The Influence of Basic Psychological Need Fulfillment on Psychological Flexibility Among Athletes in a Team Environment

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Abstract

Athletes have routinely used approaches such as stress management, resilience training and attention control training to cope with the psychological demands of performance. Psychological flexibility (PF) is emerging as a useful construct to conceptualise how athletes respond in sporting environments; higher levels of PF are characterised by an ability to pursue sporting performance outcomes, despite stress. Although the enhancement of PF has traditionally been approached through acceptance and commitment therapy interventions, several recent studies have shown a positive relationship between PF and the satisfaction of the three basic psychological needs (BPN) of autonomy, competence and relatedness. Nevertheless, to date no studies have examined the relationship between PF and BPN among athletes within a sporting context. The aim of this study was to examine the potential influence of BPN satisfaction on PF, as well as assess the incremental validity of need frustration scales in the prediction of PF levels. This study examined 68 semi-professional Australian rules footballers, over the age of 18 years, on measures of BPN and PF. Correlation and regression analysis were used to assess the hypothesized relationships both at a domain and subdomain level. The results were consistent with findings from previous research in non-athletic samples that have reported a relationship between BPN satisfaction and PF. Unique effects of competence satisfaction on PF and its subcomponents of acceptance and avoidance were observed. However, the addition of Need Frustration scales did not add to the statistical prediction of PF. The results of this study contribute to the literature on psychological flexibility among athletes and suggests novel forms of intervention to increase psychological flexibility in this population.

Keywords: psychological flexibility, basic psychological needs, self-determination theory, athletes, sport

Declaration

This thesis contains no material which has been accepted for the award of any other degree of diploma in any University, and, to the best of my knowledge, this thesis contains no material previously published except where due reference is made. I give permission for the digital version of this thesis to be made available on the web, via the University of Adelaide's digital thesis repository, the Library Search and through web search engines, unless permission has been granted by the School to restrict access for a period of time.

Contributor Roles Table

ROLE	ROLE DESCRIPTION	STUDENT	SUPERVISOR
CONCEPTUALIZATION	Ideas; formulation or evolution of overarching research goals and aims.	X	X
METHODOLOGY	Development or design of methodology; creation of models.	X	X
PROJECT ADMINISTRATION	Management and coordination responsibility for the research activity planning and execution.	X	
SUPERVISION	Oversight and leadership responsibility for the research activity planning and execution, including mentorship external to the core team.	X	X
RESOURCES	Provision of study materials, laboratory samples, instrumentation, computing resources, or other analysis tools.	X	
SOFTWARE	Programming, software development; designing computer programs; implementation of the computer code and supporting algorithms; testing of existing code.	X	
INVESTIGATION	Conducting research - specifically performing experiments, or data/evidence collection.	X	
VALIDATION	Verification of the overall replication/reproducibility of results/experiments.	X	X
DATA CURATION	Management activities to annotate (produce metadata), scrub data and maintain research data (including software code, where it is necessary for interpreting the data itself) for initial use and later re-use.	X	

FORMAL ANALYSIS	Application of statistical, mathematical, computational, or other formal techniques to analyze or synthesize study data.	X	
VISUALIZATION	Visualization/data presentation of the results.	X	
WRITING – ORIGINAL DRAFT	Specifically writing the initial draft.	X	
WRITING – REVIEW & EDITING	Critical review, commentary or revision of original draft	X	X

The Influence of Basic Psychological Need Fulfillment on Psychological Flexibility Among Athletes in a Team Environment

In sport, psychological factors are considered both the primary influence for day-to-day fluctuations in performance (Weinberg & Gould, 2023) and a significant factor in aspiring athletes realising their potential (Bailey et al., 2010). Despite the significance of this influence, there is evidence to suggest that athletes may be less likely to seek out psychological support than the general population (Rice et al., 2016). In high performance sport, stress management, effective coping, and resilience are all considered crucial psychological skills (Galli & Gonzalez, 2015; Gould & Maynard, 2009), while motivation has been identified as an essential determinant of an athlete's behavior, training process, and performance (Clancy et al., 2016). In addition to these competences, Gardner and Moore (2007) have emphasised the importance of sustained focus of attention and the ability to disengage from disruptive stimuli as significant influences on performance outcomes. Both of these processes are closely aligned with a construct referred to as psychological flexibility, which over the past decade has gained popularity within the applied performance psychology domain (Lundgren et al., 2020). Psychological flexibility among athletes is a focus of the current study, in which its relationship with basic needs derived from self-determination theory (an empirically based meta-theory of human motivation; Ryan & Deci, 2017) will be explored within a team sporting environment.

