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Creative Expression, Community, and Calculated Risks: Protective and Risk Factors associated with BMX

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This study explores the role of Bicycle Motocross (BMX) beyond its conventional recreational function, focusing on its impact on individual and social wellbeing. Through a quantitative approach employing the Adolescent Resilience Questionnaire and a tailored BMX Riding Experiences Survey, factors associated to BMX are used to predict mental and social health in riders ages 15 years to 55 years old (n=240) using linear regression analysis. The individual wellbeing dimensions investigated include confidence, emotional insight, negative cognition, social skills, and empathy. Additionally, social wellbeing aspects such as family, school, and peer connectedness are examined. Findings indicate that peer encouragement, family support, helping others after falls, creative opportunities, observational learning, and contributing to local riding spots emerged as significant positive predictors of overall wellbeing. Additionally, problem-solving demands and embracing managed risks in BMX correlated with reduced anxious thinking patterns. This research underscores the significance of BMX not merely as a recreational activity but as a promoter of comprehensive wellbeing across multiple domains.

Keywords: social wellbeing, resilience, wellbeing, BMX (bicycle motocross), cycling

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Introduction

Current research indicates that over 75% of mental health issues emerge before the age of 25 (Kessler et al., 2005). Given this, fostering positive mental health and overall wellbeing, particularly in young people, has emerged as a paramount social objective. This has led to a growing recognition of the significant influence

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that lifestyle choices and community involvement can have on an individual's resilience and thriving, and thus wellbeing. While participation in sports and physical activities has long been lauded for its numerous physical and psychological benefits, recent evidence reveals a concerning decline in exercise participation rates across all age groups (Australian Sports Commission 2023; Stubbs, 2024). This trend underscores the urgent need to identify and nurture avenues that facilitate wellbeing within diverse contexts and communities, including resilience and robust social connections.

The present study examines one such avenue – the cultural phenomenon of Bicycle Motocross (BMX) riding in Australia. Originally emerging as a countercultural pursuit, BMX riding has undergone a transition, gaining mainstream recognition through events like the X-Games and its inclusion in the Olympics. Despite concerns that this exposure may compromise the anti-establishment values traditionally associated with the BMX subculture such as corporatisation and professionalisation (Honea, 2013; Wheaton & Thorpe, 2018), the inherent challenges of BMX riding require participants to confront fears, overcome obstacles, and cultivate creativity (Camilleri, 2024). Moreover, the camaraderie and support within the BMX community, coupled with activities like trail building and maintenance, foster a sense of community, stewardship, and creative problem-solving (Olsen, 2021), potentially contributing to social cohesion and personal growth.

The impact of BMX on mental health, social belonging, and overall wellbeing remains largely unexplored. This study aims to comprehensively understand the state of individual and social wellbeing among Australian BMX riders aged 15 to 55 and above, focusing on resilience and social belonging as a measure of wellbeing through the ecological-transactional model of resilience (Gartland et al., 2011; White, 2010). This model emphasises the dynamic interplay between individual characteristics and broader environmental contexts.

The World Health Organisation's (WHO; 1948) definition of health extends beyond physical determinants to encompass mental and social health domains. Wellbeing is a multifaceted construct, encompassing life satisfaction, a range of emotions, and a sense of purpose (Chow, 2020). Belonging is a crucial aspect of social wellbeing and refers to the sense of connection, interdependence, and identity that individuals derive from being part of a social group or community; it is not strictly tied to a geographical location but rather to shared experiences, values, and practices (Neal et al., 2015; Thomas, 2024).

Research has extensively demonstrated how sport, being active, and being socially connected impacts on positive mental health outcomes and wider social benefits (Blum et al., 2022; Pascoe et al., 2020;). Engagement in BMX riding provides individuals with opportunities to fulfill the three basic psychological needs of autonomy, competence, and relatedness, as posited by self-determination theory (Ryan & Deci, 2018). Satisfying these innate needs is posited to nurture intrinsic motivation and psychological wellbeing. In the context of BMX riding, autonomy refers to the rider's freedom to progress at their own pace and according to their own success criteria, competence is derived from developing a sense of mastery or skill in executing tricks smoothly and creatively, and relatedness is fostered through the close-knit communities that form around local riding spots and online forums.

