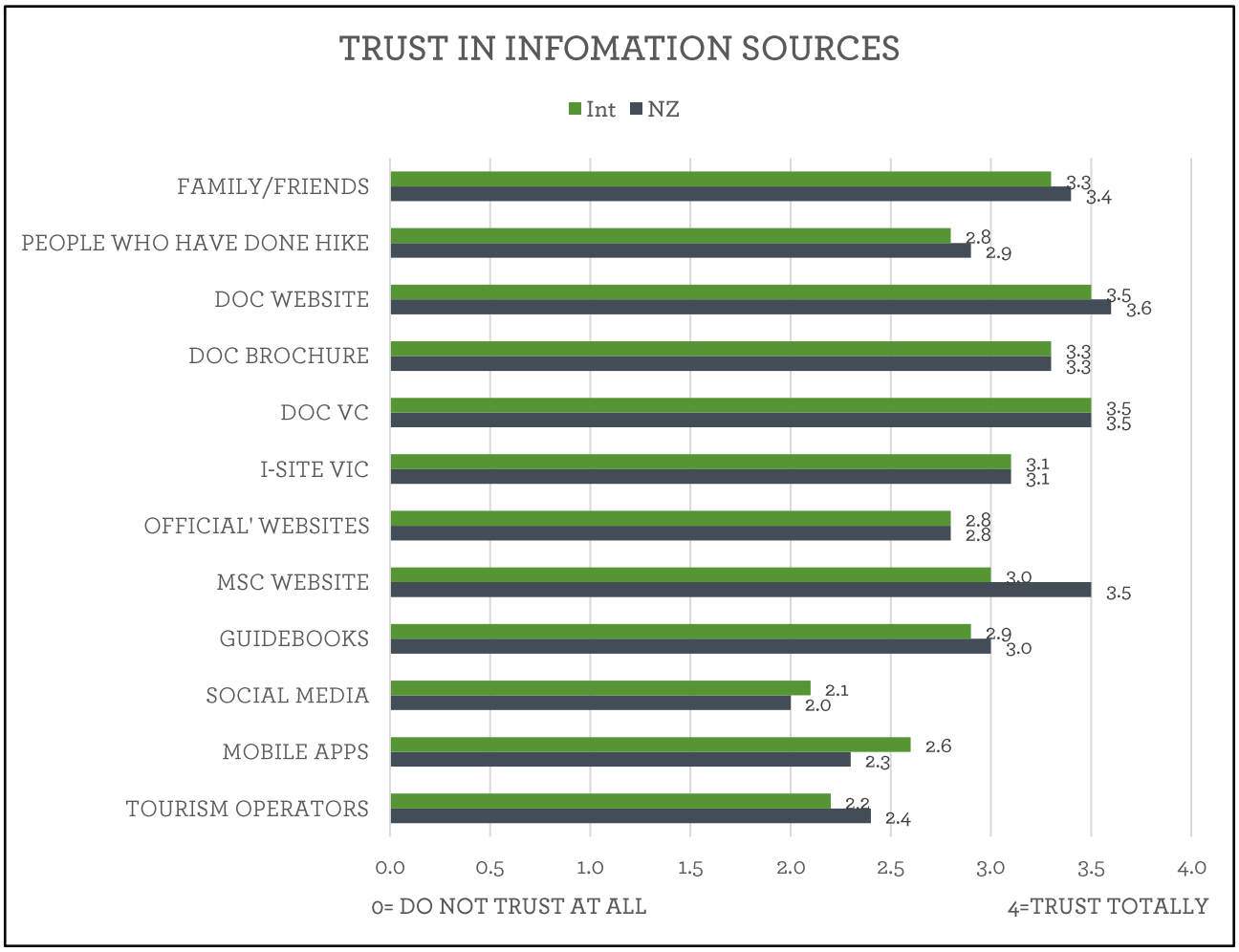

Figure 12: Respondents trust in sources of information

For both New Zealand and International respondents, trust ratings for all information sources fell on or above the scale mid-point in a range of approximately 1.5 rating points (2.0-3.6). Within this range, trust ratings are clustered here around the upper three scale points: *'Trust totally'* (3.5-4.0), *'Trust a lot'* (2.5-3.4) and *'Trust moderately'* (2.0-2.4). Overall, New Zealand and International respondents rated trust in 10 of the 12 sources essentially identically – i.e., ratings within +/- 0.1 rating point.

Only two sources of information were rated *'Trust totally'* by both New Zealand and International respondents, being *'DOC website'* (NZ 3.6; Int 3.5) and *'DOC Visitor Centres'* (NZ 3.5; Int 3.5), with New Zealand respondents also rating *'MSC website'* in this highest cluster (NZ 3.5) - the only non-DOC source rated in this cluster by either respondent group. Similarly, only two sources of information were rated *'Trust moderately'* by both respondent groups, being *'Tourism operators'* (NZ 2.4; Int 2.2) and *'Social media'* (NZ 2.0; Int 2.1), with New Zealand respondents also rating *'Mobile apps'* in the lowest of the three ratings clusters (NZ 2.3)

The remaining eight information sources rated in the intermediate *'Trust a lot'* cluster, although it is notable that *'Family/friends'* (NZ 3.4; Int 3.3) and *'DOC brochure'* (NZ 3.3; Int 3.3) were just 0.2 rating points below the highest cluster.

Discussion

The spread of trust ratings across all information sources was similar for both respondent groups (NZ 1.6; Int 1.4). However, when official and unofficial sources of information are analysed separately, the rating point spreads differ: unofficial sources (NZ 1.4; Int 1.2) approximated that of all sources, whereas the rating point spread for official sources of information was closer to a half (NZ 0.8; Int 0.7). Similarly, when the channels are analysed separately the rating point spreads differ significantly.

For official sources, both respondent groups reported significantly more trust in *'DOC Visitor Centres'* (NZ 3.5; Int 3.5) than *'i-Site Visitor Information Centres'* (NZ 3.1; Int 3.1), with a similar result for *'DOC website'* (NZ 3.6; Int 3.5) compared with other *'Official websites'* (NZ 2.8; Int 2.8). In contrast, there was significant difference between the two respondent groups' trust in *'Mobile apps'* with International respondents rating them higher than New Zealand (NZ 2.3; Int 2.6).

Of the top three most used sources of information, the one official source – *'DOC website'* - ranked the most trusted for both respondent groups, while trust rankings of the two unofficial sources varied widely: *'Family/friends'* (NZ 4th; Int 3rd=) far out-performing *'People I met'* (NZ 8th; Int 8th=).

Table 8: Comparative rankings of information source use & trust

Information Source	NZ Rankings		Int Rankings	
	Use	Trust	Use	Trust
Family/friends	1	4	2=	3=
People I met who have done the hike	3	8	2=	8=
DOC website	2	1	1	1=
DOC brochure	4	5	6	3=
DOC Visitor Centres	5	2=	4	1=
i-Site Visitor Information Centres	8=	6	9	5
'Official' visitor/tourist websites (RTOs)	11=	9	10	8=
MSC website	8=	2=	12	6
Guidebooks	10	7	7	7
Social media sites	7	12	8	12
Mobile information apps	6	11	5	10
Commercial tourism operators	11=	10	11	11

The *'MSC website'* was the official information source least used by Internationals, and the lower degree of trust reported compared with New Zealand respondents may be a result of unfamiliarity with the provider and uncertainty over its *bona fides*. New Zealand use of the website, while still low in the rankings, was more than double that of Internationals.

All three DOC sources of information were very highly trusted by both International and New Zealand respondents, and identically so. With respect to DOC VCs, there are significant operational implications of this very high level of trust given that the VC's defining point-of-difference is the F2F dissemination of information to visitors. Ensuring staff strictly adhere to sharing only definitive information, while avoiding the understandable desire to add additional value to the information via editorialising, customising and advising, is fundamental to maintaining the fidelity of risk messaging; similarly, avoiding misunderstandings due to language differences, given it is often difficult to discern at the time that this has occurred. Put in simplistic terms, the higher the trust, the greater the responsibility to equip visitors with the information they need to make decisions in their own best interests.

Overall, reported degrees of trust in information sources generally did not correspond to the reported levels of use by either respondent group. There are likely multiple variables at play that are driving this disjunction – e.g., are people simply using the sources of information closest to hand, and satisficing? Irrespective, from a risk perception perspective, the interplay of these variables needs to be well understood to ensure that messaging interventions target the most salient variables.

4.4.1 Summary of Sociographic Profiles

Overall, there is a high-level of consistency between New Zealand and International hikers across most questions, indicating that hiker sociographic characteristics are broadly universal.

Use of Social Media/User Generated Content (UGC)

Both International and New Zealand hikers use of social media platforms as sources of trail information ranked in the bottom half of the twelve sources used.

'Facebook', *'YouTube'* and *'Instagram'* were the top three social media sites used by both hiker groupings.

The distribution in use of six unofficial apps was the same for both hiker groupings, with *'Campermate'* highly dominant, followed by *'Rankers'*. International hiker use of *'Campermate'* was more than 13 times higher than New Zealand, and *'Rankers'* use three times higher. New Zealand hikers' use of the official *'MetService'* app was four times higher than that of International.

All five generic types of social media users were represented amongst hikers using *'Social media sites'* and *'Mobile information apps'*, with the digital footprint of many including contributions of UGC.

Apps built around *'Commercial tourism operators'* marketing content supplemented by unofficial UGC were preferred by International hikers but received minimal use by New Zealand hikers. Typically, moderation of UGC is largely left to users and contributors.

Information Sources Trusted

New Zealand and International hikers rated trust in 10 of the 12 information sources essentially identically, with ratings for all information sources falling on or above the scale mid-point. Only *'DOC website'* and *'DOC Visitor Centres'* rated *'Trust totally'* by both New Zealand and International hikers, with *'MSC website'* also receiving the highest rating from New Zealand hikers.

Both International and New Zealand hikers' rated their trust in *'Family/friends'* very close to *'Trust totally'*, and far higher than all other unofficial sources.

For official sources, both hiker groupings reported significantly more trust in *'DOC Visitor Centres'* and *'DOC website'* than *'i-Site Visitor Information Centres'* and other *'Official websites'* respectively. International hikers rated their trust in *'Mobile apps'* significantly higher than New Zealand hikers.

All three DOC sources – and channels - of information were very highly trusted by both International and New Zealand hikers. This has significant operational implications regarding maintaining the currency and accuracy of DOC information, especially for DOC VCs.

Overall, reported degrees of trust in information sources generally did not correspond to the reported levels of use by either hiker grouping.

4.5 Respondent Risk Profiles

Risk profile is an evaluation of an individual's willingness and ability to take risks, where risk is the effect of uncertainty on objectives. Individuals use complex, multi-attribute conceptions of risk, which include additional considerations beyond the potential for serious harm or death. The focus in this section is on the overall effect of incomplete knowledge of events or circumstances on an individual's decision-making.

4.5.1 Backcountry Familiarity

Q5: Have you tramped/hiked in New Zealand's backcountry BEFORE this trip?

Respondents were asked whether or not they had prior familiarity with the New Zealand backcountry.

Results

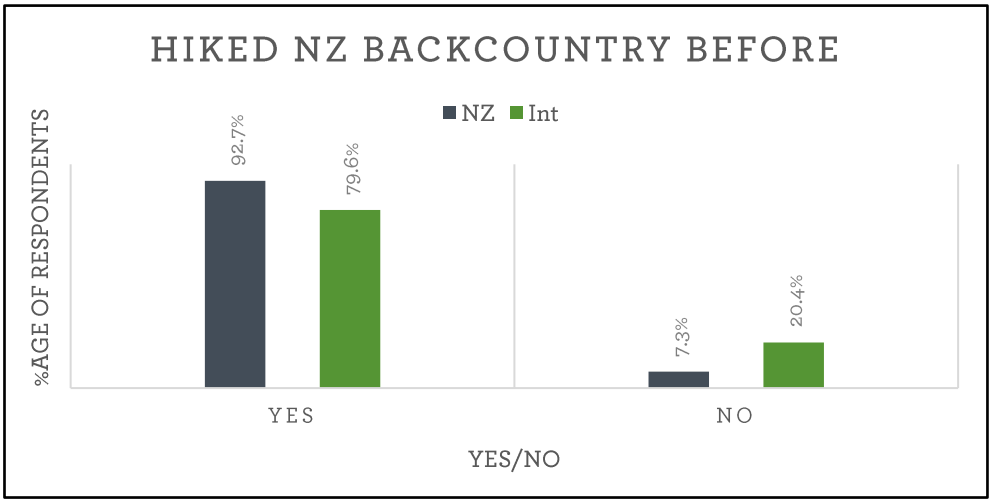

Figure 13: Respondents' familiarity with New Zealand's backcountry

Experience of hiking in the New Zealand backcountry was very high for New Zealand respondents (92.7%), but also high for Internationals (79.6%). Conversely, one in five International respondents (20.4%) reported no New Zealand backcountry hiking experience, a level of inexperience nearly three times higher than New Zealand (7.3%).

Discussion

The very high proportion of New Zealand respondents reporting having previously hiked in the New Zealand backcountry is to be expected.

Perhaps in contrast, the more than three quarters of International respondents reporting familiarity with the New Zealand backcountry warrants further explanation. For the purposes of meaningful comparison, International respondents should be differentiated as either visitors or permanent residents, given the latter's familiarity with the New Zealand backcountry will more likely mirror that of New Zealand respondents. Over one tenth (11.2%) of International respondents reported New Zealand as their *'Normal country of residence'*, leaving the balance as visitors; specifically, 70.7% of the International *'Yes'* respondents. This downwardly adjusted

figure still indicates that the large majority of International visitors are hiking more than once while in New Zealand, and presumably becoming increasingly familiar with New Zealand terrain, weather and trail infrastructure. A deeper understanding of International visitors' hiking 'career' in New Zealand would be informative for risk communication strategies.

With respect to solo hikers, of those respondents reporting *'No'* to having previously hiked in the New Zealand backcountry, a quarter of New Zealand respondents (25.0%) and more than a third of Internationals (42.6%) were hiking solo.

4.5.2 Site Familiarity

Q7 A: Is this your FIRST trip to [site]?

Respondents were asked whether or not they had prior familiarity with the survey trail.

Results

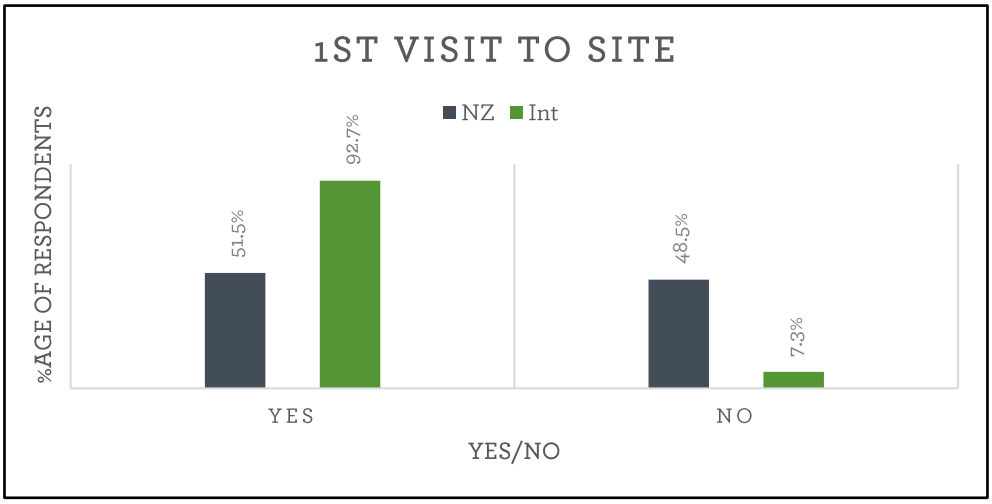

Figure 14: Respondents' familiarity with site – previously visited

Just over half of New Zealand respondents (51.5%) were undertaking the trail for the first time, compared with nearly all Internationals (92.7%). This differential is to be expected, given International respondents are likely travelling through the country, and in the limited time in New Zealand available to most of them, are more motivated to undertake new trails than to repeat trails.

Q7 B: (If 'No') When was your LAST visit to [site]?

Respondents who reported having prior familiarity with the trail, were subsequently asked to indicate the interval between their current visit and their most recent previous visit.

