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Willegers, Marley; Woodman, Tim; Tilley, Flo

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Agentic emotion regulation in high-risk sport: An in-depth analysis across climbing disciplines

Marley Willegers, Tim Woodman, Flo Tilley
Institute for the Psychology of Elite Performance, Bangor University, UK

Author Note

Correspondence should be addresses to Marley Willegers, Institute for the Psychology of Elite Performance, Bangor University, UK. Email: pepa3a@bangor.ac.uk

Abstract

Research has now debunked the standpoint that high-risk sports participants are a homogenous group of sensation seekers (Barlow et al., 2013); the process of agentic emotion regulation is a primary motive for high-engagement high-risk sports (i.e., mountaineering). The evidence, however, remains cross-sectional, and there is currently no evidence to support the timeline of this process. We aimed to bridge that gap by investigating the process of agentic emotion regulation over three post-participation time points across different disciplines of climbing that vary in risk and objective danger. Emotion regulation is the process by which individuals alter the nature, intensity, and duration of their emotions (Gross, 2008). Agency refers to individuals' perceived control over their internal beliefs, desires, intentions, and actions (Bandura, 1997). The results from two retrospective (n = 161, n = 134) studies and one longitudinal (n = 45) study revealed that those who engage in high-risk forms of climbing (i.e., traditional climbing) experience a greater increase in agency and emotion regulation difficulty after participation than individuals who participate in lower-risk forms of climbing (i.e., sport climbers) and other relatively low-risk sports (i.e., swimming). This research supports the benefits of high-risk activities for regulating participants' agentic emotion regulation difficulties.

Keywords: risk-taking sport, transferable effects, sensation seeking, mountaineering, traditional climbing

1. Emotion regulation in high-risk sport: An in-depth analysis across climbing disciplines

High-risk sports are psychologically captivating, in part, because participants appear to risk their lives for the sake of it, and the motive that might underlie such activities has remained rather elusive (Barlow et al., 2013). Despite the risks, or perhaps because of the risks, in contrast to what some perceive as an ever-increasing sanitization of society (Woodman, Hardy, & Barlow, 2020), participation in high-risk sports such as white-water kayaking, rock climbing, and skydiving is increasing (Thorpe & Dumont, 2018). We use the term *high-risk sports* to define sports where the possibility of severe injury or death is inherent in the activity in the event of mismanagement or something going awry (Cohen et al., 2018; Windsor et al., 2009). Sports widely considered high-risk sports include white water kayaking, traditional rock climbing, and mountaineering (Cohen et al., 2018).

The high-risk sports literature has evolved considerably beyond unidimensional interpretations of Zuckerman's (1979) Sensation Seeking Theory. Agentic Emotion Regulation Theory is one such example (Barlow et al., 2013). Despite these advances, there is a lack of literature on the specific evolution of the agentic emotion regulation motivation that leads individuals to return to these activities. This paper aims to bridge that gap by exploring high-risk sports individuals' post-activity timeline of agentic emotion regulation to further our understanding of the underlying motivation for high-risk sports.

1.1 Limitation of the sensation seeking view for understanding the motives for high-risk sports

Research on the motives underlying high-risk sports participation has typically viewed participants through the single-focus lens of Zuckerman's sensation seeking theory (1964).

Although Zuckerman's theory has helped, in part, to explain the motives underlying some high-risk sports (e.g., skydiving), the literature and media have perpetuated the narrative that high-risk sport participants are a homogenous group of sensation seekers (see Breivik, 1996; Horvath & Zuckerman, 1993; Zuckerman, 1994, 2007). However, these conclusions run counter to the motives reported by other high-risk sport participants, such as mountaineers and trans-Ocean rowers (Castanier et al., 2010; Lester, 2004; Woodman et al., 2010). Importantly, Zuckerman, Eysenck, and Eysenck's (1978) Sensation Seeking Scale (SSS-V) was never intended to be used as a measure of motives for high-risk sport (see Barlow et al., 2013). Specifically, the SSS-V measures individuals' propensity to engage in activities that Zuckerman assumed to increase stimulation and arousal, not their motivation for such activities (Zarevski et al., 1998; Zuckerman, 2007). In summary, Zuckerman never put forth sensation seeking theory as a *motive* for high-risk sports (cf. Barlow et al., 2013) so it is unsurprising that this theory has limited value for understanding such motives.

1.2 Agentic Emotion Regulation theory

Woodman, Hardy, and Barlow (2010) developed Agentic Emotion Regulation theory to explain the motives that might underpin participation in high-engagement high-risk sports (such as mountaineering and trans-ocean rowing, which require considerable planning and preparation). Emotion regulation is the process by which individuals' actions alter the emotions that they experience, when they experience them, and how they experience and express them (Gross, 2008). Agentic Emotion Regulation theory proposes that some high-risk sports provide the opportunity to experience external and easily identifiable sources of anxiety, and overcoming this anxiety helps bolster participants' sense of emotional control (Woodman et al., 2008; Woodman et al., 2009). The physical dangers implicit in high-risk activities require individuals

to exercise a variety of antecedent and response-based emotion regulation strategies (Gross, 2008) to manage strong emotions; failure to do so can have life-threatening consequences (Barlow et al., 2015; Breivik, 2010). Another facet of Agentic Emotion Regulation theory is agency. Agentic people intentionally influence their development and life circumstances (Bandura, 1997). The most fundamental mechanism of agency is individuals' perception of their ability to exercise control over important events in their life, in which they are in control of their internal beliefs, desires, and intent (Bandura, 1997). In contrast to the decisions made in domestic life, high-risk sports participants are often making decisions that will determine whether they live or die (Woodman et al., 2009). Thus, the high-risk sports domain requires a great deal of physical and emotional control to manage these risks. Participants report that engaging in high-risk sport is their only opportunity to manage these physical and emotional challenges and to meet their agentic emotion regulation expectations (Barlow et al., 2013; Lester, 2004; Woodman et al., 2010).

Woodman et al. (2010) found that expeditionary high-risk sports participants, such as mountaineers and trans-Atlantic rowers, displayed a greater difficulty regulating their emotions and a depleted sense of agency in daily life. However, they were able to assuage this difficulty by actively regulating their emotions in the high-risk domain. Mountaineers' and trans-Atlantic rowers' post-participation experience speaks to an agentic emotion regulation transfer benefit from their sporting to their interpersonal domain. These findings illuminate the agentic emotion regulation affordances of the high-risk sport domain and the regulatory function that participation therein may serve.

Within this agentic emotion regulation framework, Barlow et al. (2013) developed the Sensation Seeking, Emotion Regulation and Agency Scale (SEAS), which allows researchers to

explore different motives for engaging in high-risk activities. Using the SEAS, they revealed that mountaineers were predominantly motivated by agentic emotion regulation and that skydivers were motivated by sensation seeking. Additionally, mountaineers and controls displayed no differences on any sensation seeking factors, further refuting the universal sensation seeking view of high-risk sports. Importantly, only the mountaineers experienced positive emotion regulation and agency transfer effect from the mountaineering domain back into aspects of everyday life.

1.3 Purpose of the present research

Although research has identified that high-risk sports participants can derive immediate agentic emotion regulation benefits from participation and transfer these benefits back into their daily life (see Barlow et al., 2013; Woodman et al., 2010), we know nothing about the process of agentic emotion regulation thereafter. In short, although we understand that some high-risk sports participants derive an agentic emotion regulation benefit from their activity, we do not understand how their agentic emotion regulation difficulty evolves over time after participation. Such an understanding would go some way to explain the motives that underlie participants' repeated return to the danger of the high-risk sport domain. The purpose of the present research was to begin to address this gap and to investigate the relative decay of the agentic emotion regulation benefits derived from one's activity. Studies 1 and 2 aimed to provide a retrospective account of any differences between high-risk climbers' (mountaineers, traditional climbers) and low-risk sport participants' (sport climbing, bouldering, hiking, swimming) agency and emotion regulation difficulty post-participation. In Study 3, the national lockdown laws to control the COVID-19 pandemic resulted in individuals being temporarily unable to participate in their activity, which is unusual for many avid participants. This scenario provided an opportunity to

measure post-participation emotional regulation and agency difficulty in real-time (i.e., longitudinally). Further to this, we also aimed to confirm Barlow et al.'s (2013) finding that sensation seeking was not a motive for participation in some high-risk sports such as climbing. To that end, this paper aimed to test the following hypothesis across three studies.

1.4 Agency and emotion regulation hypothesis

Unlike low-risk sporting participants, high-risk climbers are motivated by the emotion regulation and agency function of participation. Thus, we hypothesized that only high-risk climbers' (i.e., mountaineers, traditional climbers) *difficulty with emotion regulation and agency* would significantly increase in the time after participation, with no such increase for low-risk climbers (i.e., sport climbers) and low-risk sport controls.

1.5 Sensation seeking hypothesis

High-risk climbers and low-risk sporting participants are not motivated by the sensation need satisfaction function of participation. Specifically, both high-risk climbers' (i.e., mountaineers, traditional climbers) and low-risk sporting participants' (i.e., sport climbers, runners) *sensation need satisfaction* will not significantly increase in the time after participation.

2. Study 1

The aim of Study 1 was to explore the retrospective sensation need satisfaction, emotion regulation, and agency difficulties of high-risk climbers (i.e., traditional climbers and mountaineers), relatively low-risk climbers (i.e., sport climbers), and low-risk sport controls (i.e., hikers, swimmers, golfers, cyclists) one day, one week, and six weeks after participation in their respective sporting activities. We selected these groups to allow us to investigate the sensation need satisfaction, emotion regulation, and agency difficulty of high-risk climbers after participation while controlling for environmental (sport climbing in mountainous natural

environments) and physical (physicality of low-risk sport) factors. Observing an increase in high-risk climbers' agency and emotion regulation difficulty and sensation need satisfaction after participation would speak to the regulatory function that their sport serves. In contrast, finding no change in agentic emotion regulation difficulty or sensation need satisfaction after participation would suggest that participants do not engage in their sport to regulate their sense of agentic emotion regulation (i.e., low-risk sports participants) or fulfil their sensation seeking needs.