This investigation examines if specific factors surrounding BMX participation promote the development of resilience across the lifespan. While the framework from Morrison and Allen (2007) and Helmreich et al. (2017) was originally conceptualised for student resilience, the protective factors and risk factors identified may also be relevant for resilience in adolescents and adults. This analysis explores whether engagement in BMX riding may serve as a protective factor by providing opportunities for autonomy through learner-centred practices, cultivating a sense of purpose through culturally relevant activities, enhancing social bonds through cooperative engagement, developing problem-solving capacities by overcoming obstacles, and bolstering achievement motivation through optimal challenges and high expectations inherent to progressing skills in the sport.

Method

This is the first quantitative study aimed at predicting resilience factors among BMX riders. To investigate which factors in BMX predict wellbeing, the researchers utilised an ecological-transactional model. The ecological-transactional model offers a layered perspective, ranging from overarching societal and cultural influences on specific individual factors (Gartland et al., 2011). This model provides an understanding of the bidirectional relationship between an individual and their environment, given the establishment of biological, psychological and sociocultural factors as determinants of mental health (Eriksson et al., 2018). It places an emphasis on the dynamic interplay between the context in which a person operates and their overall function. By adopting this model, the study aims to delve deeply into the complexities that shape an individual's resilience, in the context of engaging in BMX activities. It is hypothesised that engagement in BMX riding positively contributes to overall wellbeing by fulfilling basic psychological needs, social connectedness and enhancing resilience.

Participants

Participants were recruited through multiple channels, including social media, BMX organisations, and community outreach efforts over an 8-month period in 2023. These invitations contained a URL link and QR code directing participants to a downloadable Plain Language Statement. The final sample consisted of 240 survey responses from Australian BMX riders aged 15 years and older (See Table I for further information). Including all BMX riders in the study, regardless of their skill, discipline, and intensity of practice, allows for insights into a critical developmental period characterised by identity formation, independence exploration, and risk-taking behaviour (Arnett, 2000).

Table I

Survey Participant Age, Level of Proficiency, and Hours Per Week Spent Riding with Riding Style

		Riding style			
		Race	Freestyle	Race and freestyle	Total
Age	15 - 29	47	21	20	88
	30 – 41[1]	30	27	12	69
	42+	56	8	19	83
Gender	Male	85	51	45	181
	Female	48	4	6	58
	Non-binary	0	1	0	1
Skill level – self report	Beginner: low difficulty and low success rate	18	8	1	27
	Intermediate: growing difficulty and more successful than not	51	29	16	96
	Expert: high difficulty and high success rate	50	14	30	94
	Pro: very high difficulty and very high success rate	14	5	4	23
Hours per week	1 - 5 hours	79	39	24	142
	6 - 10 hours	41	9	17	67
	11+ hours	13	8	10	31
	Total	133	56	51	240

Materials

Adolescent Resilience Questionnaire (ARQ)

Participants completed the Adolescent Resilience Questionnaire (ARQ; Gartland et al., 2011), a validated measure assessing resilience across individual, family, peer, school, and community domains. In Gartland's original study, the ARQ demonstrated acceptable internal consistency across its 12 scales, with Cronbach's alpha values ranging from 0.6 to 0.9. The scales measuring Confidence (self/future), Negative Cognition, and Peer Connectedness each had reliability coefficients of 0.8, while Emotional Insight, Social Skills, and Empathy/Tolerance were measured at 0.7, indicating good consistency. The Family Connectedness and Community Connectedness scales exhibited the highest reliability at 0.9, followed closely by Family Availability (0.8), School Supportive Environment (0.8), and School Connectedness (0.7). The Peer Availability scale had the lowest reliability (0.6), suggesting a need for further refinement.

Despite its name, the ARQ was administered to participants of all ages in this study. This enabled meaningful comparisons and an examination of the impact of BMX riding on resilience as a component of wellbeing throughout the lifespan. For participants no longer in school, instructions were provided to answer the School Connectedness items retrospectively, reflecting on their experiences during their time in school.

BMX Riding Experiences Survey

A 20-item survey was developed to investigate the psychological, behavioural, environmental, and socio-cultural dimensions of BMX riding experiences. The statements aimed to capture the psychological factors

(e.g., creativity, risk-taking), environmental influences (e.g., opportunities, affordances), and social elements (e.g., peer validation, conflicts with authorities) shaping riders' experiences. The survey questions are listed in Appendix 1.