Results

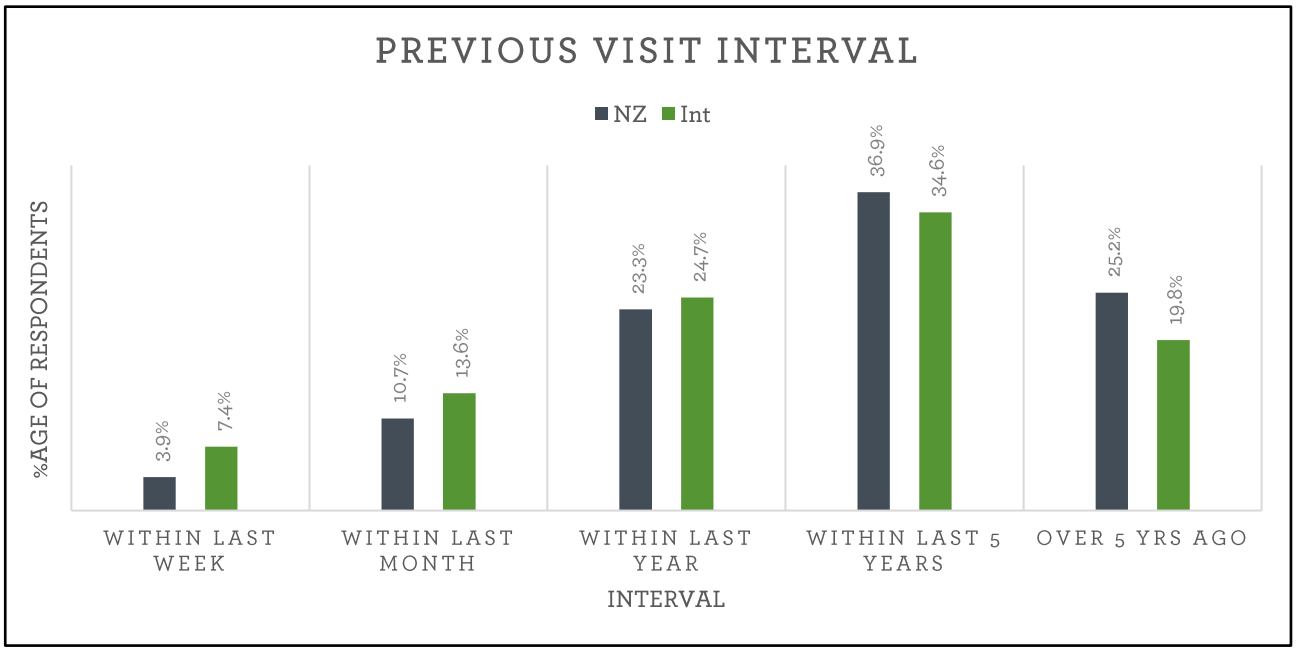

Figure 15: Respondents' familiarity with site – interval between most recent previous visit

The distribution across the different previous visit intervals was very similar for both nationality groups, with the most common interval being *'Within last 5 years'* (NZ 36.9%; Int 34.6%) and the least common *'Within last week'* (NZ 3.9%; Int 7.4%). Of those respondents who had prior familiarity with the trail, more than one third of New Zealand (37.9%) and nearly one half of International (45.7%) had last visited the site within the preceding year.

Discussion

While small in number, the close similarity in the distribution of New Zealand and International responses across all previous visit intervals appears noteworthy. This seems especially so for *'Within last year'* and *'Within last 5 years'* intervals, given this suggests many Internationals are making multiple visits to New Zealand and repeating their hiking experiences when doing so; however, this pattern may be partially explained by the more than one third of International respondents (34.1%) reporting New Zealand as their normal country of residence.

Repeat visitation is a strong indicator the respondent's previous trail experience was sufficiently beneficial that they wanted to repeat the experience and/or introduce someone else to the trail; conversely, an unpleasant trail experience is less likely to drive repeat visitation. When contemplating a repeat hike of a trail, especially within a year of the previous visit, it is likely some hikers will assume their knowledge and understanding of hazards and risks at place is still 'current' and prepare accordingly.

However, given the dynamic nature of the New Zealand backcountry, familiarity with a trail may not necessarily translate into enhanced risk management by hikers; to the contrary, it may lead to a more cavalier approach to risk management, especially if the previous hike was free of adversity. Similarly, knowledge of trail hazards acquired more than five years previously may be significantly compromised, either through changes to existing hazards – e.g., water courses - or the introduction of entirely new hazards – e.g., trails experiencing rapid growth in popularity resulting in crowding and congestion. While most Internationals will never return in person, like their New Zealand counterparts they can be expected to become sources of unofficial

information via F2F and/or digital channels. However, it is not possible to determine from the data how currency of information moderates the value or trust recipients place in it.

4.5.3 Group Familiarity

Q1 E: (If 'Solo/Alone') Have you ever tramped/hiked alone in the backcountry BEFORE this trip?

Respondents hiking without companions were asked whether or not they had prior familiarity with hiking alone in the backcountry.

Results

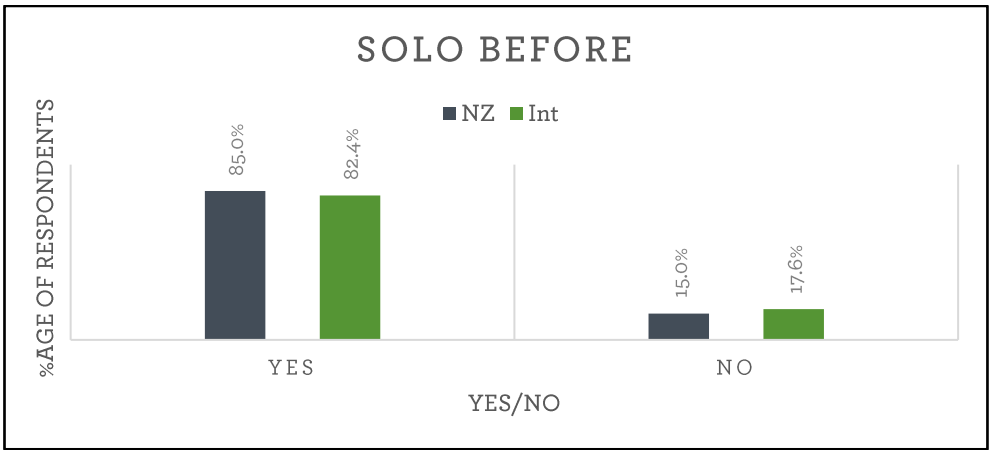

Figure 16: Respondents' group familiarity – previously hiked alone in backcountry

The proportion of respondents familiar with hiking solo was essentially the same for both respondent groups, with well over four fifths of both New Zealand (85.0%) and International (82.4%) respondents having previously hiked alone.

Q1 F: (If NOT 'Solo/Alone') Have you tramped/hiked with these companions BEFORE this trip?

Respondents hiking with companions were asked whether or not they had prior familiarity hiking in the backcountry with those same companions.

Results

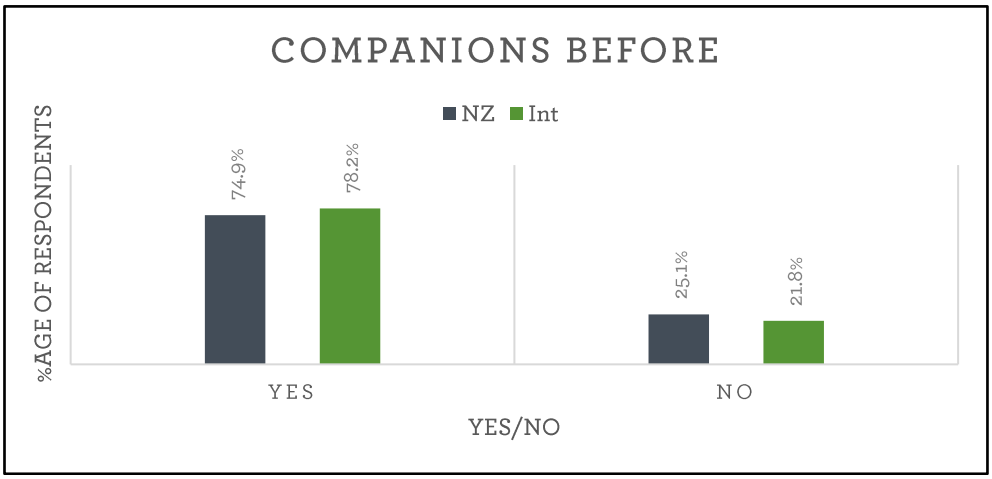

Figure 17: Respondents' group familiarity – previously hiked with companions

Again, the proportion of respondents having hiked with their companions previously was very similar for both respondent groups, with approximately three quarters of New Zealand (74.9%) and International (78.2%) respondents familiar with their trail companions.

Discussion

A hiking group's familiarity with soloing or other group members can be a salient influence on perceptions of risk, given an absence of familiarity introduces an additional variable of indeterminate significance. How hikers integrate this new variable into their risk perception of their activity cannot be determined from the data, yet is clearly worth investigating.

The proportion of all International respondents reporting undertaking their first solo hike on the research trails was nearly double that of all New Zealand respondents (NZ 2.6%; Int 4.9%). While a very small minority, over an entire summer hiking season this translates to a significant number of hikers undertaking their first solo hike on these trails, and presumably equally or more challenging trails. It is reasonable to conclude that a proportion of these first-time soloists will find themselves on trails that significantly test their competencies, with little to no margin for error.

While hiking solo, especially for the first time, increases a hiker's risk exposure, choosing to hike with new companions who may be completely unknown quantities may introduce significantly greater risk. Approximately a quarter of both respondent groups reported they were accompanied on their hike by companions with whom they had no shared hiking experience; furthermore, it is likely some would have met their companions for the first time only hours earlier - not uncommon with International hikers. On such occasions, group leadership may not necessarily be assigned to the most competent member of the group; more tellingly, the true competence of individual group members may only become apparent when adversity is encountered. In this context, it is worth noting that a significant proportion of respondents who reported no hiking familiarity with their companions rated their own skill levels as *'No skills'* or *'Beginner'* (NZ: 17.8%; Int 11.6%); presumably some of these respondents were prepared to be led by relative strangers.

With respect to solo hiking, the convention for risk messaging is to discourage people from hiking alone; however, this research has found approximately one fifth of New Zealand hikers and more than a quarter of International hikers choose to hike solo - and many will prefer to do so. It may therefore be worth examining the development of risk messaging tailored for solo hikers, including identifying challenging trails that present relatively 'safe' opportunities for first-time soloists.

4.5.4 Risk Preferences

Typically, risk associated with outdoor activity is considered from two perspectives:

1. *Avoid*: something to be avoided – i.e., when risk represents the possibility of experiencing a negative outcome from the activity;
2. *Encounter*: something to be desired under certain conditions – i.e., when risk is an integral element of accruing the benefits sought from the activity.

These two perspectives can be represented as risk preferences that may be expected to influence visitors' risk-related behaviours and decision-making at place.

Q8: How much do you AGREE with the following statements?

- *When tramping/hiking in the backcountry I want to ENCOUNTER some risk*
- *When tramping/hiking in the backcountry I seek to AVOID risk*

To establish their risk preferences, respondents were asked to rate their level of agreement with statements derived from the *'Encounter'* and *'Avoid'* perspectives.

Results

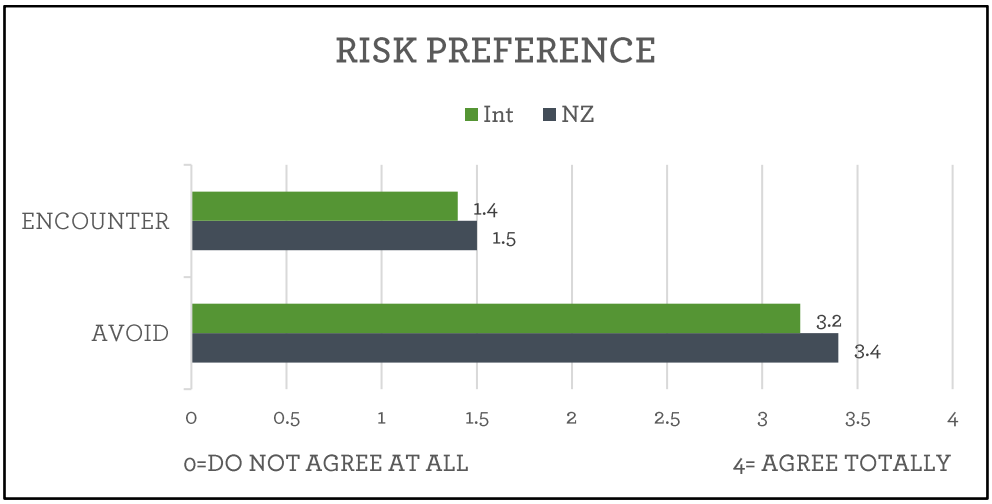

Figure 18: Respondents' risk preferences

While very similar, New Zealand respondents rated both risk preferences slightly higher than International respondents. Both respondent groups rated their *'Avoid'* risk preference closest to *'Agreed a lot'* (NZ 3.4; Int 3.2). In contrast, both groups rated their *'Encounter'* risk preference at the opposite end of the scale closest to *'Agreed slightly'* (NZ 1.5; Int 1.4).

Discussion

The ratings indicate that while both New Zealand and International respondents' strong preference is to avoid risk, this does not directly translate into a preference not to encounter some risk. This is illustrated by comparing the proportion of respondents at opposite ends of the scale. Only 2.4% of New Zealand respondents reported they *'Do not agree at all'* or *'Agree slightly'* with the *'Avoid'* statement, while in contrast 24.6% *'Agree a lot'* or *'Agree Totally'* with the *'Encounter'* statement. International respondents had a similar but less pronounced spread in their preferences, with 4.7% rating the *'Avoid'* statement *'Agree slightly'* or *'Do not agree at all'*, and 18.9% the *'Encounter'* statement *'Agree a lot'* or *'Agree Totally'*.

These results support the notion that visitors often hold both perspectives simultaneously, and that risk preferences can therefore be represented as a function of the two perspectives. This may be characterised as hikers acknowledging there is a 'baseline' level of risk associated with hiking in the backcountry: encountering this level of risk is accepted – and embraced - because it is inherent in the activity and mitigated by the benefits obtained; whereas, risk beyond this baseline is to be avoided because the additional benefits provide insufficient mitigation.

4.5.5 Skill Self-Assessment

Q9 A: How would you RATE your current level of SKILL as a tramper/hiker?

Using a six-point scale of competency, respondents were asked to self-assess their current level of hiking skill.

Results

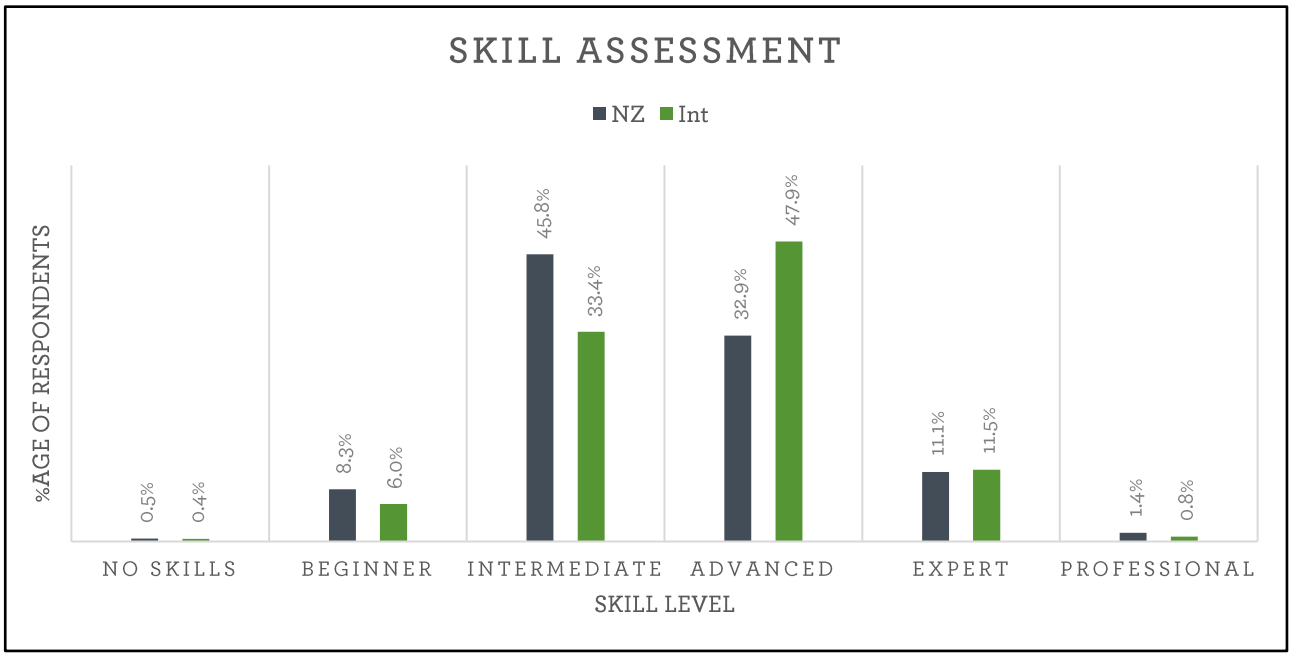

Figure 19: Respondents' skill self-assessment

At either end of the skill assessment scale, New Zealand and International respondents reported very similar results. The combined proportion of *'Expert'* and *'Professional'* skill levels were essentially the same (NZ 12.5%; Int 12.3%), while the combined proportion of *'No skills'* and *'Beginner'* levels differed slightly (NZ 8.8%; Int 6.4%). Correspondingly, the remaining *'Intermediate'* and *'Advanced'* skill levels together accounted for over three quarters (NZ 78.7%; Int 81.3%) of both respondent groups; however, the distribution across the two skill levels were mirror-opposites, such that nearly half of New Zealand (45.8%) respondents assessed their skill level as *'Intermediate'* while the same proportion of Internationals (47.9%) assessed their skill level as *'Advanced'*.