2.1 Methods

2.2 Participants

We conducted an *a priori* G*Power analysis (Faul et al., 2007) for testing a 3 (time) × 4 (group) mixed-model ANOVA with a small effect size (η_p^2 = .02) and an alpha level of .05. The results showed that a total sample size of 116 (i.e., n = 29 per group) would be required to achieve a power of .80. The first and third author used convenience and snowball sampling methods via online social media platforms (i.e., Facebook, sporting online forums) to recruit 663 participants from various sporting activities (mountaineering, traditional rock climbing, sport climbing, golf, squash, swimming, cycling, rowing). Based on the demographic information provided therein, the first author categorized 161 participants from the initial 663 sample into their respective sporting groups. Specifically, *Mountaineers* were individuals who stated that mountaineering was their preferred sport and who reported being *intermediate* to *expert* in ability. *Traditional rock climbers* were individuals who stated that traditional climbing was their preferred sport, who reported being *intermediate* to *expert* in ability. *Sport climbers* were individuals who stated that sport climbing was their preferred sport and who did not participate in traditional climbing or mountaineering as a secondary sport. *Low-risk sport control* were individuals who participated in various low-risk sporting activities (such as hiking, golf, squash,

swimming, cycling, rowing) and did not participate in any high-risk sporting activities. In this study, there were no missing data from the 161 eligible participants.

2.2.1 High-risk climbing groups

Thirty-two participants were operationalized as *mountaineers* (27 men, 5 women; M_{age} = 38.41, SD = 16.02; $M_{years\ of\ participation}$ = 16.34, SD = 14.55). Mountaineering most often involves an attempt to reach a high point in remote mountainous terrain, which can require days, weeks, or months of walking and climbing, typically with no external aid. The dangers include avalanches, rock fall, falling (i.e., off a mountain face, into a crevasse), hypothermia, and frostbite, all of which can result in serious injury or death (Schöffl et al., 2012).

Fifty-eight participants were operationalized as *traditional rock climbers* (49 men, 9 women; M_{age} = 33.54, SD = 17.20; $M_{years\ of\ participation}$ = 14.35, SD = 15.78). Traditional rock climbing is one of the most dangerous climbing disciplines (Schöffl et al., 2012). Traditional climbing involves climbing outdoor rock faces and placing unfixed anchors and protection into cracks in the rock. If climbers fall and this protection fails, they will fall until the next piece of protection, which may fail due to the dynamic load placed upon that protection. As the protection is not fixed into the rock, the risk of severe injury or death is omnipresent (Schöffl et al., 2012).

2.2.2 Low-risk climbing group

Twenty-one participants were operationalized as *sport climbers*(13 men, 8 women; M_{age} = 34.00, SD = 13.09; $M_{years\ of\ participation}$ = 9.38, SD = 7.15). Sport climbing involves climbing rock faces or artificial indoor climbing walls with fixed protection bolts in the rock/wall and requires no self-placed unfixed protection. Lead climbers may fall twice the distance of the previously fixed protection that they clipped into, but the risk of the fixed protection bolts failing in the event of a fall is extremely low. Due to the security of these fixed bolts, sport climbing poses

minimal risk of severe injury and is a low-risk activity (Schöffl et al., 2012).

2.2.3 Low-risk sport controls

Fifty participants were operationalized at *low-risk sport controls* (25 men, 26 women; M_{age} = 32.78, *SD* = 13.99; $M_{years\ of\ participation}$ = 16.60, *SD* = 12.57).

2.3 Measures

We used the between-participation Sensation Seeking, Emotion Regulation and Agency Scale (SEAS) consisting of six sensation-seeking items (i.e., *I look forward to getting a physical thrill from participating*), six emotion regulation items (i.e., *The emotional elements of my life are difficult to deal with*), and six agency items (i.e., *I feel like people or circumstances are trying to impose limits on me*; Barlow et al., 2013). Participants responded on a Likert scale from 1 (*strongly disagree*) to 7 (*strongly agree*).

We asked participants to complete three different between-participation SEAS, by adopting the mindset of being absent from their sport for one day (Time 1), one week (Time 2), and six weeks (Time 3). These timeframes allowed us to measure the sensation seeking, emotion regulation, and agency fluctuation that participants experience after bouts of participation (Barlow et al., 2013). This design allowed us to capture any increased difficulty as a function of time since their last participation (see Barlow et al., 2013; Castanier et al., 2010, 2011; Woodman et al., 2009, 2010). Specifically, participants received the following introductions for each of the between-participation SEAS: Time 1, *Please answer the following statements thinking about your feeling toward your life the day after participating in your preferred sport or activity*; Time 2, *Please answer the following statements thinking about your feeling towards your life the week after participating in your preferred sport or activity*; Time 3, *Please answer the following statements thinking about your feeling towards your life six weeks after*

participating in your preferred sport or activity.

[1]Given the modification to the opening instructions to the SEAS, we sought to ensure that we retained the internal consistency of the scale. To that end, we tested the reliability of this version of the SEAS using the Hayes and Coutts (2020) SPSS OMEGA macro. McDonald's omega and Cronbach's alphas demonstrated very good reliability for all the SEAS 6-item factors across all three time points (see Table 1).

2.4 Procedure

The first author and third author, under supervision of the second author, shared a URL link on several social media platforms (i.e., Facebook, Instagram) that directed participants to the welcome page. The welcome page informed participants of the nature of the study and the data confidentiality and protection regulations in place. Participants provided informed consent and demographic information before completing the retrospective SEAS for one day, one week, and six weeks post participation; they were opted into a £100 prize draw on completion of the survey. The institutional ethics committee granted ethical approval.

2.5 Analysis strategy

We conducted statistical analyses using SPSS (IBM, Armonk, NY). We explored the hypothesized time × group interaction on emotion regulation difficulty, agency difficulty, and sensation need satisfaction. Specifically, we conducted a time × group mixed-model ANOVA for each of the SEAS factors and explored significant interactions using repeated measures ANOVA and one-way ANOVA follow-up tests where appropriate. This method allowed us to identify differences between high-risk and low-risk sports groups' sensation need satisfaction, emotion

[1] Using Mplus version 8.5, we conducted an additional Bayesian structural equation model (BSEM) to test the factor structure and model fit of the SEAS. We direct the interested reader to the supplementary material.

regulation, and agency difficulty over the three after participation time points (i.e., one day, one week, and six weeks). We reported Greenhouse-Geisser corrections and Bonferroni multiple comparisons when the analysis assumptions were violated (Bathke et al., 2009).

3. Results[2]

3.1 Main analysis

3.1.1 Emotion Regulation

The 3 (time) × 4 (group) mixed-model ANOVA results provided support for the emotion regulation hypothesizes. Specifically, the results revealed a significant main effect for Time, $F(1.47, 231.63) = 13.30$, $p < .01$, $\eta_p^2 = .07$, and a significant time × group interaction for emotion regulation $F(4.42, 231.63) = 3.19$, $p = .01$, $\eta_p^2 = .05$ (see Figure 1). Probing of the interaction via one-way repeated measures ANOVAs revealed a significant increase in emotion regulation difficulty across time for mountaineers $F(1.52, 47.16) = 11.46$, $p < .01$, $\eta_p^2 = .27$ and traditional climbers $F(1.48, 84.68) = 14.77$, $p < .01$, $\eta_p^2 = .20$. Bonferroni comparisons revealed that both mountaineers' and traditional climbers' difficulty with emotion regulation significantly increased between one day and one week (mountaineers $p = .02$; tradition climbers $p < .01$), and between one day and six weeks (mountaineers $p < .01$; traditional climbers $p < .01$) post-activity. Traditional climbers' difficulty also increased between one week and six weeks ($p = .02$). The follow-up tests for sport climbers ($p = .95$) and low-risk sport controls ($p = .50$) revealed no significant differences across time (see Table 1).

3.1.2 Agency

The 3 (time) × 4 (group) mixed-model ANOVA results did not support the agency

[2] Across all three studies in this paper, all significant interactions held when controlling for sex and years of sporting participation.

hypotheses. Specifically, the results revealed a significant main effect for Time, $F(1.39, 216.62) = 13.97$, $p < .01$, $\eta_p^2 = .08$, and no significant time × group interaction for agency, $F(4.13, 216.62) = .86$, $p = .48$, $\eta_p^2 = .01$ (see Figure 2 & Table 1). Follow-up tests for the main effect for time revealed that participants significantly increased in agency difficulty between one day and one week ($p < .01$), one week and six weeks ($p < .01$), and one day and six weeks ($p < .01$).

3.1.3 Sensation Seeking

The 3 (time) × 4 (group) mixed-model ANOVA provided support for the sensation seeking hypothesizes. Specifically, the results revealed a significant main effect for Time, $F(1.54, 242.13) = 4.08$, $p = .02$, $\eta_p^2 = .02$, and no significant main effect for Group, $F(3, 157) = 2.58$, $p = .06$, $\eta_p^2 = .04$, and no time × group interaction for sensation seeking, $F(4.62,242.13) = 1.02$, $p = .39$, $\eta_p^2 = .01$ (see Figure 3 & Table 1). The follow-up tests for the main effects revealed no significant increase in sensation need satisfaction across time.

4. Discussion

The aim of Study 1 was to test our hypothesis that high-risk climbers (i.e., traditional climbers and mountaineers) would display different emotion regulation and agency profiles in the time after sports participation to comparable low-risk climbers (i.e., sport climbers) and low-risk controls (i.e., hikers, swimmers, golfers, cyclists). Consistent with our hypothesis, mountaineers' and traditional climbers' emotion regulation profiles differed significantly from low-risk sport climbers and low-risk sport controls. Specifically, as hypothesized, difficulty in emotion regulation significantly increased across time only for mountaineers and traditional climbers. These findings demonstrate that mountaineers and traditional climbers experience better emotion regulation one day after participation compared to one week and/or six weeks afterward, indicating the emotion regulation function that high-risk climbing may serve.