In this study, the ARQ demonstrated acceptable reliability, with a Cronbach's alpha of .729 and a Cronbach's alpha based on standardised items of .727. The BMX questionnaire exhibited good internal consistency, with a Cronbach's alpha of .795 and a Cronbach's alpha based on standardised items of .814. These reliability coefficients indicate that the instruments used in this study provide consistent and reliable measurements of the constructs under investigation.

By utilising the ARQ, a well-established resilience measure, with the tailored BMX Riding Experiences Survey, this study examined how specific aspects of involvement in the BMX scene may contribute to or undermine resilience, and therefore wellbeing, across multiple age groups. The multi-dimensional assessment captures individual characteristics, environmental factors, and socio-cultural influences inherent to the BMX experience. All materials were published in English.

Procedure

Potential participants were informed about the research project through means such as announcements on social media platforms, BMX organisation and community member outreach, and physical advertisements at BMX retail outlets and racing clubs. Interested individuals were provided with a URL and QR code to access a downloadable Plain Language Statement, which outlined the voluntary, anonymous, non-identifiable, and confidential nature of participation.

Upon accessing the online survey, participants were presented with an informed consent document. Those who agreed to participate proceeded to complete the demographic questionnaire, followed by the Adolescent Resilience Questionnaire (ARQ) and BMX Riding Experiences Survey.

This research was conducted in accordance with the ethical principles of the National Statement on Ethical Conduct in Human Research (National Health and Medical Research Council, 2023). Approval was obtained from the University of Melbourne Human Research Ethics Committee (Reference: 2022-24785-34779-6) prior to recruitment.

Data Analysis

Statistical analysis was conducted using SPSS (Statistical Package for the Social Sciences) all responses regardless of survey completion status. Raw scores from the survey responses were converted to T-scores (M=50, SD=10) to allow for standardised comparisons across the different psychosocial factors measured. The key analysis involved multiple regression modelling to identify which BMX riding factors significantly predicted wellbeing scores, operationalised as a composite of individual, social, and family wellbeing indicators (Diener et al., 2010). Stepwise regression with probability criteria of F-to-enter = 0.05 and F-to-remove = 0.10 was employed (Draper & Smith, 1998). This approach iteratively added and removed predictors based solely on statistical significance criteria, allowing the data to identify the subset of BMX factors with

the strongest collective predictive power (Hair et al., 2014). Throughout the analyses, an alpha level of .05 was used to determine statistical significance. Effect sizes were evaluated using guidelines from Cohen (1988) and Ferguson (2009).

Results

Multidimensional Positive Wellbeing Score

Based on the data, a protective factor score was determined by combining the T-scores from the individual and social resilience factors measured by the ARQ (Gartland, 2011): Individual wellbeing attributes included help-seeking behaviour, confidence in interpersonal skills, and positive agency. Social factors such as positive social connections, family investment, family support, school, and community connectedness play a significant role in shaping overall wellbeing (Eriksson et al., 2018). Each of these components contributes uniquely to the protective factor score, reflecting the interplay between individual traits and social support structures in influencing an individual's overall sense of wellbeing. The results suggest that various aspects related to BMX riding significantly influence protective factor scores (Table III).

As shown in Tables II and III, the R-square value of 0.271, indicates that this model explains 27.1% of the variance in the Protective Factor Score. Additionally, the Adjusted R-square value of 0.249 for Model 6 is also the highest among all the models, indicating that this model has the best fit when accounting for the number of predictors. ANOVA for the model had a significant F-value of 12.210 with a p-value<0.001, indicating that the model is statistically significant in predicting the Protective Factor Score. Table IV shows the individual predictors included in this model and their significance levels. All six predictors in Model 6 have significant p-values (p<0.05), suggesting that they all contribute significantly to the prediction of the Protective Factor Score. Based on the results from Shapiro-Wilk test (p = 0.436), we can conclude that the residuals are approximately normal, satisfying the assumption of normality (Table IV). In this data, homoscedasticity appears to be satisfied, as the residuals do not exhibit any obvious patterns of increasing or decreasing variance across levels of the fitted values. Regarding collinearity, while the predictors show moderate correlations (e.g., between "BMX riding - My friends encourage me to progress on my BMX" and "BMX riding - My family/carers support my BMX riding"), there is no indication of severe multicollinearity, as evidenced by the condition indices and variance proportions, which do not suggest any problematic relationships between the predictors.