Discussion

Respondents were not supplied with a common assessment frame with which to undertake their skill self-assessment, necessarily leading to greater variability in the responses and potentially influencing the distribution across the scale. Nevertheless, it is reasonable to assume that the assessment points of reference used by respondents – e.g., comparison with peers; guidebook ratings of previously completed hikes; qualifications; etc – will be similar, and that the self-assessed skill levels will therefore be similar.

Given the challenging nature of the research trails, the virtual absence of *'No skills'* and minimal number of *'Beginner'* respondents is to be expected. Splitting the self-assessments at the mid-level, nearly two thirds of Internationals (60.2%) rated their skill *'Advanced'* or higher, compared with under half of New Zealand (45.4%) respondents. The above proviso notwithstanding, the average skill level of International hikers is significantly higher than that of New Zealand hikers, and can be assumed to translate to a greater 'margin for error' on the trail; furthermore, the self-assessments are strongly indicative of both New Zealand and International hikers choosing to undertake trails appropriate for their competencies. Designing and delivering trail-specific risk messaging similarly appropriate for a trail's assigned primary user group may also increase the effectiveness of same. *(see 4.5.9)*

4.5.6 Frequency of Activity

Q10 A: How MANY times have you been tramping/hiking over the past 12 months/year (including this trip)?

Using six levels of activity, respondents were asked to report the frequency with which they undertook hiking activity over the previous year.

Results

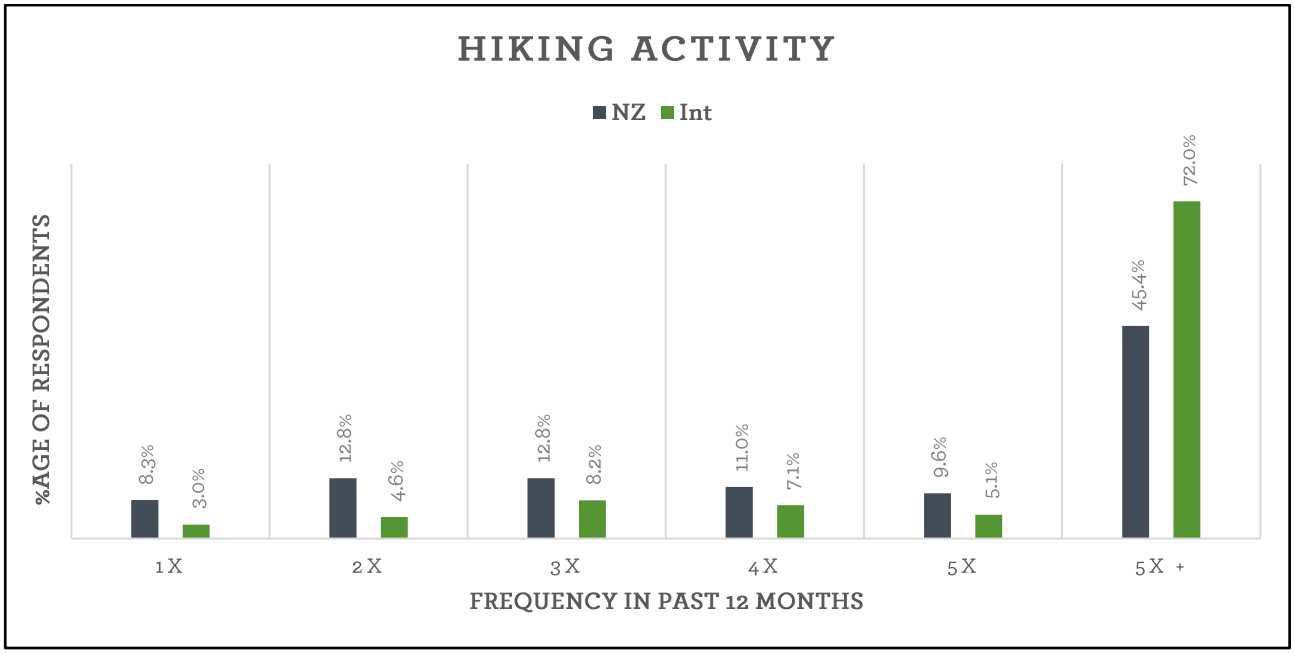

Figure 20: Respondents' frequency of hiking over previous 12 months

Both New Zealand and International respondents reported relatively consistent levels of hiking activity across the lower frequencies *('1x'-'5x')*, with a greater proportion of New Zealand respondents active at each of these frequencies. This translates into a marked difference in the highest frequency bracket *('5x+')*, with under half of New Zealand respondents (45.4%) having hiked more than five times in the previous 12 months, compared with nearly three quarters of Internationals (72.0%).

Discussion

The frequency with which respondents engage in hiking may be viewed as an indicator of the importance they place on the benefits derived from the activity, and how fully the activity is integrated into their lives. This result is reflective of the cultural importance of 'hiking in nature' in many of the countries from which New Zealand sources a large proportion of its international visitors, most notably countries in Europe.

To the extent that this higher frequency of hiking activity occurs on more challenging trails, it seems reasonable to conclude that, on average, International hikers are likely to be more experienced, skilled and physically fit than their average New Zealand counterparts. Unfamiliarity with the New Zealand backcountry and any associated negative influence on risk perception notwithstanding, assumptions about International hikers and their rates of misadventure may be counterproductively influencing the design and delivery of safety messaging. *(see 4.5.7)*

4.5.7 History of Misadventure

Q10 B: (If you have tramped/hiked in the backcountry before this trip) Have YOU ever been:

- *LOST when tramping/hiking in the backcountry*
- *SERIOUSLY INJURED when tramping/hiking in the backcountry*
- *RESCUED when tramping/hiking in the backcountry*

Respondents were asked to report whether they had previously suffered one or more types of misadventure while hiking in the backcountry.

Results

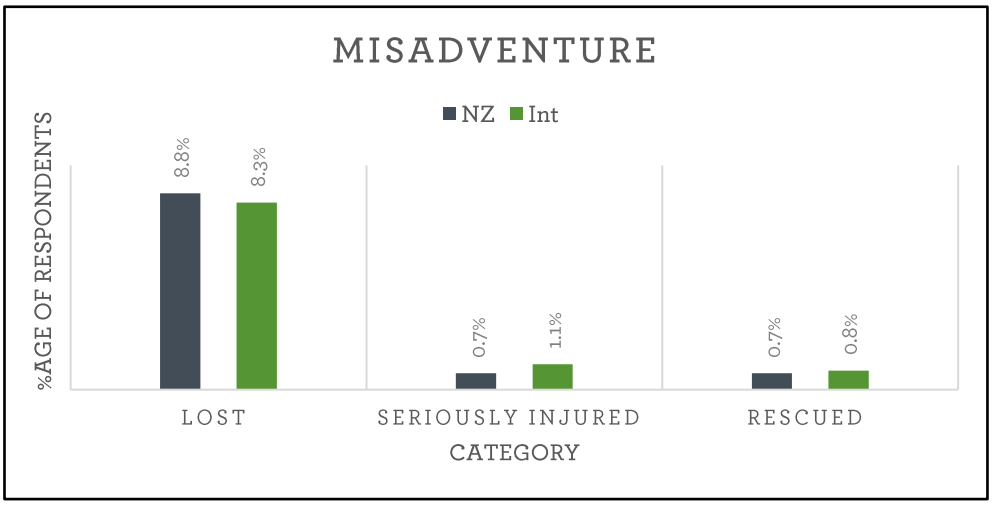

Figure 21: Respondents' history of misadventure

The proportion of New Zealand and International respondents who had previously suffered misadventure were essentially identical across all three types of misadventure, with being *'Lost'* by far the most common misadventure. Of New Zealand respondents who reported previously suffering a misadventure, nearly a third (32.1%) had suffered more than one, compared with just over one tenth (12.2%) of Internationals.

Discussion

Note: the number of affirmative responses reported for this question is very small (NZ n=5; Int n=21), and this discussion should therefore be considered accordingly.

There is an obvious connection between being *'Rescued'* and being *'Lost'* and/or *'Seriously injured'*, given severe incidents of the latter ideally result in the former. For both respondent groups, the rate of being *'Lost'* is nearly nine times greater (9:100) than the rate for being *'Seriously injured'* (1:100), indicating that the large majority of *'Lost'* incidences do not appear to result in rescue and presumably are resolved by the hikers themselves. Nevertheless, the question arises as to the strength of any causal relationship between being lost and subsequently sustaining serious injury; i.e., to what extent and at what rate does being lost progress to decisions and behaviours that result in greater risk-taking and increase the likelihood of serious injury? A deeper understanding of *'Lost'* misadventure has the potential to inform safety messaging, both generically and specifically, such that a given reduction in the incidence of hikers becoming *'Lost'* results in a proportionately greater reduction in *'Serious injury'* and *'Rescue'* misadventures.

The results may also present a counter argument to the above. The effectively identical distribution of the three types of misadventure across both respondent groups seems

noteworthy. Assuming International respondents who suffered misadventure largely did so in cultures and backcountry environments other than New Zealand, the similarity in misadventure rates to New Zealand respondents may suggest there is a baseline level of misadventure for the population of hikers who undertake more challenging trails. To the extent that this may be the case, the assumptions that inform the design and delivery of initiatives seeking to reduce the rate of serious incidents and accidents in the hiking community may need revisiting, given the potential for diminishing returns.

4.5.8 Preparedness

Q11: How much do you AGREE with the following statements about this tramp/hike?

- *I have/had ALL the **information** I need/ed to complete my tramp/hike safely*
- *I have/had ALL the **skills** I needed to complete my tramp/hike safely*
- *I have/had ALL the **experience** I need/ed to complete my tramp/hike safely*
- *I have/had ALL the **physical fitness** I need/ed to complete my tramp/hike safely*
- *I have/had ALL the **equipment & clothing** I need/ed to complete my tramp/hike safely*
- *I have/had ALL the **food & drink** I need/ed to complete my tramp/hike safely*
- *I have/had EVERYTHING I need/ed to **survive a night** in the open*
- *I am/was FULLY aware of the **weather forecast** for this area today*
- *I am/was FULLY aware of ALL the **natural hazards** I may encounter on this tramp/hike*

Respondents were asked to rate their level of agreement with a series of nine statements relating to their preparedness to hike the trail. Each statement may be interpreted as having an 'ideal' rating according to its implications for safety, being *'Agree totally'* (4.0).

Pre-hike responses may be characterised as *ex-ante* self-assessments of preparation, and post-hike responses as *ex-post* self-evaluations of that preparation. Statements are abbreviated for conciseness as shown above in **bold** font.

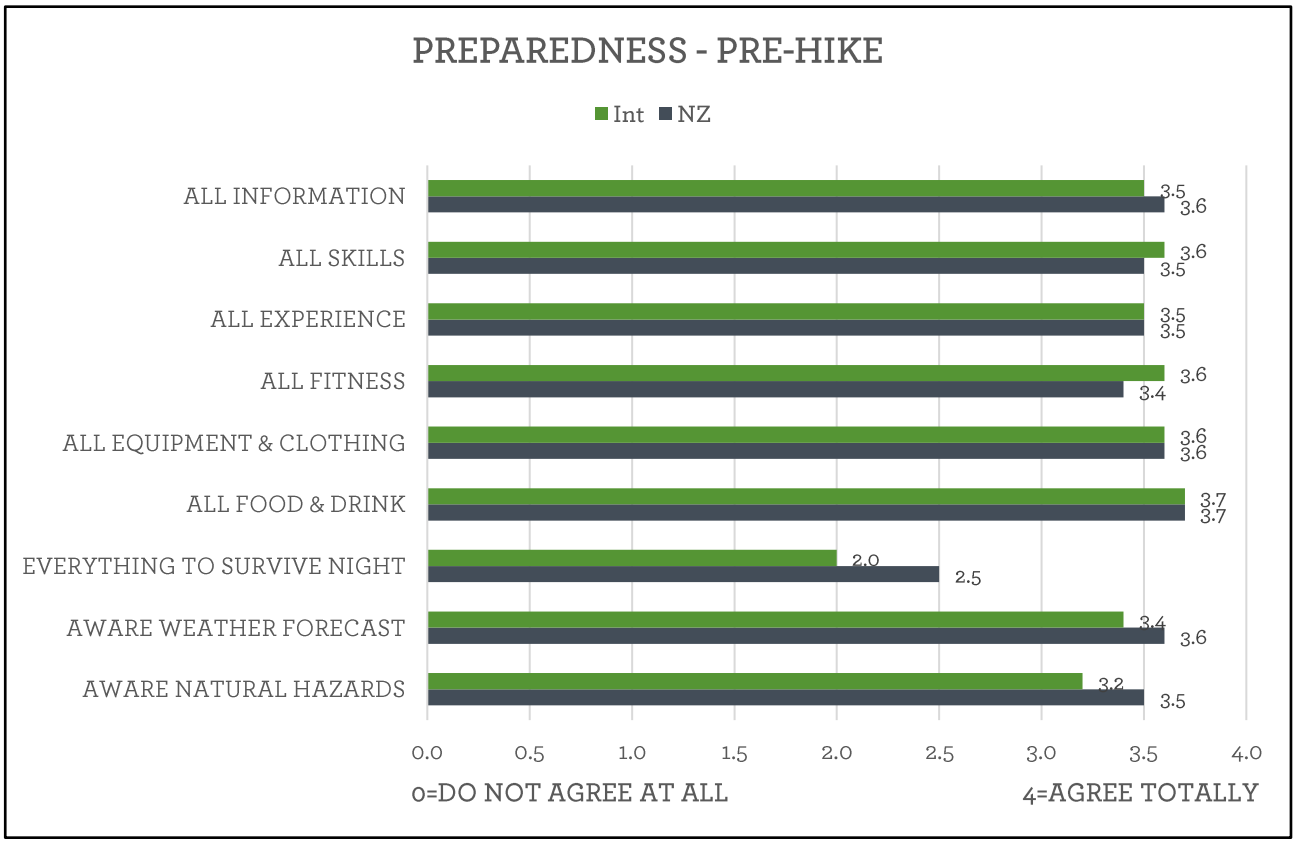

Figure 22: Respondents' preparedness self-assessment – Pre-hike

The agreement rating points spread across all statements was significantly less for New Zealand respondents (1.2) than International (1.7). Overall, New Zealand and International respondents rated their agreement with five of the nine statements essentially identically – i.e., ratings within +/- 0.1 rating point. Of the other four statements, New Zealand respondents rated their agreement with *'Physical fitness'* 0.2 rating point lower than Internationals, while the statements *'Survive a night'*, *'Weather forecast'*, and *'Natural hazards'* were rated 0.2–0.5 points lower by Internationals.

For New Zealand respondents, ratings were distributed across two ranges, *'Agree totally'* (3.5-4.0) and *'Agree a lot'* (2.5-3.4). Seven statements fell within the *'Agree totally'* range with a very narrow rating point spread (0.2), and two within the *'Agree a lot'* range with a full rating point spread (1.0). In contrast, the distribution of International ratings was wider. International respondents rated six statements the same as New Zealand within the *'Agree totally'* range and with a similarly very narrow rating point spread (0.2). Two statements *('Weather forecast'; 'Natural hazards')* fell within the *'Agree a lot'* range with again a narrow rating point spread (0.2), and one statement *('Survive a night')* within the *'Agree moderately'* (1.5-2.4) range.