The findings for agency revealed no such differentiation between the sports. That is, regardless of the nature of the sport (i.e., high- or low-risk), participants experienced greater agentic difficulty as time increased from their previous participation. However, previous research indicates that agency is not a primary motive for engaging in low-risk activities (Barlow et al., 2013; Woodman, MacGregor, & Hardy, 2020), so this effect clearly warrants further attention.

None of the groups displayed significant differences in sensation need satisfaction. Specifically, mountaineers' and traditional climbers' sensation-seeking profiles were no different from low-risk sport climbers, hikers, and swimmers. Thus, these results support our hypothesis and further refute the longstanding view that high-risk sports participants form a homogenous sensation seeking group (Freixanet, 1991; Zuckerman, 2007). In summary, the results supported the hypothesis that higher risk climbers would experience greater emotion regulation difficulties after participation but did not support the hypothesis that agency would reveal a similar pattern.

5. Study 2

The aim of Study 2 was twofold. First, we aimed to retest the hypotheses from Study 1. Second, we aimed to focus more sharply on different rock-climbing disciplines to test the hypothesis that traditional climbers will demonstrate significantly different emotion regulation and agency profiles during the time after sports participation compared to low-risk forms of climbing (such as sport climbers and boulderers) and low-risk sport controls. Specifically, only traditional climbers will significantly increase in agentic emotion regulation difficulty post participation.

6. Methods

6.1 Participants

We recruited a different sample of participants (n = 291) adopting the same method as

Study 1 (i.e., convenience and snowball sampling via social media platforms). Based on the demographic information provided therein, the first author categorized 134 participants from the initial 291 sample into their respective sporting groups. The first author used the same inclusion criteria from study 1 to categorise *traditional rock climbers*, *sport climbers*, and *low-risk sport controls* in study 2. With a sharper focus on different rock climbing disciplines, we sampled a population of *boulderers*. Bouldering is a form of rock climbing performed on small rock formations or artificial climbing walls without ropes or gear placement for protection. Boulders are typically 1-4 meters high with large foam mats (i.e., bouldering mats) placed around the falling zone for protection in the event of a fall. Due to the relatively low consequences of a fall (i.e., falling 1-4 meters onto foam mats), the risk of severe injury or death is minimal, and therefore we consider bouldering a low-risk sport. *Boulderers* were individuals who stated that bouldering was their preferred sport and who did not participate in traditional climbing or mountaineering as a secondary sport. The first author checked participants' email addresses to ensure the same participants did not participate in multiple studies. The groups were 35 traditional climbers (28 men, 7 women; M_{age} = 29.82, SD = 12.34; $M_{years\ of\ participation}$ = 9.87, SD = 10.87), 30 sport climbers (22 men, 7 women, 1 other; M_{age} = 24.06, SD = 5.49; $M_{years\ of\ participation}$ = 7.56, SD = 4.86), 32 boulderers (24 men, 8 women; M_{age} = 27.64, SD = 10.59; $M_{years\ of\ participation}$ = 8.12, SD = 10.49), and 37 low-risk sport controls (18 men, 19 women; M_{age} = 34.27, SD = 15.00; $M_{years\ of\ participation}$ = 10.36, SD = 12.77). In this study, there were no missing data from the 134 eligible participants.

6.2 Measures and procedures

Participants in Study 2 completed the same procedures and measures as those in Study 1. McDonald's omega and Cronbach's alphas demonstrated very good reliability for all the SEAS

6-item factors across all three time points (see Table 2).

7. Results

7.1 Main analysis

7.1.1 Emotion Regulation

The 3 (time) × 4 (group) mixed-model ANOVA results provided support for the emotion regulation hypothesizes. Specifically, the results revealed a significant main effect for Time, $F(1.55, 202.62) = 16.94$, $p < .01$, $\eta_p^2 = .11$, Group, $F(3, 130) = 2.95$, $p = .03$, $\eta_p^2 = .06$ and a significant time × group interaction for emotion regulation, $F(4.67, 202.62) = 5.62$, $p < .01$, $\eta_p^2 = .11$; see Figure 4 & Table 2). Probing of the interaction revealed a significant increase in emotion regulation difficulty across time for traditional climbers only, $F(1.54, 52.36) = 14.98$, $p < .01$, $\eta_p^2 = .30$. Bonferroni comparisons revealed traditional climbers' difficulty with emotion regulation significantly increased between one day and one week ($p < .01$), and between one day and six weeks ($p < .01$). The between-groups differences were significant at Time 2, $F(3, 130) = 3.35$, $p = .02$ $\eta_p^2 = .07$, and at Time 3, $F(3, 130) = 4.97$, $p < .01$, $\eta_p^2 = .10$, not at Time 1 ($p = .65$). Bonferroni multiple comparisons revealed that traditional climbers experienced significantly greater emotion regulation difficulty compared to low-risk sport participants one week ($p = .01$) and six weeks ($p < .01$) after sport participation.

7.1.2 Agency

The 3 (time) × 4 (group) mixed-model ANOVA results provided support for the agency hypothesizes. Specifically, the agency results revealed a significant main effect for Time, $F(1.57, 205.29) = 9.68$, $p < .01$, $\eta_p^2 = .06$ and a significant time × group interaction, $F(4.73, 205.29) = .7.81$, $p < .01$, $\eta_p^2 = .15$ (see Figure 5 & Table 2). Probing of the interaction via one-way repeated measures ANOVAs revealed a significant increase in agency difficulty across time for traditional

climbers only, $F(1.65, 56.33) = 13.31$, $p < .01$ $\eta_p^2 = .28$. Bonferroni comparisons revealed that traditional climbers' difficulty with agency significantly increased between one day and six weeks ($p < .01$), and between one week and six weeks ($p < .01$). Low-risk controls difficulty with agency significantly decrease post participation $F(1.55, 55.57) = 7.11$, $p < .01$ $\eta_p^2 = .16$. Bonferroni comparisons revealed that low-risk controls difficulty with agency significantly decreased between one day and one weeks ($p = .01$), and between one day and six weeks ($p = .02$). There was also a between-group difference in agency difficulty at six weeks after sport participation, $F(3, 130) = 4.77$, $p < .01$, $\eta_p^2 = .09$, with no such differences at one day ($p = .75$) or one week ($p = .26$). Bonferroni comparisons revealed that traditional climbers experienced significantly greater difficulty in agency than low-risk sports participants six weeks after sports participation ($p < .01$), which further supports the hypothesis.

7.1.3 Sensation Seeking

The 3 (time) × 4 (group) mixed-model ANOVA results supported the sensation seeking hypothesis, revealing no main effect for Time, $F(1.69, 220.75) = 1.51$, $p = .22$, $\eta_p^2 = .01$, and Group, $F(3, 130) = .1.03$, $p = .38$, $\eta_p^2 = .02$, and no significant time × group interaction for sensation seeking, $F(5.09, 220.75) = .74$, $p = .59$, $\eta_p^2 = .01$ (see Figure 6 & Table 2).

8. Discussion

The purpose of Study 2 was to retest the hypothesis of Study 1 with a sharper focus on different rock-climbing disciplines. Specifically, we aimed to test the hypothesis that traditional climbers would demonstrate a profile of emotion regulation and agency difficulty different from that of their relatively low-risk counterparts (i.e., sport climbers, boulderers, and low-risk controls). The results supported this hypothesis; only traditional climbers experienced a significant increase in emotional regulation and agency difficulty across time. Furthermore, the

sensation seeking results supported our hypothesis and results from Study 1, in which none of the groups differed from one another or increased in sensation need satisfaction across time. These findings further debunk the sensation seeking explanation for participating in all high-risk activities. The results thus support the notion that the greater agentic emotion regulation experiences that traditional climbing provide serve a regulatory function to reduce participants' agentic emotion regulation difficulties (Barlow et al., 2013).

9. Study 3

The aim of Study 3 was twofold. First, we aimed to retest the hypotheses from Studies 1 and 2; that traditional climbers will demonstrate significantly more pronounced emotion regulation and agency difficulty after sports participation compared to low-risk participants. Second, we aimed to address the main limitation of Studies 1 and 2; namely, the cross-sectional retrospective design. Specifically, we had not been in a position ethically to require participants to withdraw for long periods of time from their meaningful activity. Rather perversely, the recent COVID-19 pandemic provided a unique opportunity to test the hypotheses in a longitudinal design while people were temporarily prevented from participating in their activity.

10. Methods

10.1 Participants

We conducted an *a priori* G*Power analysis (Faul et al., 2007) for testing a 3 (time) × 3 (group) mixed-model ANOVA with a small effect size (η_p^2 = .02) and an alpha level of .05. The results showed that a total sample size of 102 (i.e., n = 34 per group) would be required to achieve a power of .80. The first author recruited a sample of 161 participants, adopting the same method as in Studies 1 and 2. Based on the demographic information provided therein, the first author categorized 45 participants from the initial 161 sample into their respective sporting

groups. The first author used the same inclusion criteria from study 1 and 2 to categorise *traditional rock climbers*, *sport climbers*, *boulderers* and *low-risk sport controls* in study 3. The first author checked participants' email addresses to ensure the same participants did not participate in multiple studies. The groups were 16 traditional climbers (6 men, 10 women; M_{age} = 31.75, SD = 10.40; $M_{years\ of\ participation}$ = 9.62, SD = 8.40); 17 low-risk climbers (i.e., sport climbers and boulderers; 6 men, 11women; M_{age} = 28.72, SD = 9.52; $M_{years\ of\ participation}$ = 4.88, SD = 4.62); and 12 low-risk sport controls (6 men, 6 women; M_{age} = 33.91, SD = 15.15; $M_{years\ of\ participation}$ = 25.33, SD = 18.24). We combined sport climbers and boulderers into a single group as there were insufficient numbers within each group to analyze separately. We deemed this appropriate given that both sports are low-risk climbing activities and both groups reported similar profiles when observed separately in Study 2. Due to participant dropout and sporting participation during the study, we struggled to recruit a satisfactory sample size for this study. Thus, the following analysis, with a sample size 45 participants, was only sensitive to identifying medium effect sizes (η_p^2 = .06, total sample size required 36; Faul et al., 2007).