Table II

Positive wellbeing Regression Coefficients

Model	Predictor Variable	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig.
6 (Constant)		220.498	28.096	-	7.848	<.001
	My friends encourage me to progress on my BMX	1.051	0.229	0.279	4.587	<.001
	My family/carers support my BMX riding	0.991	0.228	0.264	4.337	<.001
	I know how to help others when they fall	0.847	0.229	0.225	3.704	<.001
	I have opportunities to use my creative abilities on my BMX	0.774	0.230	0.205	3.371	<.001
	Watching others ride inspires me to get better	0.463	0.229	0.123	2.021	0.045
	I have opportunities to improve my local riding spots	0.456	0.229	0.121	1.991	0.048
Dependent Variable: Protective Factor Score						

Table III

Positive Wellbeing Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
6	.521[f]	.271	.249	32.62676	.015	3.963	1	197	.048
Predictors: - My friends encourage me to progress on my BMX - My family/carers support my BMX riding - I know how to help others when they fall - I have opportunities to use my creative abilities on my BMX - Watching others ride inspires me to get better - I have opportunities to improve my local riding spots									
Dependent Variable: Protective factor score									

Table IV

Tests of Normality for Positive Wellbeing Factors

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Positive Wellbeing Linear regression -Unstandardized Residual	.050	204	.200*	.993	204	.436
*. This is a lower bound of the true significance. a. Lilliefors Significance Correction						

Risk Factor Score

To gain insights into the potential impact of BMX riding on risk factors such as low empathy and anxious thinking, a regression analysis was conducted. This involved using scores derived from BMX-related questions as predictor variables to ascertain their predictive power on these specific types of negative thinking. A three-factor model emerged as the best for predicting at-risk wellbeing scores, measured by lower empathy and anxious thinking. With an R-square of 0.103, this model explained 10.3% of the variance in at-risk wellbeing (Table VI). The adjusted R-square of 0.090 suggests good fit given the predictors. The three predictors were statistically significant ($p<0.05$) (Table V).

Table V

Risk Factor Score Coefficients

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
3	(Constant)	138.613	8.341		16.619	<.001
	Riding BMX helps me to find ways to solve problems	-.343	.096	-.240	-3.589	<.001
	I am not scared to take risks on my BMX	-.228	.096	-.159	-2.387	.018
	Watching others ride inspires me to get better	-.205	.096	-.143	-2.148	.033
Dependent variable: At risk wellbeing score						

ANOVA results confirmed Model 3's overall significance ($F(3,201)=7.730$, $p<0.001$) in predicting at-risk wellbeing. Each predictor incrementally improved the variance explained: problem-solving (5.7%), adding risk-taking (8.3%), then inspired by others (10.3%). The R2 change statistics further supported the significant incremental contribution of each new predictor. These results suggest that BMX riding, specifically problem-solving, risk-taking, and being inspired by others, can significantly impact the at-risk wellbeing of individuals, which is measured by lower empathy and anxious thinking. The results from the Shapiro-Wilk test ($p = 0.259$) indicate that the residuals are normally distributed, suggesting that the normality assumption is satisfied. Although the Kolmogorov-Smirnov test yielded a marginal p-value of 0.050, it does not provide strong evidence against normality, further supporting the conclusion that the residuals follow a normal distribution (Table VII). The scatter plot of residuals versus predicted values did not reveal any evidence of heteroscedasticity, suggesting that the assumption of homoscedasticity holds in this data. Additionally, the correlation matrix analysis indicated no significant issues with collinearity among the predictors, confirming the absence of multicollinearity in the model.

Table VI

Risk Factor Score Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
3	.322[c]	.103	.090	13.66555	.021	4.613	1	201	.033
Predictors: - Riding BMX helps me to find ways to solve problems - I am not scared to take risks on my BMX - Watching others ride inspires me to get better									

Table VII

Tests of Normality for Risk Factors

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
At Risk Linear regression - Unstandardized Residual	.062	205	.050	.991	205	.259
a. Lilliefors Significance Correction						

Descriptive statistics were calculated for the ARQ variables across three age groups: 15-29 years, 30-41 years, and 42+ years. One-way ANOVA compared the means between the age groups. The analysis revealed significant age group differences across several resilience and wellbeing factors measured by the ARQ. Younger participants aged 15-29 years reported higher levels of family support and social safety compared to older age groups. In contrast, those 42 years and above exhibited greater school/community connectedness and confident interpersonal skills. The 30-41 years group demonstrated the lowest school connectedness. Additionally, the oldest group displayed higher rigid thinking (less empathy) compared to the younger cohorts.