Results – Post-hike

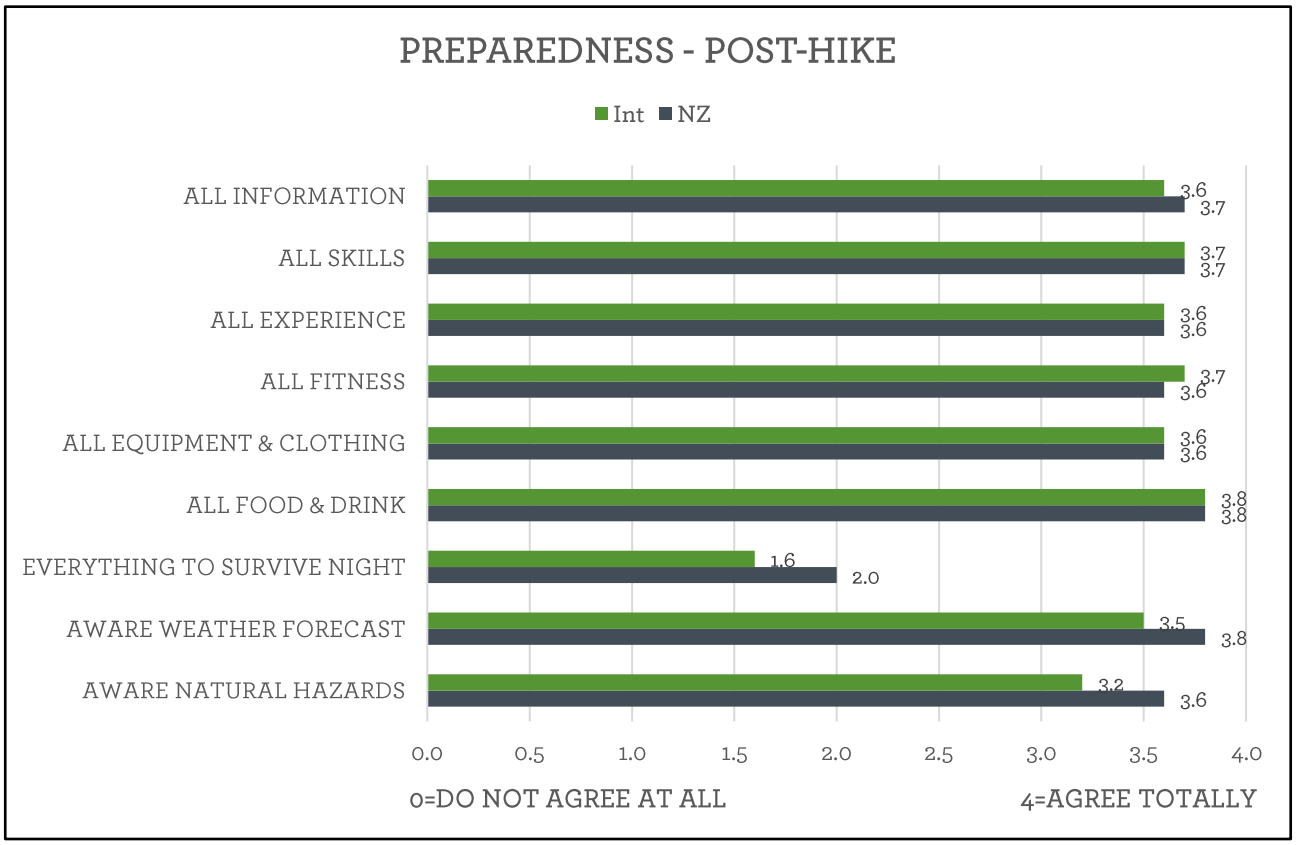

Figure 23: Respondents' preparedness self-assessment – Post-hike

The results pattern for the post-hike preparedness question was very similar to the Pre-hike, although the agreement rating points spread across all statements was notably 0.5 points greater for both respondent groups (NZ 1.8; Int 2.2). Overall, New Zealand and International respondents rated their agreement with six of the nine statements essentially identically – i.e., ratings within +/- 0.1 rating point. The exceptions were the three statements *'Survive a night'*, *'Weather forecast'*, and *'Natural hazards'*, with Internationals rating their agreement 0.3–0.4 rating points lower.

For New Zealand respondents, ratings were again distributed across two ranges, although the ranges differed from the pre-hike results. Eight statements fell within the *'Agree totally'* (3.5-4.0) range with a very narrow rating point spread (0.2), and one *('Survive a night')* within the *'Agree moderately'* (1.5-2.4) range. As with the pre-hike results, the International ratings were distributed across three ranges. International respondents rated seven statements the same as New Zealand within the *'Agree totally'* range but with a wider rating point spread (0.3). One statement *('Natural hazards')* fell within the *'Agree a lot'* range, and the same statement *('Survive a night')* as the pre-hike within the *'Agree moderately'* (1.5-2.4) range.

Discussion

Note: Pre-hike and post-hike respondents were not the same individuals; differences across each statement assume both samples were equally representative of the population.

Agreement ratings for almost all statements were remarkably similar for both respondent groups across both pre- and post-hike responses. Similarly, distribution of the statements across the agreement rating ranges was very stable between pre- and post-hike. Furthermore, almost all statement ratings fell within, or very close to, the *'Agree totally'* (3.5-4.0) range. Overall, with

respect to changes in post-hike agreement ratings from pre-hike ratings, those statements reporting a rating increase, decrease or no change were identical for both respondent groups.

Changes in agreement ratings are summarised below in Table 7. Rating colours indicate whether the difference is in favour of the 'ideal' response; red indicates the post-hike rating is further from the ideal, and green indicates rating is closer. For the purposes of this discussion, ratings that differ by +/- 0.1 rating point are treated as equivalent to 0.0; i.e., they are not considered significant as the difference may be due to rounding. Post-hike ratings increased across seven statements, remained unchanged for one, and decreased for one; the spread of rating point increases was greater for International (0.1-0.4) respondents than New Zealand (0.1-0.2).

Table 9: Difference between pre-hike & post-hike ratings

Statement	NZ Δ	Int Δ
I have/had all the **information** I need/ed to complete my tramp/hike safely	+0.1	+0.1
I have/had all the **skills** I needed to complete my tramp/hike safely	+0.2	+0.1
I have/had all the **experience** I need/ed to complete my tramp/hike safely	+0.1	+0.1
I have/had all the **physical fitness** I need/ed to complete my tramp/hike safely	+0.2	+0.1
I have/had all the **equipment & clothing** I need/ed to complete my tramp/hike safely	0.0	0.0
I have/had all the **food & drink** I need/ed to complete my tramp/hike safely	+0.1	+0.1
I have/had everything I need/ed to **survive a night** in the open	-0.5	-0.4
I am/was fully aware of the **weather forecast** for this area today	+0.2	+0.1
I am/was fully aware of all the **natural hazards** I may encounter on this tramp/hike	+0.1	0.0

The consistently close to the 'ideal' *'Agree totally'* ratings across almost all preparedness statements in both pre- and post-hike results strongly suggest that generic risk messaging from official sources, likely reinforced by unofficial sources, is positively contributing to hikers adopting appropriate risk-mitigating behaviours. Consistently very high preparedness ratings for the *'Information'* gathered prior to the hike, the *'Equipment & clothing'* selected, and the *'Food & drink'* carried, strongly indicate that hikers are not encountering problematic unknowns and are maintaining personal comfort and bodily sustenance. In combination, these variables represent sound judgement, at least with respect to the hike both as envisioned and as experienced. Similarly, very high and consistent preparedness ratings for *'Fitness', 'Experience'* and *'Skills'* again strongly indicate that hikers understand the demands of the trails they are undertaking and choosing trails appropriate for their competencies.

With respect to *'Information'* gathered prior to the hike, the preparedness ratings for two statements, awareness of *'Weather forecast'* and *'Natural hazards'*, could be expected to be closely linked given their dynamic nature and the associated importance of obtaining current information. This appears to be the case for New Zealand respondents, with ratings for both statements consistent with their close to 'ideal' ratings for *'Information'*. While this consistency is also the case for Internationals with respect to *'Weather forecast'*, there was significant inconsistency with respect to *'Natural hazards'*. Nevertheless, again both pre- and post-hike results strongly suggest that generic official risk messaging about weather and natural hazards in the backcountry, is positively contributing to risk-mitigating behaviours by hikers.

There is an obvious qualification to the above assessment, however. With the exception of a few minor injuries, virtually all respondents' hiking experiences unfolded as expected and without any adverse events. This appears to be reflected in the almost universal improvement in the statement agreement ratings in the post-hike results, suggesting that pre-hike preparedness assessments tend to be slightly conservative; this is preferable from the perspective of hikers

self-managing risk as it implies there is margin for error, albeit small. The above notwithstanding, any conclusions regarding the adequacy of hiker preparedness should be qualified by the fact that respondent preparedness levels were not 'stress-tested'.

This caution is exemplified by the one notable exception to the above uniformity and stability of statement ratings. *'Survive a night'* not only rated significantly lower than all other statements at, or very close to, the *'Agree moderately'* range, but also reported by far the largest rating point shift between pre- and post-hike responses. Unsurprisingly, by undertaking the hike, respondents acquired a greater appreciation of what would be required to *'Survive a night'* on that trail; however, what is particularly notable is the degree to which reality not only changed respondents' assessed levels of preparedness, but that this change was strongly negative.

The relatively low ratings of *'Survive a night'* raise major questions regarding how hikers perceive risks at place, and how the potential for adverse events is incorporated into both their risk assessments and preparation for same. When considering only the multiday hikes *(Angelus Hut; Cascade Saddle)*, the ratings for this statement were much higher for both New Zealand (Pre 3.4; Post 3.6) and International (Pre 3.1; Post 3.7) respondents, and more consistent with the ratings for all other preparedness statements. This is unsurprising, given hikers on these trails are intending to overnight in the backcountry. However, this contrast further reinforces the stark difference in the mindset of hikers undertaking day hikes with those undertaking multi-day hikes; expressed purely in survival terms, should a day hiker/s experience an adverse event that prevents them from returning before dark, the probability of group members surviving a night in the open is significantly lower. The implications for the relevance and/or efficacy of current safety messaging are obvious.

4.5.9 Safety Management

Q13: How much do you AGREE with the following statements?

- *I will RELY/RELIED on my companions/other walkers to keep me safe on this tramp/hike*
- *I will RELY/RELIED on DOC to keep me safe on this tramp/hike*
- *I am/was able to contact/alert emergency services at ALL times and locations*
- *If I do/had NOT return/ed as planned, a person/organisation WILL/WOULD notify emergency services*
- *DOC safety messages/signs are intended for people LESS capable than me*
- *DOC safety messages/signs EXAGGERATE the hazards and risks present on tramps/hikes*
- *I feel SAFER when there are other people on the track/trail*
- *The most popular tracks/trails are always the SAFEST tracks/trails*
- *DOC safety messages/signs/markers on THIS track/trail are/were CONFUSING/UNHELPFUL*
- *DOC safety messages/signs/markers on THIS track/trail do/did NOT help me be MORE safe*

Respondents were asked to rate their level of agreement with a series of 10 statements relating to managing hiker safety on the trail. Each statement may be interpreted as having an 'ideal' rating according to its implications for safety; the ideals are either *'Do not agree at all'* (0.0) or *'Agree totally'* (4.0) and are shown in brackets in the statement schedules.

Responses are reported and discussed here under three categories: *beliefs*, *attitudes* and *behaviours*. Pre-hike responses may be characterised as *ex-ante* declarations of beliefs, attitudes and intended behaviours, and post-hike responses as *ex-post* reflections on beliefs, attitudes and actualised behaviours. Statements are abbreviated for conciseness as shown in **bold** font.

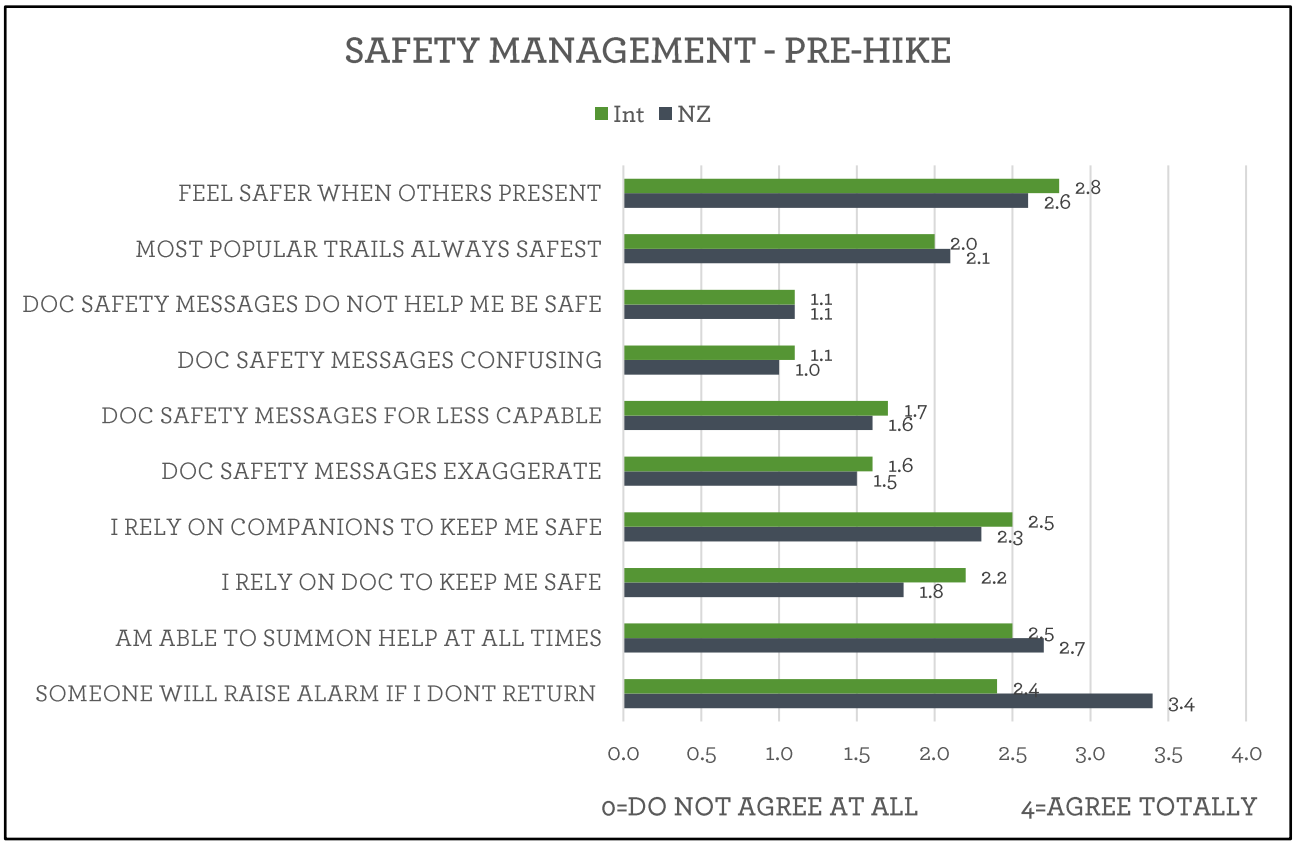

Figure 24: Respondents' perspectives on safety management – Pre-hike

Beliefs

Beliefs are the assumptions and convictions people hold to be true based on past experiences.

- *I **feel safer** when there are other people on the trail (0.0)*
- *The most **popular** trails are always the **safest** trails (0.0)*

Rated levels of agreement with each of the Belief statements were very similar across nationality groups, with ratings clustered just above the scale midpoint (2.0). Respondents rated *'Feel safer'* closer to *'Agree a lot'* (NZ 2.6; Int 2.8). Respondents rated *'Popular safest'* lower at *'Agree Moderately'* (NZ 2.1; Int 2.0).

Attitudes

Attitudes are the judgements people make about objects based on their beliefs and values.

- *DOC safety messages/signs/markers on this trail **do not help** me be more safe (0.0)*
- *DOC safety messages/signs/markers on this trail are **confusing/unhelpful** (0.0)*
- *DOC safety messages/signs are intended for people **less capable** than me (0.0)*
- *DOC safety messages/signs **exaggerate** hazards and risks present on tramps/hikes (0.0)*

As with the belief statements, rated levels of agreement with each of the attitude statements were effectively identical across both nationality groups, with all ratings clustered below the scale midpoint (2.0). Respondents rated both *'Do not help'* (NZ 1.1; Int 1.1), and *'Confusing/unhelpful'* (NZ 1.0; Int 1.1) the same at *'Agree slightly'*.

Respondents rated *'Less capable'* (NZ 1.6; Int 1.7) and *'Exaggerate hazards/risks'* (NZ 1.5; Int 1.6) higher and closer to *'Agree Moderately'*.

Behaviours

Behaviours are how people express their beliefs, values and attitudes.

- *I will **rely on my companions**/other walkers to keep me safe on this tramp/hike (0.0)*
- *I will **rely on DOC** to keep me safe on this tramp/hike (0.0)*
- *I am **able to contact**/alert emergency services at all times and locations (4.0)*
- *If I **do not return** as planned, a person/organisation will notify emergency services (4.0)*

In contrast with the belief and attitude statements, rated levels of agreement with each of the behaviour statements differed meaningfully between nationality groups, with almost all ratings clustered above the scale midpoint (2.0). Both New Zealand and International respondents rated *'Rely on companions'* very similarly (NZ 2.3; Int 2.5), whereas there was greater variability between nationality groups for 'Rely on DOC' (NZ 1.8; Int 2.2); nevertheless, all ratings were closer to *'Agree moderately'*.

With the two reverse scale statements, both New Zealand and International respondents rated *'Able to contact'* very similarly (NZ 2.7; Int 2.5) and above *'Agree moderately'*, whereas there was a full rating point difference between nationality groups for *'Do not return'* (NZ 3.4; Int 2.4), New Zealand rating above *'Agree a lot'* and Internationals closer to *'Agree Moderately'*.