10.2 Measures and Procedure

We largely replicated the measures and procedures from Studies 1 and 2 (i.e., demographic survey, SEAS, convenience, and snowball sampling via social media platforms). However, rather than completing the SEASs retrospectively at a single time point, participants completed the SEAS three times over fourteen days. After agreeing to participate, participants stated when they last participated in their sport before completing the first SEAS. We then contacted participants via email seven and fourteen days later to complete the second and third SEAS, respectively. Participants completed the study at different time points throughout the pandemic, and therefore the time between participants' last sporting participation and the

completion of the first SEAS varied. Participants time away from their sport, prior to participating the study, would have most likely affected their sense of agentic emotion dysregulation. Thus, we included the number of days participants had been absent from their sport prior to participation in this study as a covariate to control for this. This design allowed us to investigate participants' emotion regulation and agency fluctuation over a two-week period of sporting absence. To screen for sporting participation during this time, participants reported whether they had participated in their sport over this two-week period. The uncertainty of the ongoing government guidelines and international laws regarding social and sporting activities throughout the pandemic led us to restrict the timeline to a two-week period, thus ensuring that participants remained in lockdown for this study. Furthermore, based on traditional climbers' reports, we considered a 2-week period long enough to capture the fluctuation of these individuals' sense of agentic emotion regulation (Barlow et al., 2013; Lester, 2004). As such, we provided the following introductory statement to the SEAS; *Please answer the following statements thinking about your feelings toward your life after not participating in your preferred sport or activity for [insert number of days absence] days*. Upon completing all three SEASs, participants were eligible to enter a £50 prize draw.

McDonald's omega and Cronbach's alphas demonstrated good reliability for all the SEAS 6-item factors across all three time points (see Table 3).

11. Results[3]

11.1 Main analysis

11.1.1 Emotion Regulation

[3] The interactions in Study 3 held when controlling for time spent away from sport prior to the study.

The 3 (time) × 3 (group) mixed-model ANOVA results supported the emotion regulation hypothesis. Specifically, the results revealed a significant time × group interaction for emotion regulation, $F(4, 84) = 2.78$, $p = .03$, $\eta_p^2 = .11$ (see Figure 7 & Table 3). Probing the interaction revealed a significant increase in emotion regulation difficulty across time for traditional climbers only, $F(2, 30) = 7.09$, $p < .01$, $\eta_p^2 = .32$. Bonferroni comparisons revealed traditional climbers' difficulty with emotion regulation significantly increased between Day 1 and Day 14 ($p = .02$). The repeated measures ANOVAs revealed no significant differences in emotion regulation difficulty across time for low-risk climbers ($p = .54$) and low-risk controls ($p = .75$). We also performed one-way ANOVAs to identify differences in emotion regulation difficulty between groups at each of the three time points. Results revealed a significant group difference at Day 7, $F(2, 42) = 3.47$, $p = .04$, $\eta_p^2 = .14$; and Day 14, $F(2, 42) = 3.98$, $p = .02$, $\eta_p^2 = .16$; no such differences emerged for Day 1 ($p = .06$). Multiple comparisons revealed that traditional climbers experienced significantly greater difficulty in emotion regulation compared to low-risk control participants on Day 7 ($p = .05$) and Day 14 ($p = .02$). No significant differences were observed between traditional climbers and low-risk climbers on Day 7 ($p = .97$) and Day 14 ($p = .75$) or low-risk climbers and controls on Day 7 ($p = .07$) and Day 14 ($p = .09$).

11.1.2 Agency

The 3 (time) × 3 (group) mixed-model ANOVA results provided support for the agency hypothesis. Specifically, the results revealed a significant time × group interaction for agency, $F(4, 84) = .3.85$, $p < .01$, $\eta_p^2 = .15$ (see Figure 8 & Table 3). Bonferroni tests revealed a significant increase in agency difficulty across time for traditional climbers only, $F(2, 30) = 8.54$, $p < .01$, $\eta_p^2 = .36$; traditional climbers' difficulty with agency significantly increased between Day 1 and Day 14 ($p < .01$), and between Day 7 and Day 14 ($p < .01$). There were no such

differences in agency difficulty across time for low-risk climbers (p = .14) and low-risk controls (p = .64). These results support the hypothesis. Furthermore, one-way randomized ANOVAs revealed a significant group difference in agency difficulty at Day 14, $F(2, 42) = 4.58$, p = .01, η_p^2 = .17, with no differences at Day 1 (p = .11) or Day 7 (p = .24). Multiple comparisons revealed that traditional climbers experienced significantly greater difficulty in agency compared to low-risk climbers (p = .02) and low-risk controls (p = .05) 14 days after sports participation.

11.1.3 Sensation Seeking

The 3 (time) × 3 (group) mixed-model ANOVA results provided support for the sensation seeking hypothesis. Specifically, the results revealed no significant time × group interaction for sensation seeking, $F(4, 82) = .49$, p = .74, η_p^2 = .02 (see Table 3), and no main effect for Time, $F(2, 82) = .06$, p = .93, $\eta_p 2$ = .02) or Group, $F(2, 41) = .86$, p = .42, $\eta_p 2$ = .04 (see Figure 9 and Table 3).

12. Discussion

The purpose of Study 3 was to replicate the findings of Studies 1 and 2 and address the limitation of the cross-sectional retrospective design by investigating the *in vivo* effects of sports absence. The present study supported our hypothesis and replicated the emotional regulation and sensation seeking findings from Studies 1 and 2 and the agency findings of Study 2. Specifically, only traditional climbers experienced a significant increase in emotional regulation and agency difficulty after participation, compared to the low-risk climbers and low-risk controls who experienced no change. Furthermore, none of the groups differed from one another or increased in sensation need satisfaction across time. These longitudinal results provide further evidence for the agentic emotion regulation function that high-risk climbing serves and individuals' associated motive, specifically to benefit from an agentic emotion regulation transfer from their

activity to everyday life.

13. General Discussion

This research aimed to investigate the process of agentic emotion regulation and sensation need satisfaction in the time after sports participation. We conducted three studies aimed to demonstrate that high-risk climbers (i.e., traditional climbers) display different emotion regulation and agency profiles in the time after sports participation than comparable low-risk climbers (i.e., sport climbers and boulderers) and low-risk sport controls (i.e., footballers, swimmers).

13.1 Agency and emotion regulation profiles

Consistent with our hypothesis, our retrospective and longitudinal results revealed that high-risk climbers possess different *emotion regulation* and *agency* profiles in the time after sporting participation than low-risk climbers and sport controls. Specifically, only high-risk climbers experienced an increase in *agency* and *emotion regulation difficulty* in the time after their sporting participation, as hypothesized. These results further support Barlow et al.'s (2013) cross-sectional research, in which mountaineers' emotion regulation and agency profiles before, during, and immediately after participation significantly differed from that of skydivers and sport controls.

As we have, in part, accounted for physical (i.e., the physical requirements of low-risk sporting activities) and environmental (i.e., the mountainous natural environment of sport climbing and bouldering) factors, one could attribute the emotion regulation and agency benefits that high-risk climbers experience to the specific risk that is inherent in their sport. This increased risk provides high-risk climbers a greater opportunity to experience and subsequently regulate externally-derived emotions (i.e., fear) in ways that are not readily available in

individuals' normative everyday lives or low-risk sports (see Barlow et al., 2013; Woodman et al., 2010).

Unlike in low-risk sports, physical danger is innate in mountaineering and traditional climbing. The associated risk requires participants to control strong emotions derived from the demanding environment and to act agentically to mitigate potentially life-threatening situations (Woodman et al., 2010). The emotions that are experienced in the high-risk climbing domain are predominantly driven by sources within participants' control. For example, when controlling feelings of fear to avoid falling when climbing or finding a way past a crevasse, the climber acts as an agent, rather than reacting to uncontrollable forces (Lester, 2004). Thus, the experience of emotion regulation and agency is central to mountaineers' and traditional climbers' engagement with their activity. Furthermore, our findings suggest that men and women do not differ in their agentic emotion regulation motives for high-risk climbing activities. In other words, our interactions held across all three studies when controlling for sex. These findings contrast previous literature suggesting sex differences in motives for physical activity (Deaner, Balish, & Lombardo, 2016). The risk-agentic emotion regulation process that individuals experience during high-risk climbing activities may, in part, explain men's and women's similarities in motivation. Specifically, intense agentic emotion regulation experiences are an implicit part of high-risk climbing activities that participants experience and are likely motivated to experience regardless of sex.

In line with Castanier et al.'s (2011) proposal, the positive agentic emotion regulation benefits that high-risk climbers transferred back into their daily lives did not last long (i.e., less than six weeks). Across the mountaineering and traditional climbing literature, participants have reported a plethora of difficulties establishing control over the self and interpreting and

regulating their emotions in their daily life domains (Lester, 2004). These intrapersonal difficulties subsequently magnified the difficulty and distress they experienced in their interpersonal lives (see Barlow et al., 2013; Woodman et al., 2010). Lester (1983) suggested that for high-risk climbers many aspects of domestic life, especially maintaining romantic relationships "were more stressful to the average team member than were the icy conditions in a fragile tent on a snowy ridge in high winds with inadequate oxygen" (p. 34). Thus, the rate at which these positive agentic emotion regulation benefits deplete could be accentuated by their return to their domestic environment where they have trouble establishing control over themselves and regulating their emotions. Collectively, these findings provide compelling evidence for the agentic emotion regulation function that high-risk climbing serves.