Discussion

This study aimed to identify factors within BMX riding that predict social and mental wellbeing, an area with limited prior quantitative research examining wellbeing outcomes in this population. The results suggest various aspects of BMX riding significantly contribute to individual wellbeing.

The first factor, "My friends encourage me to progress on my BMX ", indicates that the encouragement and support from friends in BMX riding significantly contributes to the wellbeing of the individual. This aligns with research demonstrating the benefits of being socially connected for positive mental health outcomes (Blum et al., 2022; Helmreich et al., 2017; Pascoe et al., 2020). The social support and motivation that BMX friends provide can enhance self-esteem and confidence. As Hollett and Ehret (2019) describe, BMX cultivates relatedness through the atmospheres and sense of community and camaraderie that arise from the individual-

collective moments in riding. This fosters a sense of belonging and mutual support among riders (Camilleri et al., 2024; Olsen, 2021), fulfilling the need for relatedness posited by Self-Determination Theory as critical for facilitating intrinsic motivation and psychological wellbeing (Ryan & Deci, 2018).

The social connections facilitated through BMX appear to be a key factor contributing to wellbeing outcomes. Thomas' (2024) research highlighted the frequent expression of camaraderie and connection observed through banter and participation in sport, even outside of BMX specifically. This social aspect becomes increasingly important with age, as Rinehart (2021, p.216) found "there is a reduction of this very sense of competitiveness and an increase in sociability" among older BMX riders. The descriptive analysis revealed interesting age differences in peer connectedness and availability. Younger participants aged 15-29 reported higher levels of peer connectedness compared to the older age groups. This aligns with developmental research showing the heightened importance of peer relationships and sense of belonging in adolescence and emerging adulthood. The communal and socially cohesive nature of BMX aligns with extensive evidence on how sport can achieve wider social benefits (Gilchrist & Wheaton, 2017) by providing opportunities for forming supportive relationships. That said, while older riders value the benefits of BMX, they felt it difficult to connect with others outside of BMX because of stigma, which is often attributed to the anti-establishment, 'rebellious' nature associated with BMX (Camilleri et al., 2024).

The second factor, " My family/carers support my BMX riding ", suggests that family support in BMX riding also plays a significant role in the individual's wellbeing. While family support emerged as a significant predictor of wellbeing across all ages, the descriptive findings indicated differences in reported family connectedness and availability between age groups. Younger riders aged 15-29 reported higher family support compared to older participants, which aligns with the key role families play during childhood and adolescent development. This aligns with resilience research identifying family support, cohesion and closeness to caring adults as crucial protective factors, especially in childhood and adolescence (Egeland & Kreutzer, 1991; Helmreich et al., 2017). Family ties ideally transition into mutual supportive relationships as people move into adulthood (Hartling, 2003). Substantial family involvement, which includes time and resources (Marcen et al., 2022), strengthens these crucial familial bonds during this life stage.

While family support promotes resilience, Ding's (2021) study found that after BMX injuries, some families found the subcultural capital of risk difficult to accept and tried to stop their child from riding. Subcultural capital refers to the distinctive values, world view and skills developed by enthusiasts of a particular area- in this case BMX (Ding, 2019). However, Ding (2019) notes BMX's inclusion in the Olympics can legitimise the sport, generate public awareness, and create career prospects, with the associated prestige potentially eclipsing perceived risks. This aligns with research highlighting the importance of family, peer, school/work and community factors across the lifespan for resilience (Allen et al., 2022). Close relationships aid resilience (Hartling, 2003; Helmreich et al., 2017), underscoring how family support may contribute to wellbeing for BMX riders.

The third factor, "I know how to help others when they fall", implies that the ability to help others in the event of a fall or accident during BMX riding contributes to wellbeing. The concern and engagement riders

show in helping each other aligns with Rinehart and Grenfell's (2002) observations of the various social roles and high level of motivation demonstrated through BMX interactions. This could be related to the development of empathy, responsibility, and problem-solving skills. This perspective aligns with Ryan and Deci's (2018) Self-Determination Theory, which asserts that fulfilling basic psychological needs for autonomy, competence, and relatedness is integral to psychological health and wellbeing. The autonomy inherent in designing and constructing trails, the competence developed through mastering this skilled process, and the relatedness fostered by collaborating with others on these community spaces may explain why trail building cultivates such a deep sense of motivation and fulfillment for BMX riders (Camilleri et al., 2024).