Results

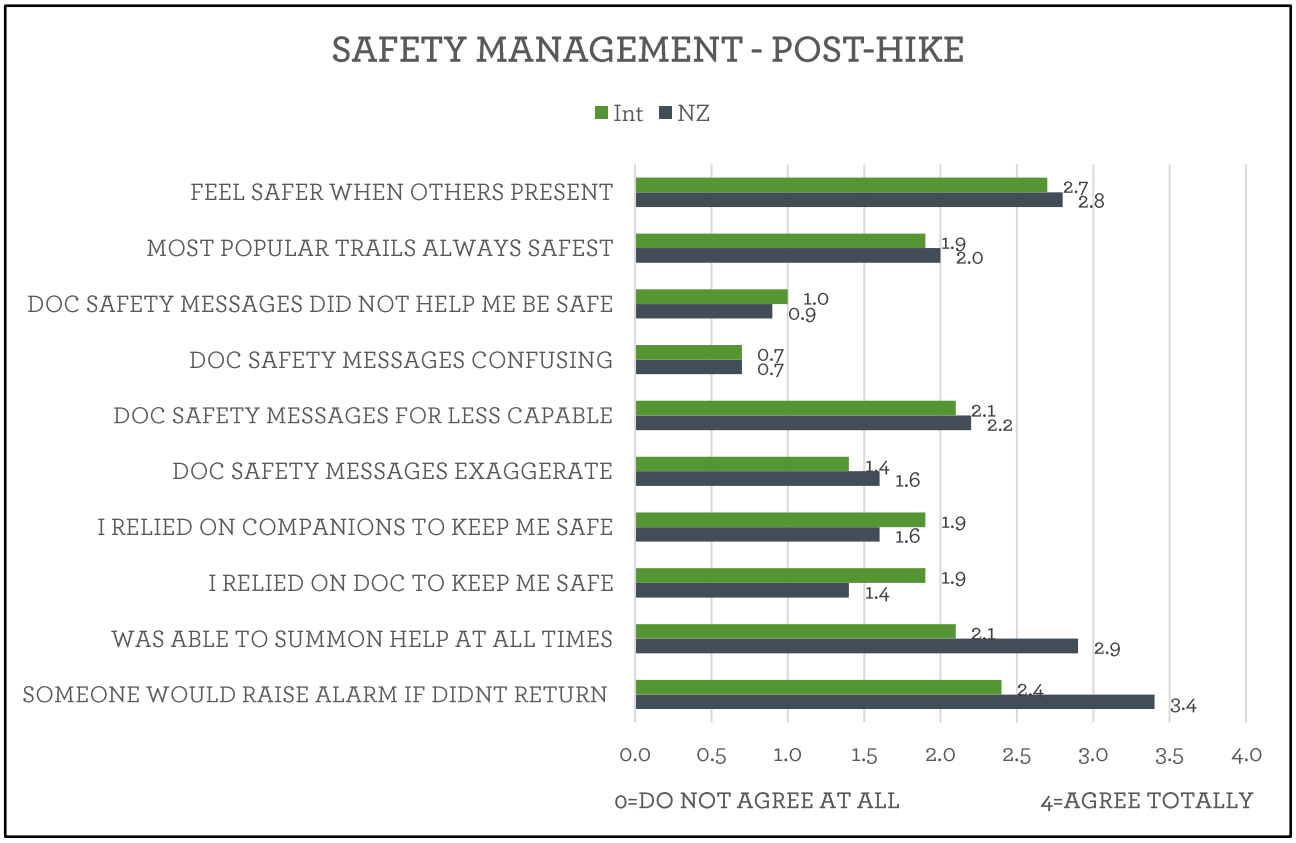

Figure 25: Respondents' perspectives on safety management – Post-hike

Beliefs

Beliefs are the assumptions and convictions people hold to be true based on past experiences.

- *I **feel safer** when there are other people on the trail (0.0)*
- *The most **popular** trails are always the **safest** trails (0.0)*

As with the pre-hike results, rated levels of agreement with each of the belief statements were very similar across nationality groups, with ratings clustered just above the scale midpoint (2.0). Respondents rated *'Feel safer'* closer to *'Agree a lot'* (NZ 2.8; Int 2.7). Respondents rated *'Popular safest'* lower at *'Agree Moderately'* (NZ 2.0; Int 1.9).

Attitudes

Attitudes are the judgements people make about objects based on their beliefs and values.

- *DOC safety messages/signs/markers on this trail **do not help** me be more safe (0.0)*
- *DOC safety messages/signs/markers on this trail are **confusing/unhelpful** (0.0)*
- *DOC safety messages/signs are intended for people **less capable** than me (0.0)*
- *DOC safety messages/signs **exaggerate** hazards and risks present on tramps/hikes (0.0)*

As with the belief statements, post=hike rated levels of agreement with each of the attitude statements were effectively identical across both nationality groups, with all ratings clustered below the scale midpoint (2.0). Respondents rated both 'Do not help' (NZ 0.9; Int 1.0), and *'Confusing/unhelpful'* (NZ 0.7; Int 0.7) at *'Agree slightly'* or lower.

In contrast, respondents rated *'Less capable'* (NZ 2.2; Int 2.1) just above *'Agree Moderately'*, and *'Exaggerate'* (NZ 1.6; Int 1.4) somewhat lower.

Behaviours

Behaviours are how people express their beliefs, values and attitudes.

- *I will **rely on** my **companions**/other walkers to keep me safe on this tramp/hike (0.0)*
- *I will **rely on DOC** to keep me safe on this tramp/hike (0.0)*
- *I am **able to contact**/alert emergency services at all times and locations (4.0)*
- *If I **do not return** as planned, a person/organisation will notify emergency services (4.0)*

As with pre-hike responses, rated levels of agreement for most of the behaviour statements differed meaningfully between nationality groups, with ratings largely clustered around the scale midpoint (2.0). Both New Zealand and International respondents rated *'Rely on companions'* very similarly (NZ 1.6; Int 1.8), whereas there was greater variability for *'Rely on DOC'* (NZ 1.4; Int 1.9); nevertheless, all ratings were closer to *'Agree moderately'*.

With the two reverse scale statements, New Zealand and International respondents rated *'Able to contact'* significantly differently, with New Zealand respondents rating *'Agree a lot'* (2.9) and Internationals just above *'Agree moderately'* (2.1). *'Do not return'* recorded a full rating point difference between nationality groups (NZ 3.4; Int 2.4), New Zealand rating well above *'Agree a lot'* and Internationals closer to *'Agree Moderately'*.

Discussion

Note: Pre-hike and post-hike respondents were not the same individuals; differences across each statement assume both samples were equally representative of the population.

Overall, across the ten safety management statements, eight reported meaningful differences between pre-hike and post-hike ratings for at least one respondent group, with the remaining two statements essentially unchanged.

Rating colours in Tables 10, 11 and 12 indicates the difference relative to the 'ideal' response: red indicates the post-hike rating is further from the ideal, and green indicates the rating is closer. Again, for the purposes of this discussion, ratings that differ by +/- 0.1 rating point are treated as equivalent to 0.0; i.e., they are not considered significant as the difference may be due to rounding.

Beliefs

Beliefs are the assumptions and convictions people hold to be true based on past experiences.

In the absence of something that fundamentally challenges and destroys a person's beliefs, those beliefs will remain unchanged. With New Zealand and International ratings for both beliefs statements being essentially the same post-hike as pre-hike, it can be concluded that respondents' beliefs about the relationship between safety and the presence of people were not challenged by their experiences on the hike.

Table 10: Beliefs: Difference of post-hike ratings from pre-hike

Statement	NZ Δ	Int Δ
I **feel safer** when there are other people on the trail	- 0.1	- 0.1
The most **popular** trails are always the **safest** trails	+ 0.2	- 0.1

With respect to solo hikers, when compared with all other respondents from their group, both New Zealand and International soloists reported little to no meaningful difference in their pre- and post-hike ratings for both *'Feel safer'* and *'Popular safest'* statements. The consistency of these ratings suggests that hikers perception of risk is not influenced by the size of their hiking group.

Enhanced feelings of safety when others are present on the trail is consistent with human nature, especially given such widely held heuristics as 'safety in numbers'. Similarly, associating the number of people who undertake a hike with the level of safety in doing so, is also understandable and a logical extension. Essentially, people have these beliefs constantly and consistently reinforced by everyday experience; as such, neither belief is inherently problematic for risk management when hiking trails.

However, these beliefs may become problematic if they alter perceptions of risk, thereby translating into attitudes and behaviours that erode hikers' margins of safety – either intentionally or unwittingly. Such behaviours may involve hikers choosing to take greater risks, particularly with respect to acting beyond the limits of their skills and understanding of hazards at place; furthermore, groupthink and herd behaviour may result in hikers surrendering personal agency and/or truncating or suspending their own 'due diligence' of risk.

Attitudes

Attitudes are the judgements people make about objects based on their beliefs and values.

For two attitude statements – *'Do not help'* and *'Exaggerate'* - New Zealand pre-hike ratings were effectively unchanged post-hike, whereas International respondents reported a slight shift towards the ideal response for one statement, and further away for the other. In contrast, the other two attitude statements – *'Confusing/unhelpful'* and *'Less capable'* – were markedly different post-hike. This difference indicates that hikers' lived experiences have the potential to modify their attitudes; a 'lived experience' being the personal knowledge about the world that people gain through direct, first-hand involvement in an everyday event.

Table 11: Attitudes: Difference of post-hike ratings from pre-hike

Statement	NZ Δ	Int Δ
	Rating	Rating
DOC safety messages/signs/markers on this trail **did not help** me be more safe	- 0.1	- 0.2
DOC safety messages/signs/markers on this trail were **confusing/unhelpful**	- 0.3	- 0.4
DOC safety messages/signs/markers are intended for people **less capable** than me	+ 0.6	+ 0.4
DOC safety messages/signs/markers **exaggerate** hazards and risks present on hikes	+ 0.1	- 0.2

Having completed the hike, respondents had encountered, engaged with, and evaluated DOC safety messages/signs/markers in context, and subsequently their attitude shifted significantly for two statements. From a risk messaging perspective, the shifts were encouraging in one instance and concerning in the other: *'Confusing/unhelpful'* moved towards the ideal (Δ: NZ -0.3; Int -0.4), while *'Less capable'* moved further away (Δ: NZ +0.6; Int +0.4). These directional differences are not contradictory.

The pre-hike result strongly indicated that DOC safety messaging *in-situ* was clear and helpful, and the post-hike result further reinforced this. However, having been adjudged relative to the knowledge needs that hikers' experienced along the trail, the messaging was also found to have lower relevance and/or greater redundancy – i.e., for many hikers, the messaging was targeting an audience that had greater needs than themselves. The obvious concern with this attitude is that it suggests that, having not experienced any of the hazards identified in the DOC safety messaging *in situ*, hikers may come to see decreasing value in engaging with these messages. This attitude may also be reflected in the very low ratings for the *'Do/did not help'* statements, which strongly suggest that hikers see minimal utility in DOC safety messages, signs and markers – although they also hold a strong attitude that risks are not overstated.

Overall, attitudes towards DOC safety messages, signs and trail markers appear unproblematic. Nevertheless, there are indications of the usual tension encountered when designing trail signage plans: what information to provide, how much, and – most importantly - for whom.

Behaviours

Behaviours are how people express their beliefs, values and attitudes.

For discussion purposes, the four behaviour statements are further categorised here has either *reliance* or *emergency response* statements.

Three statements – *'Rely on companions'*, *'Rely on DOC'* and *'Able to contact'* – were different post-hike for both New Zealand and International respondents, and markedly so for the two reliance statements. For one emergency response statement – *'Do not return'* – both respondent groups' post-hike rating was unchanged from the pre-hike. Again, lived experience may be influencing respondents' ex-post reflection on the reliance statements, and empirically informing the third.

Table 12: Behaviours: Difference of post-hike ratings from pre-hike

Statement	NZ Δ	Int Δ
I **relied on** my **companions**/other walkers to keep me safe on this hike	- 0.7	- 0.6
I **relied on DOC** to keep me safe on this hike	- 0.4	- 0.4
I was **able to contact**/alert emergency services at all times and locations	+ 0.2	- 0.4
If I **did not return** as planned, a person/organisation would notify emergency services	0.0	0.0

The ratings shifts of both *'Relied on companions'* (Δ: NZ -0.7; Int -0.6) and *'Relied on DOC'* (Δ: NZ -0.4; Int -0.4) may reflect a common behavioural inclination: *ex post facto* attribution. In the context of hiking a trail, this behaviour plays out as follows: having completed the hike without encountering any adversity, hikers attribute their achievement to their own ability and effort – and not to the level of task difficulty or luck. This shift may also be interpreted as hikers feeling they had greater agency over their own safety following the hike than they did beforehand.

For the *'Able to contact'* emergency response statement, the post-hike difference reported by New Zealand respondents shifted towards the 'ideal', whereas International respondents reported the opposite. Across all trails combined it is not possible to discern with confidence what is driving these opposite shifts, especially given the wide disparity in the number of responses collected at each trail (From n=36 to n=405). Nevertheless, a trail-by-trail comparison suggests the explanation may partly be a function of the communications solution that hikers carried; unfortunately, constraints on the length of the questionnaire prevented gathering specific data about *how* respondents would contact/alert emergency services. The proposition here is that International hikers are more accustomed to universal cellular network coverage in their backcountry, and so are less inclined than their New Zealand counterparts to carry alternative communications technologies such as satellite-based emergency locator beacons and communicators. International respondents then observe on their hike that cellular coverage is more limited than they anticipated, driving the rating further from the ideal.

With respect to solo hikers, when compared with all other respondents it may be reasonable to anticipate that these hikers would report higher levels of agreement with *'Rely on companions/other walkers'* and *'Rely on DOC'* statements. However, solo hikers in both respondent groups reported *lower* levels of agreement for both statements: *'Rely on companions/other walkers'* rated nearly a full rating point lower (Δ: NZ -0.9; Int -0.9) than respondents with companions, while the difference for *'Rely on DOC'* was less (Δ: NZ -0.2; Int -0.2). The scale and consistency of these lower ratings appears noteworthy, as it suggests that solo hikers bring a more self-reliant mindset to the trail, and that this can be expected to moderate risk-taking behaviour. It may also reflect that for soloists, to *'Rely on other walkers'* is almost certainly to rely on total strangers.

Overall, reliance behaviours and emergency response behaviours present a mixed picture with respect to risk perception and safety messaging. The explicit value proposition for hiking in groups is the shared commitment of members to support each other in the event adversity strikes on the trail; it is therefore to be expected that there would – should? - be moderate support for the statement affirming reliance on others. However, this behaviour comes with the same caveat attached to the belief statements premised on safety being a function of the presence of other people. Reliance upon DOC, while rating closer to the nominal ideal, is possibly a more nuanced behaviour. Again, the research data lack the granularity necessary to explain what DOC-controlled elements of the hiking experience are perceived by respondents as germane to their safety. Nevertheless, given DOC determines the location and specification of the vast majority of hiking experiences in New Zealand, it is reasonable that hikers will look to the provider of the service product, and at the very least rely on that provider to communicate the presence and type of natural hazards along the trail, and to manage hazards associated with the provision of trail infrastructure. In this regard, moderate agreement with the reliance statement appears unproblematic. If, on the other hand, this reliance extends to DOC indemnifying hikers against the consequences of their reckless or unwise decisions, then this behaviour becomes problematic.

The emergency response behaviours are less ambiguous, given the ideal is firmly anchored at one end of the scale. New Zealand respondents' behaviour is significantly closer to the ideal than Internationals with respect to empowering third parties to raise the alarm should they not return from the hike as expected. The much lower rating for Internationals has obvious negative implications for the time lag between a hiker becoming overdue and the notification of emergency services, and commensurately the likelihood of a successful SAR operation. Prolonging of emergency response times is also the key negative implication for hikers being unable to summon emergency services directly from the location of a mishap immediately after it occurs. With respect to emergency response behaviours, clearly both respondent groups need to make a significant shift towards the ideal behaviour in order to improve the success rate of SAR incidents.

4.5.10 Challenge Assessment

Q12: How CHALLENGING do/did you think this trip to [site] will be/was for you?

Respondents were asked to assess the level of challenge the trail presented them with. This question was asked both as a pre-hike estimation and post-hike evaluation.