13.2 Sensation seeking

These results across all three studies support our hypothesis that mountaineers' and traditional climbers' sensation need satisfaction profiles are no different from low-risk climbers' or low-risk sports participants'. Specifically, as hypothesized, none of the groups significantly differed from one another or significantly increased in *sensation need satisfaction* after participation. These results thus expand upon previous literature (Cronin, 1991; Maher et al., 2015; Zuckerman, 2007) suggesting that high-risk sportspeople are simply a homogenous group of sensation seekers. Specifically, these findings confirm previous research (Barlow et al., 2013; Woodman et al., 2020) and participants' reported experiences (Lester, 1983, 2004) that sensation seeking is not a primary motive for such high-risk climbing endeavors.

13.3 Implications, limitations, and future research directions

The current findings have important implications for risk-taking research. First, the present findings suggest a link between increased high-risk sports absence and agentic emotion

regulation difficulty. These findings indicate the positive regulatory function that high-risk sports serve and individuals' motives to participate as a means of gleaning such a benefit. Second, a wealth of research has identified causal relationships between agency and emotion regulation difficulties and antisocial risk-taking behaviors, especially among adolescents (Eisenberg et al., 2001). As inferred by the present data, high-risk sports can effectively regulate one's agency and emotional difficulties (Barlow et al., 2013) and may benefit individuals who engage in unacceptable risk-taking by engaging in specific forms of high-risk sports (Eisenberg et al., 2001). For example, high-risk sports could allow these individuals to experience a high level of control over the self, regulate externally derived identifiable emotions, and glean an agency, emotion regulation, and self-esteem benefit (see Woodman et al., 2020). Similarly, future research would do well to investigate the antecedent and response-based emotion regulation strategies high-risk sports exercise and their effect on regulating strong emotions in domestic life (see process model of emotion regulation; Gross, 2008). Evidently, more research is needed to illuminate these theoretical relationships or indeed any such benefits.

The SEAS is a scale that measures the motive for any activity, not just high-risk sports. In other words, although it was developed to explore motivation in high-risk sports, it can be applied to any setting. It is likely that other environments (high-risk or otherwise) will benefit from the application of agentic emotion regulation theory (and SEAS measurement) when there is thought to be an agency, emotion regulation, or sensation-seeking motive. Particularly when other motivational theories may be considered limited in understanding such motives (see Woodman, MacGregor, & Hardy 2020). Thus, we encourage future research to explore the generalizability of agentic emotion regulation theory to other high-risk activities, including high-risk occupations and antisocial risk-taking activities.

The retrospective data collection method was a clear limitation of Studies 1 and 2. Study 3 allowed us to measure individuals' post-participation profiles during the sporting restrictions imposed by governments to combat the COVID-19 pandemic. Thus, by adopting a longitudinal design, we overcame these limitations and confirmed the validity of the retrospective design reflected by the concurring results of the three studies. However, the small sample size in Study 3 points to the need for replication and further exploration.

Despite its clear longitudinal strength, Study 3 is not without limitations that pervade the studies and this research as a whole. Firstly, our research is limited by reliance on self-report measures. One solution to this limitation - and an interesting prospect for future research – would be to cross substantiate participants' reports of agentic emotion dysregulation with that of their closest others (triangulation design; Turner, Cardinal, & Burton, 2017). Such a design would improve the reliability of the results by cross-validating participants' accounts with their peers (Paunonen & O'Neill, 2010).

Secondly, the use of a static timeline to capture participants after participation agentic emotion dysregulation is another limitation of this research. Specifically, this design is not sensitive to interindividual differences for what constitutes a meaningful amount of time away from one's activity to cause an agentic emotion dysregulation. For example, a 6 week absence from mountaineering may be routine for a participant who has just returned from a prolonged arduous expedition. However, a 6 week absence from traditional climbing may be unthinkable for an individual who climbs 2-3 days a week. Future research may overcome this limitation by applying the SEAS inventory and an audio diary in a daily concurrent repeated measures design. A mixed methods design such as this would enable the examination of participants' interindividual differences in agentic emotion dysregulation after participation (Turner, Cardinal,

& Burton, 2017). Despite using a blunt timeframe to capture participants after participation agentic emotion dysregulation, our hypothesis was supported by the data across three studies.

Lastly, we did not randomly assign participants to groups or manipulate groups allowing us to measure factors that may determine the magnitude of high-risk climber agentic emotion regulation transfer benefits, such as the danger, intensity, and duration of individuals' latest participation. Indeed, this would be a fruitful and interesting avenue for future research but may be very difficult to implement as the prospect of another prolonged sporting absence would be hard to contemplate for most participants (see Barlow et al., 2013).

13.4 Conclusion

The present studies provide compelling evidence that mountaineers and traditional climbers experience different emotion regulation and agency trajectories than low-risk climbers and sport controls. In short, the agentic emotion regulation benefits decay more evidently for those who engage in high-risk activities. One may thus conclude that this agentic emotion regulation difficulty is a primary motive for the need to return to the high-risk domain to glean an agentic emotion regulation benefit again. The present studies provide further evidence for the value of agentic emotion regulation theory in explaining the motives for activities that seem less easily captured by other motivational frameworks such as self-determination theory (Woodman et al., 2020). The findings further support the positive agentic emotion regulation effects of engaging in high-risk sports, which are considerably different to other risk-taking endeavors (i.e., substance abuse). In summary, high-risk sports can provide a positive and effective means of regulating one's agency and emotion regulation difficulties.

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Tables

Table 1.

Study 1 differences between Traditional climbers, Mountaineers, Sport climbers, Low-risk sport controls for emotion regulation, agency, and sensation seeking difficulty after participation.

Group	Time 1	Time 2	Time 3
Emotion Regulation difficulty	ω = .88, α = .88	ω = .94, α = .94	ω = .96, α = .95
Traditional rock climbers	17.18 [18.97, 15.40 (6.80)	20.05 [22.48, 17.61] (9.24)	21.79 [24.31, 19.27] (9.59)[a]
Mountaineers	15.56 [18.56, 12.56] (8.31)	18.75 [22.30, 15.19] (9.84)	20.43 [23.68, 17.19] (9.00)[a]
Sport climbers	16.62 [20.07, 12.97] (7.79)	16.47 [20.24, 12.60] (8.39)	16.33 [20.68, 11.98] (9.55)
Low-risk sport controls	16.80 [19.04, 14.55] (7.89)	17.26 [19.54, 14.97] (8.05)	17.90 [20.48, 15.31] (9.10)
Agency difficulty	ω = .87, α = .87	ω = .94, α = .94	ω = .95, α = .95
Traditional rock climbers	15.75 [17.64, 13.87] (7.15)	17.75 [20.05, 15.46] (8.72)	19.70 [22.44, 16.96] (10.42)
Mountaineers	14.87 [17.52, 12.22] (7.35)	16.25 [19.52, 12.93] (9.20)	18.28 [21.88, 14.67] (9.99)
Sport climbers	12.28 [14.17, 9.85] (5.33)	12.42 [15.60, 9.25] (6.98)	13.23 [17.63, 8.84] (9.65)
Low-risk sport controls	13.82 [15.81, 11.82] (7.00)	14.72 [17.03, 12.40] (8.14)	16.04 [18.61, 13.46] (9.06)
Sensation need satisfaction	ω = .89, α = .88	ω = .92, α = .92	ω = .94, α = .94

Traditional rock climbers	32.68 [34.67, 30.70] (7.53)	33.63 [35.66, 31.61] (7.69)	34.37 [26.35, 32.40] (7.49)
Mountaineers	31.71 [34.10, 29.33] (6.62)	33.65 [35.91, 31.34](6.42)	34.65 [37.38, 31.92] (7.58)
Sport climbers	30.04 [33.49, 26.60] (7.56)	30.28 [34.13, 26.43](8.46)	31.14 [36.93, 25.92] (11.46)
Low-risk sport controls	30.48 [32.60, 28.35] (7.48)	29.96 [32.24, 27.67] (8.02)	30.46 [32.94, 27.97] (8.75)

Note: [a] = significantly increased in difficulty across time. Time 1 = one day after participation, Time 2 = one week after participation, Time 3 = six weeks after participation, Mean [95% confidence intervals] (SD). *T*raditional rock climbers, n = 58; mountaineers, n = 32; sport climbers n = 21; low-risk sport controls n = 50. ω = McDonald's omega; α = Cronbach's alpha.

Table 2.

Study 2 differences between Traditional climbers, Sport climbers, Boulderers, and Low-risk sport controls for emotion regulation, agency, and sensation seeking difficulty after participation.