BMX offers a means for self-expression and self-determination, fostering a sense of belonging and agency among participants (Camilleri, 2024). The riders who took responsibility for their spot were described as "self-efficacious, self-directed, thoughtful, and motivated" (Rinehart & Grenfell, 2002, pp. 305). Being able to effectively assist others likely cultivates feelings of competence, autonomy, and relatedness. Empathy, responsibility and problem-solving required to help fallen riders may contribute to the wellbeing benefits associated with this aspect of BMX.

The fourth factor, "I have opportunities to use my creative abilities on my BMX", suggests that having opportunities to be creative in BMX riding enhances wellbeing. This aligns with the sense of achievement and self-expression associated with creativity. As Rinehart and Grenfell (2002) describe, continued trail building and digging at a location involves highly creative acts of reconfiguring the environment, requiring social, cognitive, psychomotor and affective learning. This multi-componential nature of creativity is reflected in prominent research (Batey & Furnham, 2008). Creating trail spots requires riders to visualise and physically embody their designs through tools like shovels (Camilleri, 2024). Notably, the oldest age group (42+) displayed significantly higher levels of rigid thinking, as measured by lower empathy and cognitive flexibility on the ARQ. The emphasis on risk-taking, creativity, and anti-establishment values in BMX culture may become more divergent from the mindsets of older riders over time, particularly in the sub-discipline of racing.

Smith (2019) highlights how BMX riders romanticise spaces offering creativity and freedom, like transforming vacant lots into DIY dirt jump tracks. These specially constructed dirt or clay jumps not only allow stylish riding flow, but provide creative opportunities and possibilities (Healy, 2024). Olsen (2021) contended that the ability to create and maintain BMX trails fosters a profound sense of accomplishment and fulfillment in riders, providing formative experiences that shape their personal growth and remain impactful over time. This autonomy in jump construction challenges typical green space management, as youth seek self-directed opportunities (King & Church, 2020). The self-expression and achievement inherent in BMX's creative components may explain the wellbeing benefits associated with this factor.

The fifth factor, "Watching others ride inspires me to get better," emerged as a significant protective factor and negatively correlated with risk factors. Being inspired by observing others' BMX skills appears linked to motivation for self-improvement and enjoyment of learning. This inspiration stems from both in-person observation and digital media consumption, enabling a dynamic exchange where riders draw inspiration while sharing their own creative expressions (Nelson, 2010). This exchange facilitates a sense of belonging

within the transnational BMX community, fuelled by collective desires and creative intensities that fuse "idioculture with microculture" (Hollett & Ehret, 2019, p.135). Social media transcends boundaries, fostering a shared culture around rider experiences. Hollett and Ehret (2019) suggest this atmosphere influences the collective understanding of possibilities, aligning with how perspective dialogues reveal new affordances.

Moreover, Rinehart and Grenfell (2002, p.306) found a "definite lack of competition" at DIY trails, replaced by a supportive "sense of camaraderie" where riders encourage each other. A recent study from Camilleri et al. (2024), found that BMX offers a sense of belonging and community to those who invest their time and energy into the lifestyle sport. This environment conducive to observational learning may explain how watching inspiring riding contributes to wellbeing through motivation and enjoyment, rather than mere competitiveness. The collective creative process shapes the BMX community's culture and individual riders' mindsets integral to drawing inspiration.

Additionally, this factor negatively correlated with risk factors, suggesting observational learning impacts at-risk wellbeing. Seeing impressive riding may foster a growth mindset of continually developing abilities, promoting cognitive flexibility and openness to learning (Dweck, 2006). While peer feedback can aid learning new tricks (Hollett, 2017), Magnussen (2010) noted imitation's limitations for highly skilled participants. Observational learning could mitigate anxious thinking by providing motivating role models and pathways for self-improvement. Drawing inspiration likely enhances self-efficacy beliefs while reducing self-criticism (Vealey et al., 1998). As Vaughan et al. (2019) state, BMX's supportive environment for observational learning, contrasting a competitive culture, contributes to wellbeing by facilitating creativity and development.

The sixth factor, "I have opportunities to improve my local riding spots", suggests that having the opportunity to improve local riding spots enhances wellbeing. This could be due to the sense of community involvement and satisfaction of contributing to a shared space to ride. These sports cultures often operate under an anti-establishment ethos and strong do-it-yourself (DIY) culture (Ellmer et al., 2020), evident in how riders build and maintain their own tracks, develop tricks, and organise events (Rinehart & Grenfell, 2002). However, this DIY attitude can also lead to stigma and marginalisation (Camilleri, 2024).