Results: Pre-hike

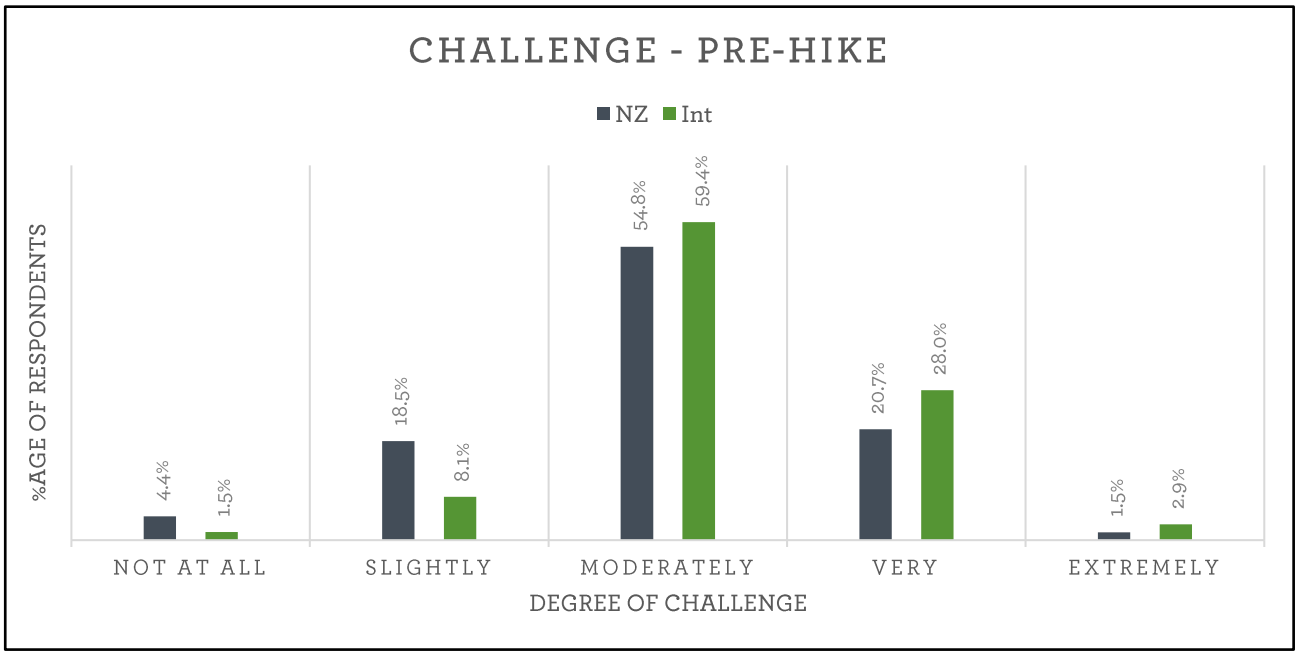

Figure 26: Respondents' assessment of degree of challenge – Pre-hike

Overall, all New Zealand respondents and all International respondents rated the challenge similarly pre-hike (NZ 3.0; Int 3.2), with Internationals rating the challenge 0.2 points higher. The most common pre-hike rating of trail challenge was *'Moderately'*, with over half of both New Zealand (54.8%) and International (59.4%) respondents reporting this rating. When combined with *'Not at all challenging'* (NZ 4.4%; Int 1.5%) and *'Slightly'* (NZ 18.5%; Int 8.1%), more than three quarters of New Zealand respondents (77.7%) and just over two thirds of Internationals (69.1%) rated the trail in these categories pre-hike. Correspondingly, just under a quarter of New Zealand respondents (22.3%) and just under a third of Internationals (30.9%) rated the trail as *'Very'* or *'Extremely'* challenging pre-hike.

Results: Post-hike

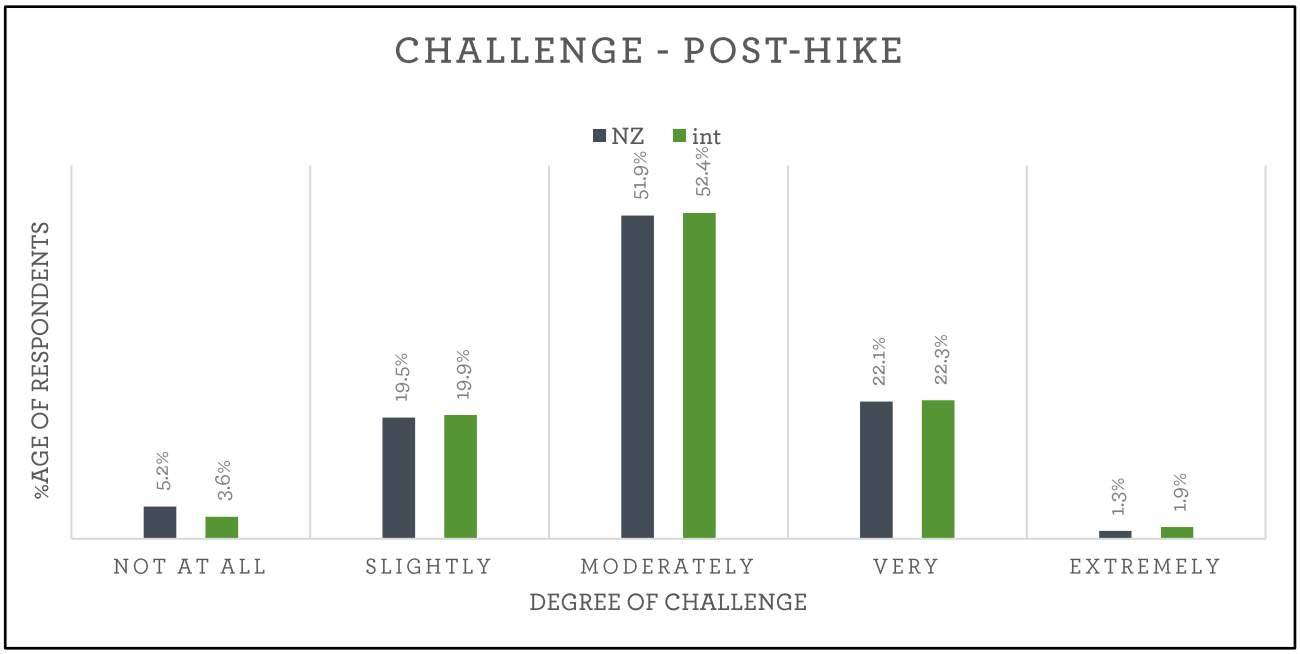

Figure 27: Respondents' assessment of degree of challenge – Post-hike

Overall, New Zealand respondents and International respondents rated the challenge very similarly post-hike (NZ 2.9; Int 3.0). As with the pre-hike rating, the most common post-hike rating of trail challenge was *'Moderately challenging'*, with again over half of both New Zealand (51.9%) and International (52.4%) respondents reporting this rating. When combined with *'Not at all challenging'* (NZ 5.2%; Int 3.6%) and *'Slightly challenging'* (NZ 19.5%; Int 19.9%), more than three quarters of both New Zealand respondents (76.6%) and Internationals (75.9%) rated the trail in these categories post-hike. Correspondingly, just under a quarter of both New Zealand respondents (23.4%) and Internationals (24.1%) rated the trail as *'Very challenging'* or *'Extremely challenging'* post-hike.

Discussion

Note: Pre-hike and post-hike respondents were not the same individuals; differences across each statement assume both samples were equally representative of the population.

The very close similarities between the scale distribution of pre- and post-hike ratings for both respondent groups is noteworthy, the above proviso notwithstanding. This result strongly indicates that the frame used by hikers to assess and evaluate the degree of challenge presented by a trail is a robust structure of concepts, perceptions, preferences and values that produces an *ex-ante* assessment closely approximating the *ex-post* evaluation of the degree of challenge actually experienced.

The nature of this challenge assessment/evaluation frame and the mix of components and the weightings accorded them likely differ from person to person; in particular, the degree of influence trail grading messages have on these ratings remains unknown. Furthermore, there will no doubt be individuals whose *ex-post* evaluation differs from their *ex-ante* assessment, yet the results indicate that at the population scale these rating disparities tend to cancel each other out – i.e., for every hiker who *ex-post* evaluates the hike as more challenging than they assessed *ex-ante*, there is another who evaluates it as less challenging. Nevertheless, the similarity of

results at the population scale suggests the frame shares sufficient commonality amongst hikers that it can be confidently used to inform risk perception and safety messaging.

With respect to solo hikers, the pre- and post-hike challenge ratings of New Zealand and International soloists were essentially the same as those of respondents in groups of two or more, with all ratings falling within the range of 3.0-3.2. This result strongly suggests that hikers use the same frame to assess and evaluate the degree of challenge presented by a hike, irrespective of whether or not they are hiking alone or as a member of a group.

4.5.11 Risk Assessment

Q14 (Pre): How much RISK do you assess for this trip to [site]?

Respondents were asked to assess the degree of risk they perceived to be associated with the hike they were about to undertake. Using a laminated hard copy of the Paling Perspective Scale (PPS) (refer Appendix 2), they were asked to mark on the scale the level of risk they assessed, then enter this level into the 'Pre-hike' questionnaire.

Note: The Paling Perspective Scale is a graphical risk assessment tool intended to enable the public to compare the probability of different risks via a visual context. The scale augments probability levels with word descriptors and colours to assist interpretation. The scale shows only the probabilities, not the consequences of a particular risk.

Results

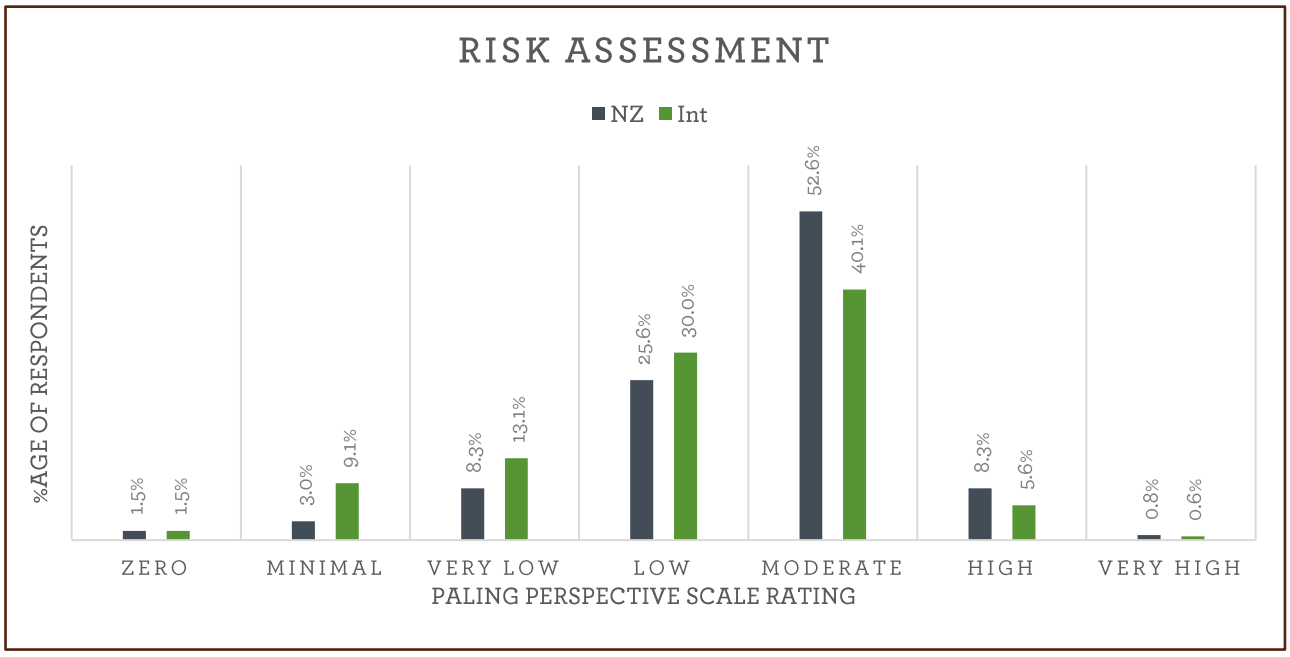

Figure 28: Respondents' pre-hike assessment of degree of risk

Over half of New Zealand respondents (52.6%) assessed the risk as *'Moderate'*, with a further 9.1% as *'High'* and *'Very High'*, representing close to two thirds (61.7%) assessing the risk higher than the population scale 'comfort' zone (*'Zero'* to *'Low'* risk). In contrast, comparable figures for International respondents were 40.1% *'Moderate'* and 6.2% *'High'* or *'Very high'*, representing less than half (46.3%) assessing the risk higher than the population scale 'comfort' zone.

Discussion

The PPS risk assessments of New Zealand and International respondents differ significantly and consistently within and beyond the 'comfort' zone (*'Zero'* to *'Low'* risk). At all assessment intervals within the zone, International respondents constitute a greater proportion than New Zealand respondents, whereas beyond the zone (*'Moderate'* to *'Very High'* risk) International hikers constitute a lesser proportion; i.e., Internationals consistently assess the degree of risk lower than New Zealand hikers. For further comparative purposes, the Scale's baseline can be reinterpreted as a 7-point weighted unipolar rating scale (*0=Risk Effectively Zero*; *7=Risk Very High*). New Zealand respondents across all sites assessed the risk at 4.5/7.0, with International respondents assessing it very similarly at 4.2/7.0. While this is a statistically meaningful difference between the two groups, it is minor and should not be interpreted as problematic.

In the absence of structured quantitative risk assessments, it is not possible to determine the 'definitive' risk rating for each trail; furthermore, it is not possible to ascertain whether or not, and to what extent, respondents incorporate their own competencies into their risk assessments given the assessment is still a subjective exercise albeit a comparative one. Nevertheless, the PPS provides useful insight into how hikers perceive the proximate risk associated with their activity in a specific setting.

4.5.12 Injury

Q14 (Post): Did you or any member of your group suffer an INJURY on the [trail] during this trip?

Respondents were asked to report and describe any injuries sustained by group members during their hike of the trail.

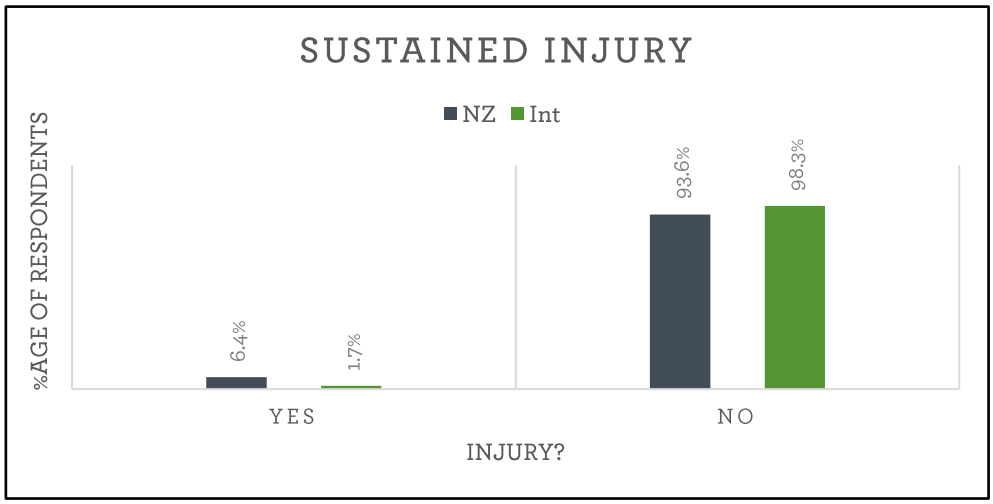

Figure 29: Respondents' injury

Results

The injury rate across all sites was very low, with only 2.5% of groups reporting an injury to a member. When analysed by respondent nationality, New Zealand-led groups (n=83) reported an injury rate of 6.4% across all sites, compared with International-led groups (n=525) at 1.7%. Similarly, adjusting for group size New Zealand-led group members (n=251) reported an injury rate of 2.0%, while International-led group members (n=826) reported 0.7%. The types of injury reported comprised direct injury to leg and ankle joints from twists and rolls, and indirect injury from falls as a result of slips and trips – e.g., broken wrist.

Discussion

Given the number of groups reporting injury was very small (n=11), any inferences should be treated with caution; nevertheless, the injury rates reported are consistent with other DOC visitor research across a range of sites[v], and may therefore be regarded as generally indicative of occurrence. Furthermore, there are significant differences based on nationality and group size that merit noting. On a per individual basis, injuries to members of New Zealand-led groups occurred at nearly three times (2.9x) the rate of International-led groups, while the reported injury rate for groups of two or more (3.4%) was more than four times (4.3x) that of solo hiking groups (0.8%).

With respect to the type of injuries reported, it is clear from the descriptions that all resulted from walking across uneven or unstable trail surfaces. While all groups were able to self-evacuate their injured members, any and/or all of these incidences could conceivably have resulted in a SAR event. Furthermore, the results may indicate that injury rates are inversely related to skill level, with more than half of injury group respondents (54.5%) self-rating their skill as *'Advanced'*, and nearly three quarters (72.7%) reporting having hiked *'Five'* or *'More than five'* times in the previous year. However, this observation comes with a significant qualification: the specific group member injured was not recorded, and therefore may not have been the respondent; nevertheless, it remains plausible that familiarity with the New Zealand backcountry may be a driver of injury and SAR incidents at these sites.

4.5.13 Summary of Risk Profiles

As with the previous section, overall there is a high-level of consistency between New Zealand and International hikers across all questions, reinforcing the observation that hiker characteristics are broadly universal.

Backcountry Familiarity

Prior experience of hiking in the New Zealand backcountry was very high for New Zealand hikers. The large majority of International hikers reported prior experience, indicating they are hiking more than once while in New Zealand.

One in five International hikers reported no familiarity with the New Zealand backcountry, a level of inexperience nearly three times higher than New Zealand hikers.

Of hikers reporting *'No'* familiarity with the New Zealand backcountry, a quarter of New Zealand respondents and more than a third of Internationals were hiking solo.