Group	Time 1	Time 2	Time 3
Emotion Regulation difficulty	ω = .83, α = .83	ω = .92, α = .91	ω = .94, α = .94
Traditional rock climbers	20.42 [23.24, 17.60] (8.47)	24.17 [27.01, 21.31] (8.31)[b]	26.91[30.33, 23.49] (9.95)[a]
Sport climbers	19.70 [22.14, 17.25] (6.53)	21.00 [23.80, 18.19] (7.52)[b]	22.83 [29.22, 19.44] (9.08)
Boulderers	20.84 [23.60, 18.08] (7.64)	20.43 [23.49, 17.38] (8.47)	22.46 [26.09, 18.84] (10.05)
Low risk sport controls	18.72 [21.12, 16.33] (7.17)	18.02 [20.88, 15.16] (8.57)	18.18 [21.26, 15.11] (9.22)
Agency difficulty	ω = .85, α = .84	ω = .91, α = .91	ω = .94, α = .94
Traditional rock climbers	16.94 [19.64, 14.24] (7.86)	19.17 [22.32, 16.01] (9.17)	23.40 [27.18, 19.61] (11.02)[ab]
Sport climbers	15.53 [17.74, 13.32] (5.92)	16.36 [19.04, 13.69] (7.16)	18.13 [21.49, 18.13] (8.99)
Boulderers	16.87 [19.51, 14.23] (7.32)	16.68 [19.64, 13.73] (8.18)	17.84 [21.34, 14.34] (9.70)
Low risk sport controls	17.43 [19.92, 14.93] (7.48)	15.40 [18.11, 12.69] (8.12)	15.10 [17.73, 12.48] (7.88)
Sensation need satisfaction	ω = .89, α = .88	ω = .89 ,α = .89	ω = .93, α = .93
Traditional rock climbers	34.68 [36.90, 34.68] (6.46)	35.14 [37.46, 32.81] (6.76)	36.02 [38.47, 33.58] (7.12)
Sport climbers	35.00 [36.88, 33.11] (5.05)	35.03 [37.36, 32.69] (6.25)	35.40 [37.56, 33.23] (5.81)

Boulderers	34.71 [37.28, 32.15] (7.10)	33.50 [36.28, 30.71] (7.71)	34.43 [36.83, 32.03] (6.65)
Low-risk sport controls	32.72 [34.52, 30.93] (5.37)	33.16 [34.80, 31.51] (4.93)	33.32 [35.78, 30.86] (7.38)

Note: [a] = significantly increased in difficulty across time; [b] = significantly greater than the low-risk sports group. Time 1 = one day after participation, Time 2 = one week after participation, Time 3 = six weeks after participation, Mean [95% confidence intervals] (SD). *n* = sample size, traditional rock climbers *n* = 35, sport climbers *n* = 30, boulderers *n* = 32, low-risk sport controls *n* = 37. ω = McDonald's omega; α = Cronbach's alphas.

Table 3.

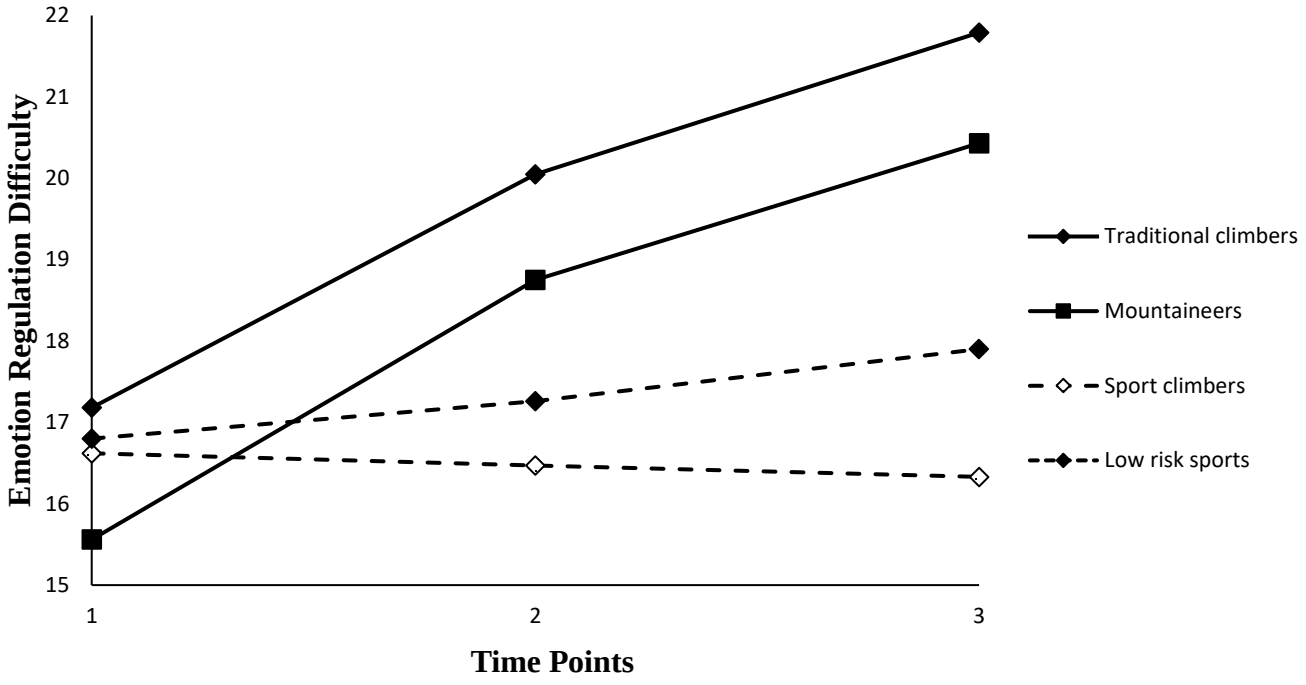
Study 3 differences between Traditional climbers, Sport climbers and Boulderers combined, and Low-risk sport controls for emotion regulation, agency, and sensation seeking difficulty after participation.

Group	Time 1	Time 2	Time 3
Emotion Regulation difficulty	ω = .91, α = .91	ω = .92, α = .92	ω = .90, α = .90
Traditional rock climbers	23.31 [27.95, 18.66] (8.71)	25.43 [29.79, 21.07] (8.18)[b]	26.93 [31.64, 22.23] (8.82)[ab]
Sport climbers and Boulderers	25.94 [29.63, 22.24] (7.18)	24.82 [27.80, 21.84] (5.79)	25.05 [28.23, 21.88] (6.17)
Low risk sport controls	18.33 [24.22, 12.43] (9.27)	18.41 [24.05, 12.77] (8.87)	19.00 [23.78, 14.21 (7.53)
Agency difficulty	ω = .75, α = .75	ω = .82, α = .82	ω = .90, α = .90
Traditional rock climbers	25.00 [28.83, 21.16] (7.19)	24.75 [28.87, 20.62] (7.73)	28.18 [32.62, 23.75] (8.32)[ac]
Sport climbers and Boulderers	22.88 [25.01, 20.74] (4.15)	21.94 [24.63, 19.24] (5.23)	20.88 [23.71, 18.04] (5.51)
Low-risk sport controls	19.75 [24.85, 14.64] (8.03)	20.33 [25.46, 15.19] (8.08)	21.08 [26.65, 15.21] (9.23)
Sensation need satisfaction	ω = .75, α = .76	ω = .89, α = .87	ω = .86, α = .85
Traditional rock climbers	36.25 [38.57, 33.92] (4.35)	36.93 [39.57, 34.30] (4.94)	37.56 [40.05, 35.07] (4.65)
Sport climbers and Boulderers	37.00 [39.10, 34.89] (4.09)	37.64 [40.19, 35.10] (4.94)	37.05 [39.77, 34.34] (5.28)
Low risk sport controls	34.66 [37.58, 31.74] (4.59)	34.91 [37.40, 32.42] (3.91)	35.58 [38.20, 32.96] (4.12)

Note: [a] = significantly increased in difficulty across time; [b] = significantly greater than the Low-risk sports group; [c] = significantly greater than other two groups. Time 1 = one day after participation, Time 2 = one week after participation, Time 3 = six weeks after participation, Mean [95% confidence intervals] (SD). *n* = sample size, traditional rock climbers *n* = 16, sport climbers and boulderers *n* = 17, low-risk sport controls *n* = 12. ω = McDonald's omega; α = Cronbach's alphas.

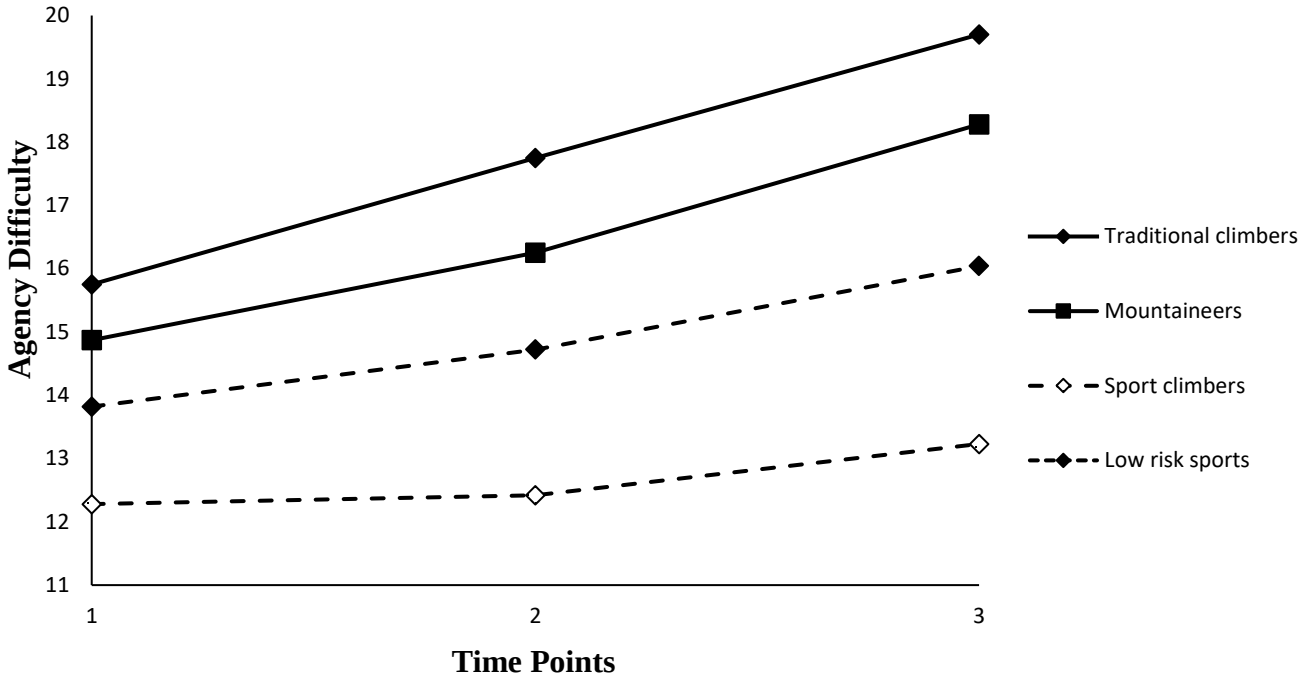
Figures

Figure 1.