Olsen (2021) describes dirt trails and jumps as highly malleable, "ever flowing, changing" (p. 55) based on refinements to suit riding styles and the environment. Riders modify features until "dialed in", sometimes working on a single location for decades. This ability to physically shape local spaces aligns with BMX's anti-establishment DIY culture. Rather than static concrete parks, BMX allows an ongoing creative process of improving shared community spaces. The opportunity to mould and refine these local riding spots may foster a sense of ownership, creative expression, and community engagement that contributes to wellbeing. The process of collectively designing and maintaining these malleable riding environments could provide satisfaction from contributing to shared spaces that reflect BMX's countercultural values and prioritise user-driven innovation (Camilleri, 2024).

The seventh factor, " Riding BMX helps me to find ways to solve problems” suggests the problem-solving aspect of BMX riding can play a significant role in reducing negative thinking patterns. Engaging in

BMX provides opportunities to encounter and overcome challenges, potentially enhancing problem-solving skills. The promotion of resilience through navigating BMX's constraints aligns with psychological resilience theory, which posits bouncing back from adversity is key for mental health and wellbeing (Den Hartigh & Hill, 2022). By embracing limitations as creative opportunities, BMX trail builders craft jumps meeting cultural/environmental demands while reflecting their vision (Camilleri, 2024). These trail spots can promote social cohesion, stewardship and creative problem-solving within BMX's unique anti-establishment DIY culture (Ellmer et al., 2020; Olsen, 2021). The process of navigating BMX constraints through problem-solving may reduce rigid thinking by requiring cognitive flexibility, emotional regulation and an openness to trying new solutions - thereby promoting resilience. Overcoming BMX challenges could decrease anxious thinking by building confidence and a greater sense of control.

The eighth and final factor, "I am not scared to take risks on my BMX" suggests that risk-taking in BMX riding can also contribute to reducing at-risk wellbeing scores. Prior research has found BMX riders exhibit a distinct personality profile high in risk-taking compared to those in safer sports (Cogan & Brown, 1999). Risk-taking may be associated with increased "hardiness", a well-evidenced resilience factor based on several systematic reviews and a meta-analysis (Helmreich et al., 2017). Hardiness encompasses commitment, control, and a tendency to view stressful circumstances as challenges rather than threats, which could potentially mitigate anxious thinking patterns. This aligns with research suggesting resilience can be enhanced by developing attitudes like hardiness through interventions (Connor, 2006). Thus, the risk-taking inherent to BMX may cultivate hardiness and associated resilience by providing opportunities to master challenges and view them as opportunities rather than threats.

For many BMX riders, this risk-taking tendency manifests as an acceptance of failure when pushing boundaries, aligning with the largely informal, self-regulated skill acquisition process in the sport (Ellmer et al., 2020). As Amabile (2019) posits, creativity often involves appreciating that norms have shifted - this willingness to embrace failure is key in the creative process of progressing one's BMX skills (Camilleri et al., 2024). However, some argue this grit in accepting pain and injury stems from embodying hypermasculine ideals of appearing tough (Smith, 2019; Thorpe, 2014). Regardless of motivations, previous research indicates motivations like risk-taking, thrill-seeking, and desires for autonomy peak during late adolescence (Rossi & Cereatti, 2018; Steinberg, 2008), a period characterised by identity exploration - something the anti-establishment BMX culture celebrates through its emphasis on risk-taking (Thorpe, 2014). At DIY riding spots, Rinehart and Grenfell (2002) observed this manifested as "freer play—and risk" where trail construction became part of the creative process, fostering ownership. This voluntary exposure to managed risks could build self-efficacy and resilience by allowing riders to repeatedly experience mastering challenges. The confidence gained from persisting through failures and difficulties in BMX may explain how an attitude of embracing risk contributes to enhanced wellbeing.