Site Familiarity

Just over half of New Zealand hikers were undertaking the trail for the first time, compared with nearly all Internationals.

For International and New Zealand hikers who had previously visited the site, the distribution across the different previous visit intervals was very similar, the most common interval being *'Within last 5 years'*.

Repeat visitation is a strong indication that hikers' previous trail experience was sufficiently unproblematic and rewarding to warrant repetition and/or introduce someone else to the trail. The dynamic nature of the New Zealand backcountry is such that familiarity with a trail may not necessarily translate into enhanced risk management by hikers, and may work to the contrary.

Most International hikers will never return to the trail, yet can be expected to become sources of unofficial information via F2F and/or digital channels.

Group Familiarity

Group familiarity was very similar for New Zealand and International hikers.

Approximately one quarter of those hiking in groups of two or more had no previous hiking experience with their companions. Of these, one in six New Zealand hikers and one in ten Internationals rated their own skill levels as *'No skills'* or *'Beginner'*.

Familiarity with companions does not necessarily equate to an understanding of others' competencies regarding hazard assessment, risk management and dealing with adversity.

Of those hiking alone, nearly one in five had not previously hiked alone. The proportion of all International hikers undertaking their first solo hike on the research trails was nearly double that of all New Zealand hikers.

Approximately one fifth of New Zealand hikers and more than a quarter of International hikers chose to hike solo, with many preferring to do so.

Risk Preferences

New Zealand and International hikers shared a very strong preference to *'Avoid'* risk, while also sharing a slight preference to *'Encounter'* some risk.

Hikers often hold *'Avoid'* and *'Encounter'* perspectives simultaneously, and risk preferences can be represented as a function of the two. Hikers acknowledge there is a 'baseline' level of risk associated with hiking in the backcountry, and encountering this level of risk is acceptable relative to the benefits obtained.

Skill Self-Assessment

Overall, New Zealand and International hikers' skill self-assessments were distributed similarly across the scale, with *'Intermediate'* and *'Advanced'* skill levels together accounting for over three quarters of both hiker groupings.

The average skill level of International hikers is significantly higher than that of New Zealand hikers, potentially translating to a greater 'margin for error' on the trail. Nearly half of New Zealand hikers assessed their skill level as *'Intermediate'* while the same proportion of Internationals assessed their skill level as *'Advanced'*.

In general, the self-assessments strongly indicate that both New Zealand and International hikers are choosing to undertake trails appropriate for their competencies.

Frequency of Activity

Under half of New Zealand and nearly three quarters of International hikers undertook more than five hikes in the previous 12 months.

On average, International hikers are likely to be more experienced, skilled and physically fit than the average New Zealand hiker.

History of Misadventure

The proportion of New Zealand and International hikers who had previously suffered misadventure were essentially identical across all three types of misadventure.

Becoming *'Lost'* was by far the most common misadventure. For both hiker groupings, the rate of being *'Lost'* was nearly nine times greater than the rate for being *'Seriously injured'*, indicating that the large majority of *'Lost'* incidents do not result in hikers needing to be *'Rescued'*.

Of hikers who had previously suffered a misadventure, nearly one third of New Zealand hikers had suffered multiple misadventures, compared with just over one tenth of Internationals.

Overall, there is a baseline level of misadventure for the population of hikers who undertake more challenging trails. Established assumptions driving ongoing investment in the design and delivery of initiatives seeking to reduce the rate of serious incidents and accidents can be expected to generate diminishing returns.

Preparedness

Overall, hikers' pre- and post-hike self-assessments of preparedness relative to nine statements were very similar for both International and New Zealand hikers. Pre- and post-hike distribution of ratings of agreement with the statements was also very similar across both hiker groupings.

Almost all statement ratings fell within, or very close to, the 'ideal' *'Agree totally'* range.

The consistency of pre- and post-hike ratings across preparedness statements and both hiker groupings strongly indicates the large majority of hikers understand the demands of the trails they are undertaking, and choosing trails appropriate for their competencies.

Generic risk messaging from official sources, likely reinforced by unofficial sources, is positively contributing to hikers adopting appropriate risk-mitigating behaviours.

With the exception of a few minor injuries, virtually all respondents' hiking experiences unfolded as expected and without any adverse events.

Agreement with one statement - *'I have/had everything I need/ed to survive a night in the open'* - rated significantly lower than all other statements, and also experienced a strongly negative shift between pre- and post-hike agreement ratings.

There is a stark difference in the mindset of hikers undertaking day hikes with those undertaking multi-day hikes, such that day-hikers have a significantly reduced probability of surviving an unexpected night in the open.

Safety Management

Ten safety management statements were sequenced and differentiated into 'Belief', 'Attitude' and 'Behaviour'. Overall, eight statements reported meaningful differences between pre-hike and post-hike agreement ratings for at least one hiker grouping.

The agreement ratings of the 'Belief' statements were very similar across International and New Zealand hikers. Ratings of these statements were essentially unchanged post-hike from pre-hike, indicating hikers' beliefs about the relationship between safety and the presence of people were not challenged by their trail experience.

For two 'Attitude' statements, New Zealand hikers' pre-hike ratings were effectively unchanged post-hike, whereas International hikers experienced slight shifts. The other two 'Attitude' statement ratings were markedly different post-hike for both hiker groupings. Attitude towards DOC *in-situ* safety messages/signs/markers declined substantially post-hike, with many hikers considering the messaging largely irrelevant to them.

These rating differences indicate hikers' lived experiences have the potential to modify their attitudes to managing their own safety.

International hikers put greater 'reliance' on DOC and companions for their safety than New Zealand hikers, and are significantly less likely to be able to rapidly alert 'emergency' services, if at all.

Three of four 'Behaviour' statements reported significant shifts between pre-hike and post-hike ratings.

The strongly positive ratings shifts for the two 'reliance' behaviour statements indicate *ex post facto* attribution: completing the hike without encountering any adversity led hikers to attribute their achievement to their own ability and effort. This shift also indicates hikers felt they had greater agency over their own safety post-hike than they did pre-hike.

Solo hikers report lower agreement ratings for the reliance statements than hikers in groups of two or more, indicating soloists are more self-reliant and moderating of their risk-taking behaviour.

For the two 'emergency' behaviour statements, International hikers reported markedly poorer ratings for their ability to summon help or have third parties do so on their behalf, than New Zealand hikers. International hikers also reported a significant post-hike decline in agreement ratings pertaining to communications. International hikers are less inclined than New Zealand hikers to carry satellite-based communications technologies, preferring to rely on less reliable cellular coverage.

The differences between post-hike and pre-hike ratings indicate hikers' lived experiences have the potential to modify their behaviours to better manage their own safety. Both International and New Zealand hikers need to make a significant shift towards 'ideal' behaviours in order to improve the success rate of SAR incidents.

Challenge Assessment

Overall, New Zealand and International hikers rated the challenge very similarly, pre- and post-hike.

Over half of all hikers assessed trails as *'Moderately'* challenging, both pre- and post-hike.

The very close similarities between the scale distribution of pre- and post-hike ratings for both International and New Zealand hikers strongly indicates that the two groupings share a common frame to assess and evaluate the degree of challenge presented by a trail.

Hikers use the same assessment frame irrespective of whether or not they are hiking alone or as a member of a group.

The assessment frame shares sufficient commonality amongst all hikers that it can be confidently used to inform risk perception and safety messaging.

Risk Assessment

Overall, the distribution of research trail risk assessments across the Paling Perspective Scale was very similar for both International and New Zealand hikers.

International hikers consistently assessed the degree of risk somewhat lower than New Zealand hikers, although this difference is not indicative of more problematic outcomes. Nearly two

thirds of New Zealand hikers assessed risk higher than the general population's 'comfort' zone (*'Zero'* to *'Low'* risk), compared with less than half of International hikers.

Injury

Injury rates on the research trails were consistent with other DOC visitor research across a range of sites.

On a per individual hiker basis, injuries to members of New Zealand-led groups occurred at nearly three times the rate of International-led groups. The reported injury rate for groups of two or more was more than four times that of solo hiking groups.

For both New Zealand and International hikers, all injuries resulted from walking across uneven or unstable trail surfaces, comprising direct injury to leg and ankle joints from twists and rolls, and indirect injury from falls as a result of slips and trips.

All groups were able to self-evacuate their injured members, although any and/or all of these incidences could conceivably have resulted in a SAR event.

Injury rates may be inversely related to skill and activity levels, with more than half of injury group respondents self-rating their skill as *'Advanced'*, and nearly three quarters having hiked *'Five'* or *'More than five'* times in the previous year.

Familiarity with the New Zealand backcountry may be a driver of injury and SAR incidents at these sites.

4.5.14 Overall Summary

Overall, there is a high-level of consistency between New Zealand and International hikers across most questions, reinforcing the observation that hiker characteristics are broadly universal.

As such, generic risk messaging is equally effective across all nationalities. Tailoring these messages for different channels, especially digital, should therefore be undertaken with caution to ensure this is not counterproductive to improving risk perception and increasing risk mitigating behaviours.

5 Research Implications

The final section discusses the implications of the research programme for further fields of enquiry.

5.1 Contribution to NZSAR Strategic Goals

This research contributes primarily to the fourth NZSAR strategic goal:

Goal 4. SAR Prevention – Reduce number and severity of SARs -

i. Lead SAR preventative strategies
ii. Facilitate more prevention activities and coordination
iii. An informed responsible public.

The findings presented in this report can be directly applied to each of the three sub-goals.

Furthermore, it is important to emphasise that these findings represent an initial limited analysis of the entire data set, and therefore should not be considered exhaustive. The richness of the data set warrants further 'deep-dive' analysis to address specific lines of enquiry, some of which are described in the following section.

5.2 Further Research & Emergent Questions

The purpose of the 'Visitor Risk Perception and Messaging Influence Research Programme' was to:

- Gain greater understanding of visitors' perception of risks at place, and how much risk they think they are exposed to;
- Identify where visitors get their information from, and what influence that information has on visitors' risk-related decision-making.

While the programme has served the above dual purposes, it has further revealed the high degree of complexity in this social context and the very substantial knowledge gaps in current understanding of how hikers ultimately reach decisions relating to their management of risk when hiking in the backcountry. The case for follow-on research is therefore compelling.

In the first instance, the research reported here should be repeated over the 2022/23 summer season to capture any shifts in visitor risk perception and behaviour post-COVID lockdowns and border closures, and to build on the baseline that has been established. The research should be repeated biennially thereafter to enable observation of trends along with the impact of various initiatives and innovations in messaging.

With respect to new lines of enquiry, as inevitably occurs when undertaking primary research, a multitude of further questions has emerged both from the data and the process of gathering that data; essentially, while understanding of the previously 'known' drivers of visitor risk may have increased, so too has the lack of understanding about previously 'unknown' drivers. The emergent questions below are drawn directly from the analysis in this report, as well as from the synthesis of additional research on risk-related behaviours and social science more broadly.

The questions are arranged into potential future research themes.

Information Communication

- Does designing and delivering risk messaging specifically for a trail's assigned primary user group increase - or decrease - the efficacy of that messaging for that group? Does that specificity decrease – or increase - the efficacy of the risk messaging for other users of the trail?
- When designing trail messages, signs and markers, what risk-related information must be provided, and why? If information must be provided, what is the most efficacious level of detail to communicate, and to whom?
- Should information communication for problematic trails comprise multiple messages with varied content optimised for different hiker applications? If yes, what are the variables that determine that content?
- Does the size of hiking group affect the efficacy of a given risk message, sign or marker? If yes, how and in what ways? Do solo hikers process a given risk message, sign or marker differently from how they would if part of a group of two or more hikers? If yes, how and in what ways?
- Does designating a trail as being more suited to solo hikers influence the risk perceptions and behaviours of soloists and/or hikers in groups of two or more on that trail? If yes, how and in what ways?
- Is the utility and/or efficacy of risk messages, signs or markers a function of the quantity, frequency, distribution, designs, etc thereof ? If yes, what are the variables, and what are their relative saliences?
- What explains hikers' low overall use of DOC VCs despite them being a highly trusted official source in close proximity to trails and holding the most current information? Why are repeat VC visits by hikers far fewer than first-time visits?

Information Integration

- Do hikers consistently privilege different information sources and channels according to a heuristic and/or hierarchy? If yes, how do hikers acquire a heuristic and/or establish a hierarchy, and how subject to modification are they?
- Is hikers' use of an information source or channel influenced by the degree of trust they have in same? If yes, how does that influence occur, and to what extent?
- Is hikers' use of and/or trust in an information source or channel influenced by the social status/mana of same? Is a hiker's use of and/or trust in an information source or channel influenced by the degree of regard the hiker has for that source? If yes, how does the influence occur, and to what extent?
- How do hikers integrate official and/or unofficial information, both pre- and during a hike, to arrive at a coherent understanding of risk at place? To what extent and in what way are unofficial sources of risk information moderated by official sources?
- Does the currency of information moderate the value or trust hikers afford it? If yes, how is this moderation accomplished?
- Does social media shape hikers' risk perceptions and influence decision-making with respect to risk management? If yes, in what way and to what extent?
- What is the efficacy of safety messages communicated to hikers as they exit a trail following completion of the hike?
- Which websites and apps do hikers privilege, and why? What drives hiker loyalty to a particular social media site or app? Do hikers' backcountry information-related digital footprints parallel their everyday use of social media? If not, how do they differ and why?

- Are hikers more conservative in their risk assessments and mitigating behaviours before a hike than after? If yes, does this result in a steady progression over time towards a more laissez-faire approach to risk management?

Mental Models

- What elements do hikers incorporate into their conceptions and evaluation of risk in the backcountry?
- Is there a difference between day walkers' mental models of risk and that of overnight walkers'? If yes, how do they differ?
- How do International and New Zealand hikers frame their hiking 'career' in the New Zealand backcountry? Do these frames differ, and if so, how?
- Do hikers' challenge-assessment frames differ from hiker to hiker? If yes, in what ways do they differ, and to what extent do they result in differences in assessments?
- Do official DOC trail grades bias or distort hikers' own assessments of the degree of challenge and risk presented by a trail? If yes, how do trail grades influence hikers' assessment frames, and is that influence consistent across the large majority of hikers? Can this influence be used to inform risk perception and safety messaging?
- What are the 'expert' assumptions about International hikers and their rates of misadventure? Are these assumptions counterproductively influencing the design and delivery of safety messaging?
- How do hikers perceive and assess risks at a given place? How does the spatial context influence that process, if at all?
- How do hikers incorporate the potential for adverse events into their risk assessments? How does preparedness for such events influence those assessments, and to what extent?
- Do hikers experience diminishing utility of DOC safety messages, signs and markers the more they encounter and engage with same across multiple sites?
- Do 'experts' tend to discount or dismiss hikers' decision-making around risk management in the backcountry? Do hikers tend to over-estimate their competencies in risk management in the backcountry? If yes, do either of these tendencies consistently act to the detriment or benefit of hikers?
- Do hikers incorporate self-assessments of their own competencies into their risk assessments at place, or does this occur independently and/or sequentially? .
- What elements of the hiking experience do hikers perceive as being controlled by or the responsibility of DOC? Which of those elements do hikers consider determinative of their safety?
- Do time-constraints and/or goal-directed behaviour influence hikers' decision-making and risk-taking behaviours? If yes, how and to what extent?

Social Context

- Does group type influence behaviours relating to risk-taking and responding to misadventure? If so, how?
- Does group familiarity influence behaviours relating to risk perception, risk-taking and responding to misadventure? If so, how?
- Do the various values, beliefs, knowledge, attitudes and understanding about risk held by individual group members typically coalesce into a group risk culture? If yes, how does this occur and over what timeframe? To what extent are group members aware that they

are contributing to the creation of a group risk culture, and how this culture is influencing their risk management behaviours?

Return on Investment

- Is there a baseline level of misadventure for the population of hikers who undertake more challenging trails? If so, how can that baseline be established?
- What 'expert' assumptions inform ongoing investment in initiatives seeking to reduce the rate of serious incidents and accidents to zero?
- When hikers become lost, does this progress to decisions and behaviours that result in greater risk-taking and increase the likelihood of serious injury? If so, to what extent and at what rate does this occur? Can this progression be leveraged to increase RoI on SAR reduction initiatives?

6 Appendices

6.1 Appendix 1: Questionnaire P.1

NZSAR New Zealand Search and Rescue

Tongariro National Park Visitor Survey: Tongariro Alpine Crossing/ TAC (Pre-hike)

DATE: _ _ / _ _ / _ _ **TIME (24hr): _ _ : _ _** **SURVEYOR (Initials): _ _ _** **FORM #: _ _ _** *(Office use only)*

SURVEY SITE: Mangatepopo Car Park **Other (*specify*) _____**

Q0. Are you walking TE ARAROA/New Zealand's Trail? Yes No

Q1. A. How many PEOPLE are in your tramping/hiking party/group (including you)? ___ # of people

B. Please indicate age/sex/nationality/country of residence of group members *(1st 4 persons only)*

Respondent =1	Age	Sex (M/F)	Nationality	Normal Country of Residence
1 (You)				
2				
3				
4				

C. *(If normally residing in New Zealand)* **Where do you live/reside?** (*specify city/town/rural area*) _____

D. What best describes the nature of your tramping/hiking party/group?

Solo/Alone Family/Couple Friends Recreational Club
Commercial Guided Other *(specify)* _____

E. (*If 'Solo/Alone'*) **Have you ever tramped/hiked alone in the backcountry BEFORE this trip?** Yes No

F. (*If NOT 'Solo/Alone'*) **Have you tramped/hiked with these companions BEFORE this trip?** Yes No

Q2. When did you DECIDE to make this trip to Tongariro Alpine Crossing/TAC?