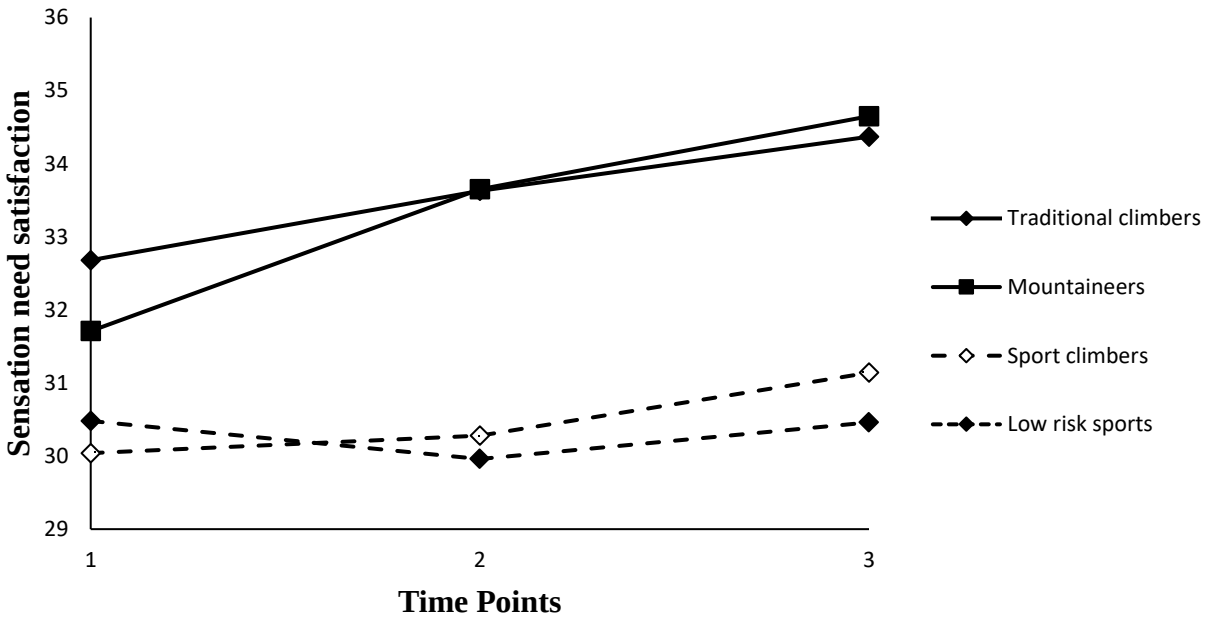
Study 1 Emotion regulation difficulty across one day, one week, and six-week post participation time points.

Figure 2.



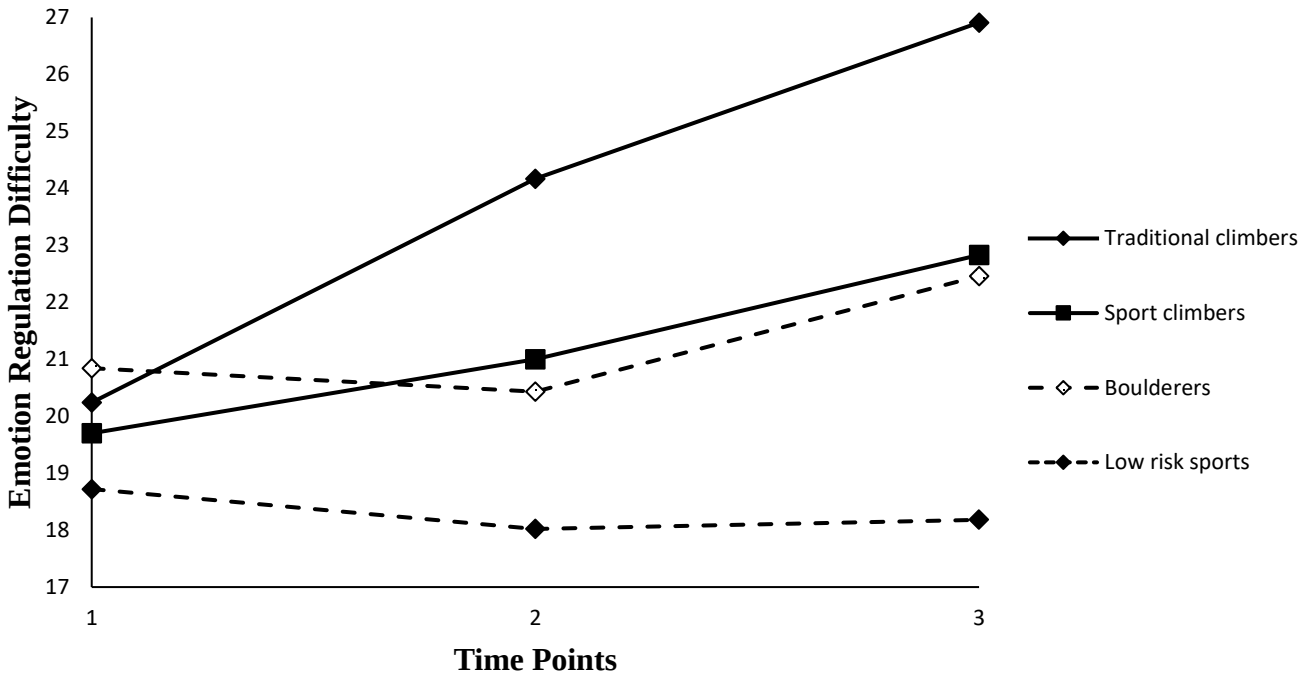
Study 1 Agency difficulty across one day, one week, and six-week post participation time points.

Figure 3.



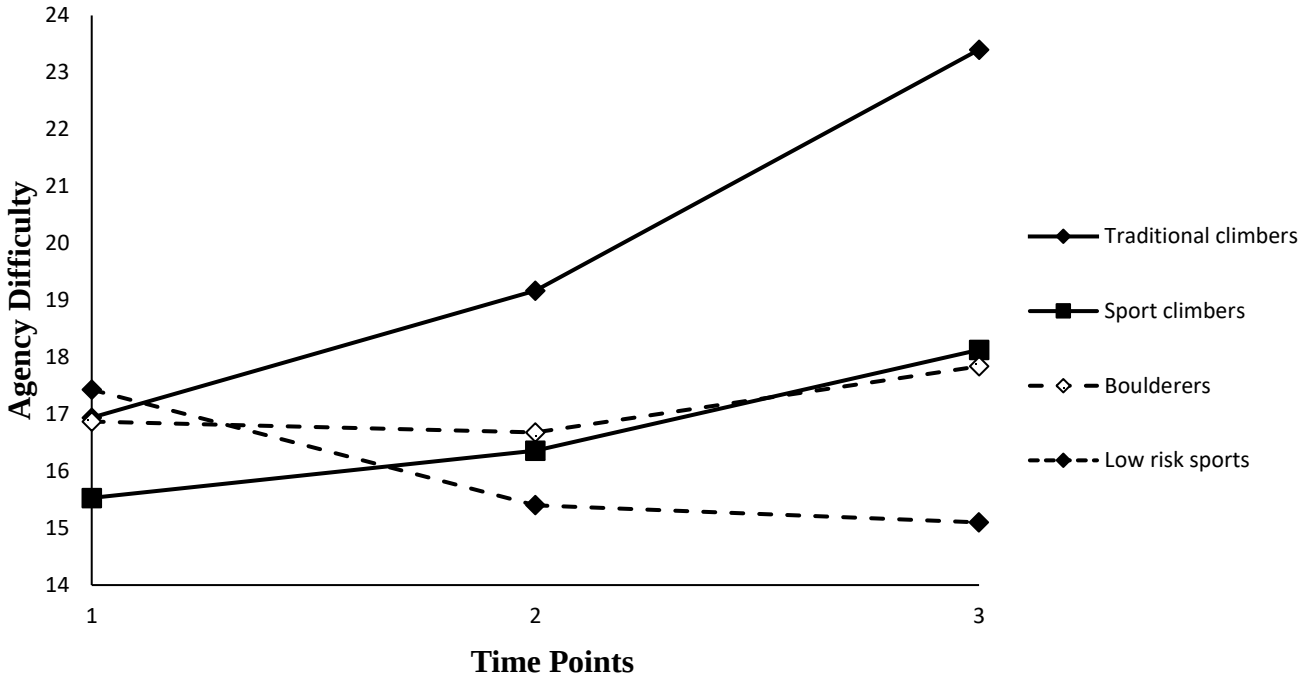
Study 1 Sensation need satisfaction across one day, one week, and six-week post participation time points.

Figure 4.