Implications

This study's findings identify several factors for developing BMX-centric programs that promote resilience. Encouraging progression fosters peer motivation and an uplifting environment where riders inspire each other's goal achievement. This strengthens social connections, communication skills, emotional literacy and positive self-cognitions as protective factors. Moreover, encouraging learning from others facilitates continuous learning, personal improvement and community strengthening by observing and being inspired by fellow riders, developing supportive adult relationships as a protective factor. This is further supported by encouraging support when falling, which can promote empathy, trust and camaraderie by motivating riders to assist fallen peers, building a sense of unity and supportive relationships with adults as protective factors. Closely related to this is the need to encourage problem-solving to cultivate resilience, critical thinking, identity development, self-efficacy and strengths recognition as protective factors from overcoming BMX obstacles. Including and promoting risk-taking works to embrace courage, confidence and decision-making skills as protective factors from calculated risk-taking for personal growth and mastery, while being aware of injury risk factors. Furthermore, acknowledging the pivotal role of family encouragement and backing is imperative. This enhances riders' belonging and security, with supportive caring parents and family harmony as protective factors. Finally, providing avenues for creative self-expression through BMX aims to boost confidence, achievement, fulfillment and self-expression as protective factors. This can be furthered by encouraging local spot improvement to foster pride, belonging, stewardship, opportunities for success, achievement recognition and social skills as protective factors by enabling riders to actively enhance local environments. These factors form a mutually reinforcing ecosystem where each factor contributes to riders' development by promoting protective factors and mitigating risk factors, highlighting BMX's transformative potential beyond just sport.

Limitations

While this study provides valuable insights into the constructs measured by the ARQ and BMX questionnaires, several limitations must be acknowledged. First, the reliance on self-report measures may introduce biases, such as social desirability or recall bias, which could affect the validity of the responses. Although the ARQ (Cronbach's alpha = .729) and BMX (Cronbach's alpha = .795) scales demonstrated acceptable internal consistency, in the case of the former there is room for improving measurement precision. Finally, the sample consisted of 240 Australian BMX riders, which, while diverse in age and riding style, may not fully represent BMX riders in other cultural, social, or geographic contexts. BMX culture varies internationally, and the experiences of riders in different countries may differ based on access to infrastructure, societal attitudes, and riding styles

Conclusion

The findings of this study suggest that several key factors related to BMX riding significantly contribute to individual wellbeing. Specifically, encouragement from friends, family support, the ability to help others after falls/accidents, opportunities for creative self-expression, inspiration drawn from observing skilled riders, and

the ability to collaboratively improve local riding environments emerged as significant positive predictors of overall wellbeing.

Moreover, the problem-solving demands inherent to BMX, the sport's emphasis on risk-taking, and being inspired by watching others were associated with lower levels of negative cognition, as measured by reduced empathy and anxious thinking patterns. While these predictors significantly contributed to the model, it is important to note that collectively they only explained a modest portion of the variance in at-risk wellbeing scores. This suggests there are likely additional factors beyond those examined here that negatively impact wellbeing in this population.

Nonetheless, the results indicate that BMX riding may provide a context conducive to developing important psychological resources like problem-solving abilities, comfort with managed risk-taking, and a growth mindset fostered through observational learning. The process of cultivating these skills and mindsets through BMX participation could potentially mitigate anxious thinking patterns, thereby enhancing overall wellbeing. To develop a more comprehensive understanding, future research should explore other potential predictors and pathways through which BMX riding may influence wellbeing outcomes, both positively and negatively. Examining a broader array of factors may elucidate additional mechanisms by which action sports shape resilience and flourishing.

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Declaration of Interest Statement

The authors report no conflict of interest. The authors alone are responsible for the content and writing of the paper.

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Appendix 1: BMX Riding Experiences Survey

Individual

1. Riding BMX helps me to find ways to solve problems
2. Being creative on my BMX helps me grow as a person
3. I always try new tricks even if I am going to get it wrong or crash
4. I will keep trying a trick until I get it
5. I am scared to take risks on my BMX
6. I want to ride my BMX until I am not physically able to
7. BMX gives my life meaning
8. I like to ride new spots so I can get better at riding my BMX
9. Crashing in front of others doesn't bother me
10. I know how to help others when they fall

Affordances

11. I have opportunities to use my creative abilities on my BMX.
12. I have opportunities to improve my local riding spots.
13. My local riding spots challenge me.

Socio-cultural

14. Other riders' reactions tell me if I have done something good.
15. Watching others ride inspires me get better.
16. My friends encourage me to progress on my BMX.
17. Showing your tricks to others is a part of BMX.
18. I have been in trouble riding my bike (from Police, Local Government, Rangers, other adults – not parents or BMX riders)
19. My family/carers support my BMX riding
20. Riders help each other if someone hurts themselves