Today Within last 48 hours Within last week Within last month 2 or more months ago

Q 3. A. (*Thinking about the sources of information you have USED to plan this and previous tramping/hiking trips*) **Please RATE your level of TRUST in the following SOURCES of information.** *(circle rating)*

*(**X**=Never used **0**=Do not trust at all **2**=Trust moderately **4**=Trust totally)*

Family/friends	X	0	1	2	3	4
People I met who have done the tramp/hike	X	0	1	2	3	4
Department of Conservation (DOC) website	X	0	1	2	3	4
DOC brochure	X	0	1	2	3	4
DOC Visitor Centres	X	0	1	2	3	4
i-SITE Visitor information Centres	X	0	1	2	3	4
'Official' visitor/tourist websites	X	0	1	2	3	4
MSC (New Zealand Mountain Safety Council) website/on-line videos	X	0	1	2	3	4
Guidebooks	X	0	1	2	3	4
Social media sites (e.g., facebook; YouTube; Instagram; etc)	X	0	1	2	3	4
Mobile information apps (e.g., CamperMate; Rankers; etc)	X	0	1	2	3	4
Commercial tourism operators	X	0	1	2	3	4

B. (*Looking at the ABOVE list of sources of information*) **Please indicate which of the ABOVE sources of information you used for THIS trip to TAC.** *(tick all that apply – tick boxes on left of each row)*

C. (*If you used 'Social media sites' to source information for THIS trip*) **Please indicate which of the following sites you used.** *(tick all that apply)*

facebook YouTube Instagram QZone Weibo Twitter Reddit
Pinterest Other (*specify*) _____

D. (*If you used 'Mobile information apps' to source information for THIS trip*) **Please indicate which of the following apps you used.** *(tick all that apply)*

CamperMate Rankers Essential New Zealand Breadcrumbs Metservice
Other (*specify*) _____

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Department of Conservation Te Papa Atawhai

NEW ZEALAND SEARCH AND RESCUE Rapu Whakarauora Aotearoa

Questionnaire P.2

Q4. (*Before this trip*) Did you visit/contact DOC's Whakapapa VISITOR CENTRE? Yes No

Q5. Have you tramped/hiked in New Zealand's backcountry BEFORE this trip? Yes No

Q6. How FAR will you go on THIS trip?
Full crossing – to Ketetahi Soda Springs Red Crater Blue Lake Other *(specify)* _____

Q7. A. Is this your FIRST trip to Tongariro Alpine Crossing/TAC? Yes No

B. *(If 'No')* When was your LAST visit to Tongariro Alpine Crossing/TAC?
Within last week Within last month Within last year Within last 5 years Over 5 years ago

Q8. How much do you AGREE with the following statements? *(circle level of agreement)*

	(0=Do not agree at all 2=Agree moderately 4=Agree totally)
When tramping/hiking in the backcountry I seek to AVOID risk	0 1 2 3 4
When tramping/hiking in the backcountry I want to ENCOUNTER some risk	0 1 2 3 4

Q9. A. How would you RATE your current level of SKILL as a tramper/hiker?
No skills Beginner Intermediate Advanced Expert Professional

Q10. A. How MANY times have you been tramping/hiking over the past 12 months/year (including this trip)?
1x 2x 3x 4x 5x more than 5x

B. (*If you have tramped/hiked in the backcountry before this trip*) Have YOU ever been:

LOST when tramping/hiking in the backcountry	Yes No
SERIOUSLY INJURED when tramping/hiking in the backcountry	Yes No
RESCUED when tramping/hiking in the backcountry	Yes No

Q11. How much do you AGREE with the following statements about this tramp/hike? *(circle level of agreement)*

	(0=Do not agree at all 2=Agree moderately 4=Agree totally)
I have ALL the information I need to complete my tramp/hike safely	0 1 2 3 4
I have ALL the skills I need to complete my tramp/hike safely	0 1 2 3 4
I have ALL the experience I need to complete my tramp/hike safely	0 1 2 3 4
I have ALL the physical fitness I need to complete my tramp/hike safely	0 1 2 3 4
I have ALL the equipment and clothing I need to complete my tramp/hike safely	0 1 2 3 4
I have ALL the food and drink I need to complete my tramp/hike safely	0 1 2 3 4
I have EVERYTHING I need to survive a night in the open	0 1 2 3 4
I am FULLY aware of the weather forecast for this area today	0 1 2 3 4
I am FULLY aware of ALL the natural hazards I may encounter on this tramp/hike	0 1 2 3 4

Q12 How CHALLENGING do you think this trip to Tongariro Alpine Crossing/TAC will be for you?
Not at all Slightly Moderately Very Extremely

Q13. How much do you AGREE with the following statements? *(circle level of agreement)*

	(0=Do not agree at all 2=Agree moderately 4=Agree totally)
I will RELY on my companions/other guests to keep me safe on this tramp/hike	0 1 2 3 4
I will RELY on DOC to keep me safe on this tramp/hike	0 1 2 3 4
I am able to contact/alert emergency services at ALL times and locations	0 1 2 3 4
If I do NOT return as planned, a person/organisation WILL notify emergency services	0 1 2 3 4
DOC safety messages/signs are intended for people LESS capable than me	0 1 2 3 4
DOC safety messages/signs EXAGGERATE the hazards and risks present on tramps/hikes	0 1 2 3 4
I feel SAFER when there are other people on the track/trail	0 1 2 3 4
The most popular tracks/trails are always the SAFEST tracks/trails	0 1 2 3 4
DOC safety messages/signs/markers on THIS track/trail are CONFUSING/UNHELPFUL	0 1 2 3 4
DOC safety messages/signs/markers on THIS track/trail do NOT help me be MORE safe	0 1 2 3 4

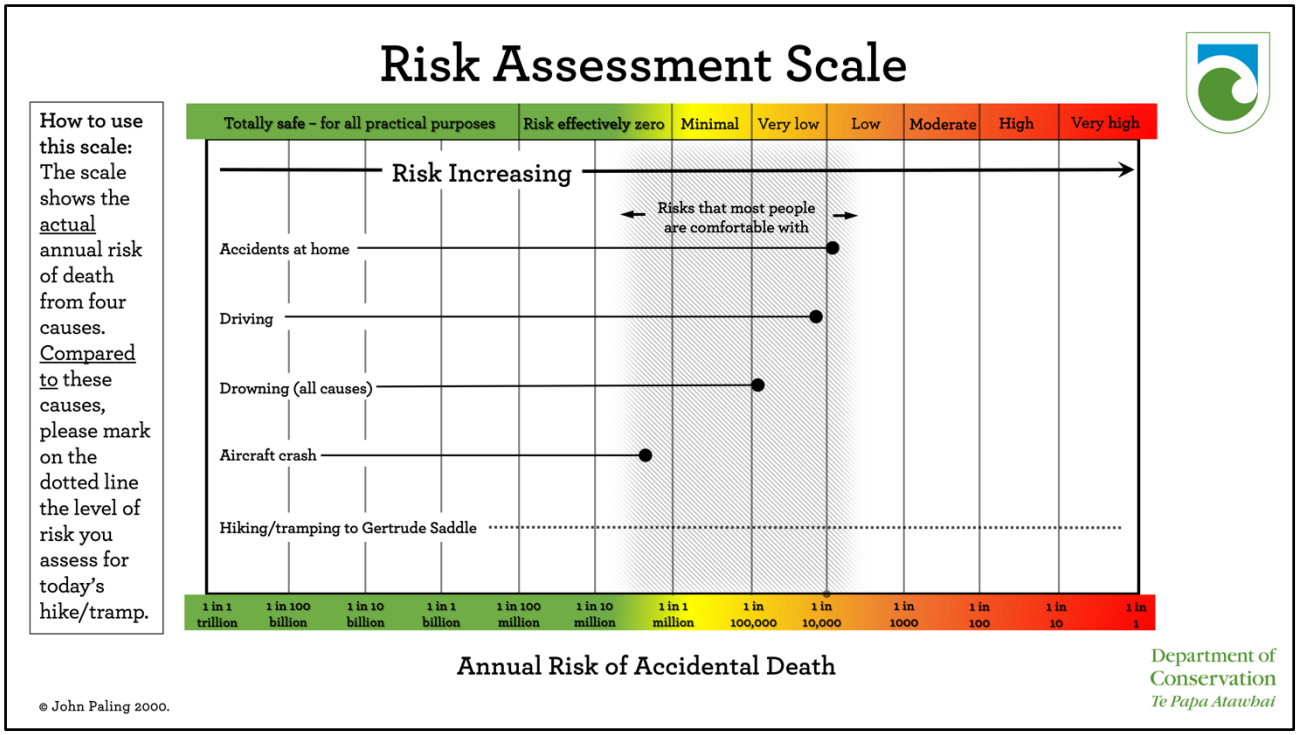
Q14. How much RISK do you assess for this trip to Tongariro Alpine Crossing/TAC?
Zero Minimal Very Low Low Moderate High Very High

THANK YOU FOR YOUR TIME! ☺

Department of Conservation
Te Papa Atawhai

NEW ZEALAND SEARCH AND RESCUE
Rapu Whakarauora Aotearoa

6.2 Appendix 2: Paling Perspective Scale



The Paling Perspective Scale is a graphical risk assessment tool intended to enable the public to compare the probability of different risks via a visual context. The scale augments probability levels with word descriptors, colours and other known risks familiar to the public to assist interpretation. The scale shows only the *probabilities*, not the *consequences* of a particular risk.

It should be noted that the PPS was originally developed in the medical sector to communicate to patients the risk associated with taking part in experimental treatments. Its purpose was to address five core challenges associated with communicating risk *(see below)*. The author of this report was the first to adapt and apply the PPS to outdoor recreationists, field testing it with hikers on *Tongariro Alpine Crossing* in early 2017. Respondents found PPS to be very intuitive to use, and typically were able to make subjective risk assessments in 10 to 15 seconds. The PPS has since been used in several DOC research projects at a range of sites.

Challenges to Understanding Risks

1. *Emotions Outweigh Facts*

When determining what represents a significant risk, most people are influenced more by emotional factors than by well-documented empirical facts. It is therefore important when communicating risk to recognise the instinctive bias people typically bring to their judgments.

2. *Risks vs Hazards*

There is an important distinction between risks and hazards. The two are often confused, resulting in much time and energy being devoted to adverse events that are in fact unlikely to ever happen.

3. *Multiple Causes*

People tend to think of harm being the consequence of a single cause. In reality there are usually multiple contributory factors that lead to harm actually occurring. Some factors may not be usually considered risk factors, making it much more complex to define a risk.

4. *Unforeseen* Consequences

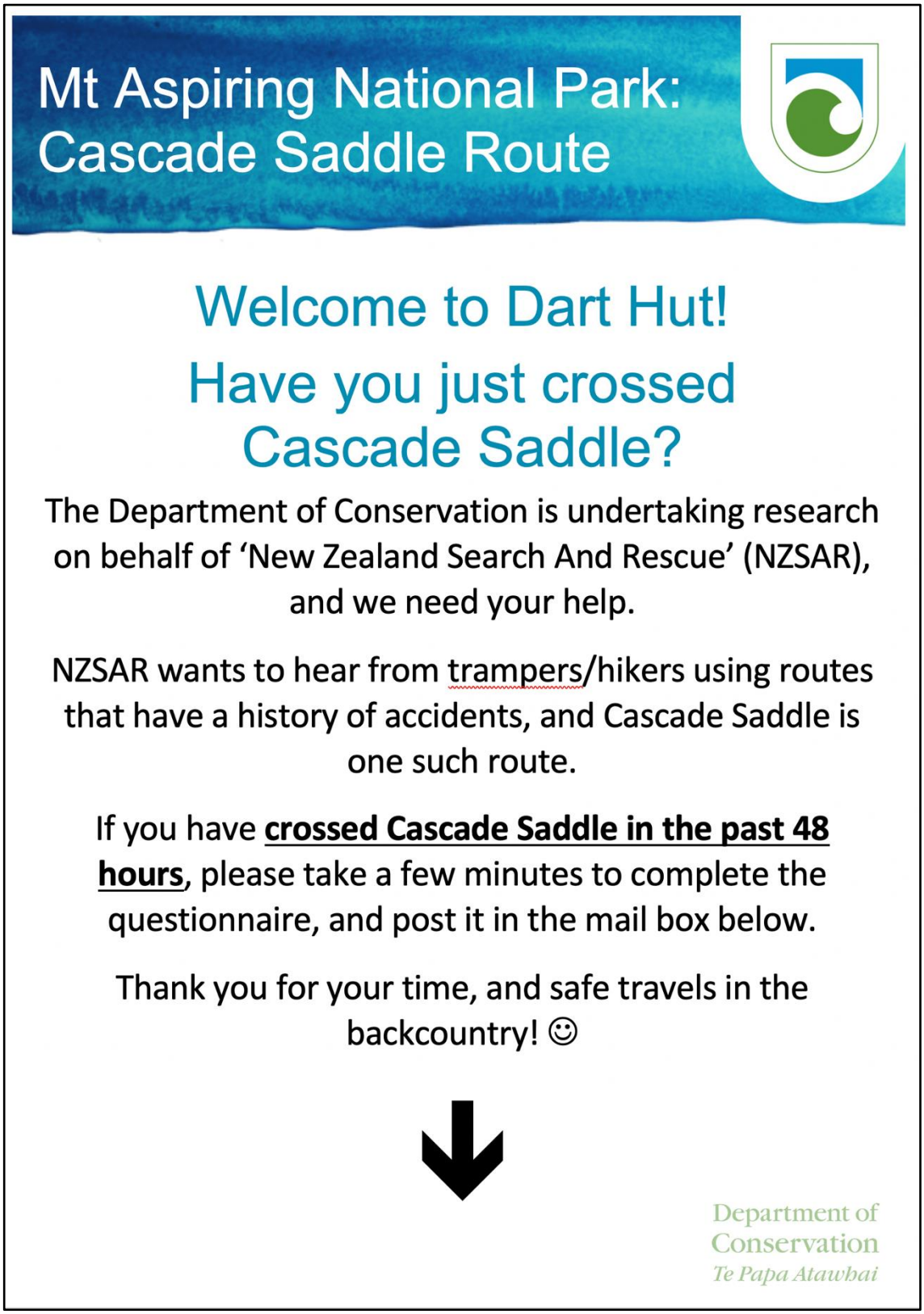
In trying to avoid a risk, it is very common to change some element of the situation to deliver a solution. However, due to the complexity issue, such interventions can inadvertently result in exposure to new and/or different risks, or even create risks that did not previously exist.

5. *Trade-offs: Risks vs Benefits*

For some people, even a large risk is worth taking if the benefit is highly valued. When people make personal decisions about risks, they often make their judgment by balancing the risks with the hoped for benefits.

Risk Communication Institute 2021

6.3 Appendix 3: Hut Survey Invitation Notice



Mt Aspiring National Park:
Cascade Saddle Route

Welcome to Dart Hut!

Have you just crossed Cascade Saddle?

The Department of Conservation is undertaking research on behalf of 'New Zealand Search And Rescue' (NZSAR), and we need your help.

NZSAR wants to hear from trampers/hikers using routes that have a history of accidents, and Cascade Saddle is one such route.

If you have **crossed Cascade Saddle in the past 48 hours**, please take a few minutes to complete the questionnaire, and post it in the mail box below.

Thank you for your time, and safe travels in the backcountry! ☺

Department of Conservation
Te Papa Atawhai

[i] Ordinal scales are variable measurement scales used to depict the *order* of variables – not the *difference* between variables. In this case, each labelled point on the scale represents a degree of presence along a continuum, with the difference between points arbitrary – i.e., the degree of change cannot be measured in absolute terms.

[ii] Weighting boosts the analytical value of each response according to the degree the attribute or quality is present, such that the value increment between each point is not consistent; i.e., each additional point on the rating scale is increasingly valuable - the greater the presence, the greater the weighting. For example, a rating of '4' is the ultimate high score, and therefore deemed to be of the highest value; weighting amplifies this status by according additional value, such that the analytical value of a '4' rating is more than twice that of a '2' rating, which in turn is more than twice that of a '1' rating.

[iii] StatsNZ: International Travel June 2019

[iv] ibid

[v] 'Day Hikes' Visitor Survey 2019/20: n=1,693; injury rate 2.9% (sites included Tongariro Alpine Crossing n=479)