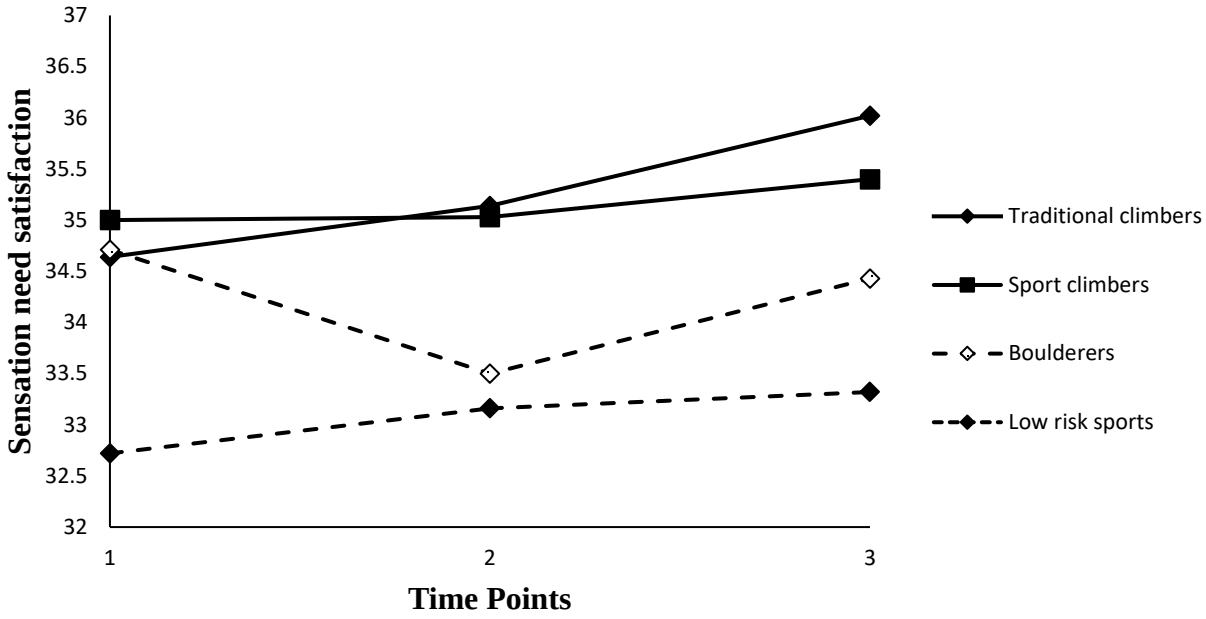
Study 2 Emotion regulation difficulty across one day, one week, and six-week post participation time points.

Figure 5.



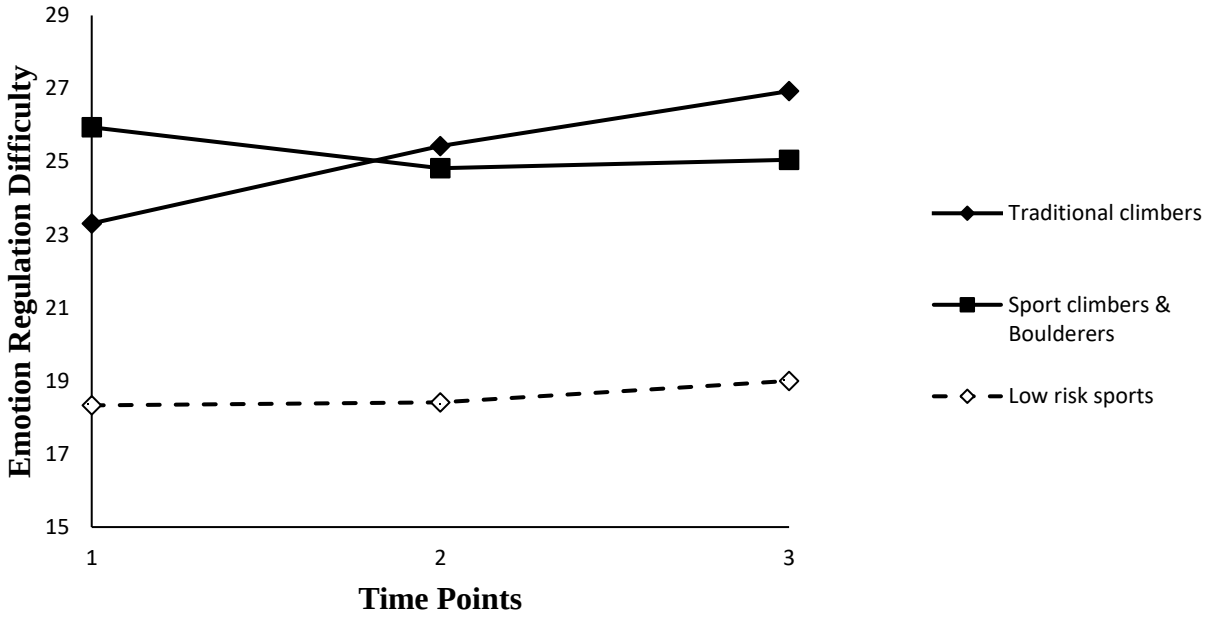
Study 2 Agency difficulty across one day, one week, and six-week post participation time points.

Figure 6.



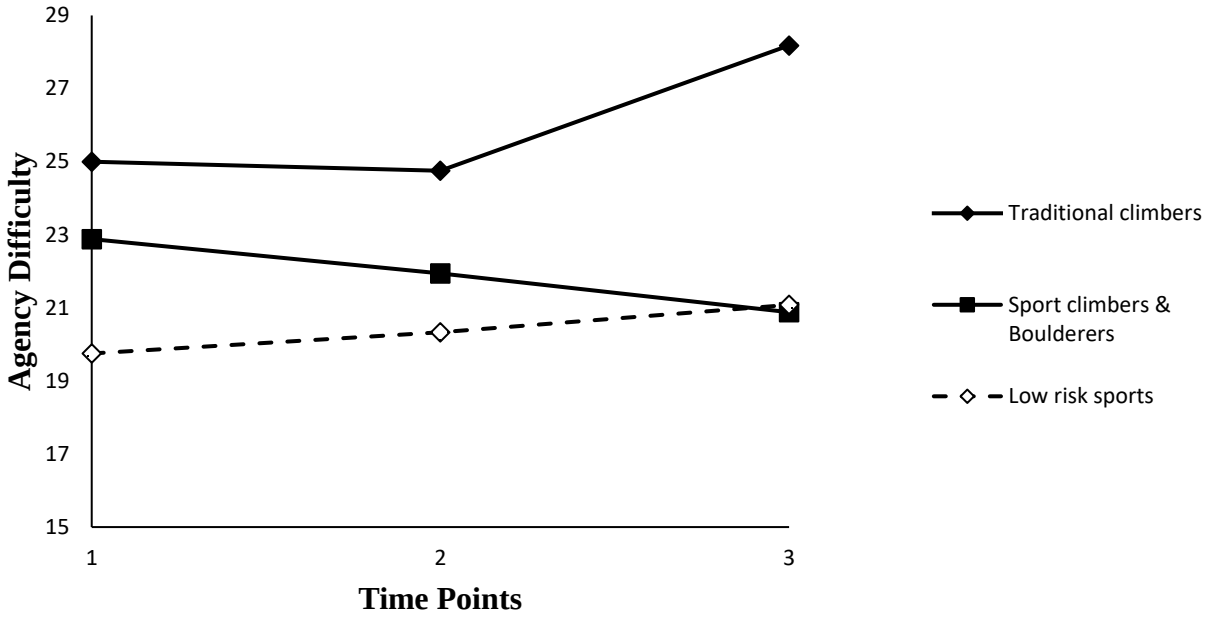
Study 2 Sensation need satisfaction across one day, one week, and six-week post participation time points.

Figure 7.



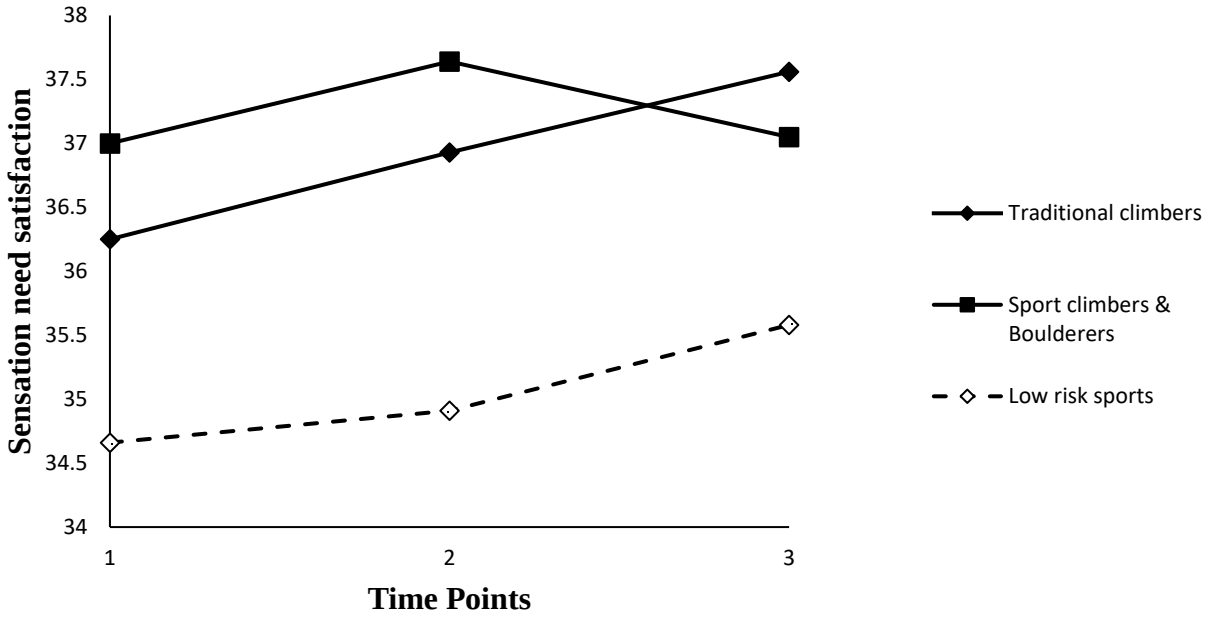
Study 3 Emotion regulation difficulty across one day, one week, and two-week post participation time points.

Figure 8.



Study 3 Agency difficulty across one day, one week, and two-week post participation time points.

Figure 9.



Study 3 Sensation need satisfaction across one day, one week, and two-week post participation time points.