Psychological Flexibility

Psychological flexibility (PF) refers to an individual's capacity to remain in contact with the present moment and retain commitment towards appropriate valued actions, even in the presence of challenging or uncomfortable internal experiences (Hayes et al., 2012; Homayooni et al., 2020). According to Kashdan and Rottenberg (2010), achieving high levels of psychological flexibility involves a range of internal dynamic processes including the ability to reconfigure mental resources, shift perspective, and balance competing desires. These capabilities all determine how well an individual

can adapt to fluctuating environmental demands (Kashdan & Rottenberg, 2010). PF is considered a trait-like individual difference (Kashdan et al., 2020) and is the central construct of the acceptance and commitment therapy framework (ACT; Hayes et al., 2011), a behavioural therapy that utilises acceptance and mindfulness strategies (Hayes et al., 2001). Although the construct of PF was originally developed as part of the ACT therapeutic approach, Kashdan et al. (2020) has reconceptualised PF as having three overlapping subdomains: acceptance, avoidance, and harnessing. The current study will utilise Kashdan et al.'s (2020) conceptualisation of PF to assess psychological flexibility among athletes. *Acceptance* is considered a healthy strategy (Kashdan et al. 2020) and is defined as the ability to manage private psychological events, actively and consciously, without any attempt to escape or avoid them (Hayes et al., 1999). In sport, the ability to focus on the present moment while accepting internal experiences, such as thoughts and feelings, has been shown to facilitate the automatic execution of performance (Gardner & Moore, 2007, 2012); in turn, peak performance is likely to occur when athletes execute skills with automaticity (Birrer et al., 2012). *Avoidance* is considered a passive strategy typically linked with unhealthy outcomes (Kashdan et al. 2020) and involves the attempt to control, manipulate or avoid unwanted psychological experiences (Hayes, 2002). Although using avoidance can provide momentary relief from an aversive experience, ultimately it can take an athlete further from what is important in the long term by narrowing behavioural patterns to the point that they become fixed and rigid (Doorley et al., 2020). Avoidance of internal experiences can also lead to *ironic rebound* effects where attempts to suppress thoughts and feelings can inadvertently lead to increased attention being paid to them (Wegner, 1994). The third domain of *harnessing* involves utilizing and embracing negative emotions to drive goal pursuit (Kashdan et al. 2020). Harnessing has not traditionally been considered within the PF model as defined within ACT. However, findings from a number of studies have indicated that the utilisation of anger, fear, and worry can be useful in enhancing levels of motivation and arousal during competition (Doorley et al., 2020; Gee & Luiselli, 2010; Robazza & Bortoli, 2007; Tamir & Ford, 2009). Consequently, this form of adaptive responding has been conceptualised by Kashdan et al.

(2020) as being part of a psychologically flexible response pattern. It is proposed that psychologically flexible individuals are better able to tolerate uncomfortable states so long as doing so facilitates meaningful goal pursuit (Kashdan et al., 2020). This from of adaptation is highly important within sporting contexts. Research in sport has shown PF to be a predictor of resilience (Harris, 2022), reduced anxiety and depression (Chang et al., 2017; Zhang et al., 2014), pain tolerance, perseverance, and faster recovery to baseline (Feldner et al., 2006). Moore (2009) suggested athletes with low PF may lack the effective behavioural responses required for optimal performance, while several studies have directly linked high PF with improved performance outcomes (Gross et al., 2018; Johles et al., 2020; Lundgren et al., 2020; 2018).

A broad range of measures have been used to assess PF in the psychological literature. A systematic review by Mooney (2022) identified the Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011) as the most used measure of PF in the research literature. However, issues regarding the AAQ-II's discriminant validity have been consistently highlighted due to strong correlations between the measure and negative affect, neuroticism, and emotional disturbances (Tyndall et al., 2019; Wolgast, 2014); these findings have led researchers to acknowledge that the AAQ-II appears to measure psychological inflexibility and experiential avoidance (Kashdan et al., 2020). The Personalised Psychological Flexibility Inventory (PPFI; Kashdan et al., 2020) is the first measure to address these shortcomings by linking reactions to stress and obstacles with an individual's personally meaningful goals. As PF has been shown to be variable across different contexts (Hayes et al., 1999), the advantage of the PPFI is in its individualised goal specificity which increases its relevance to a given context. In contrast to previous measures, the PPFI has been shown to be distinct from negative emotionality (Kashdan et al., 2020), as well as demonstrating reliability and validity across a range of general, organisational, and sporting contexts (Doorley et al., 2020; Kashdan et al., 2020; Rutherford, 2021). Motivation, and the factors that affect it, could be an influencing factor on goal directed behaviour, which forms the main focus within Kashdan's conceptualisation of PF. Several studies have indicated a relationship between motivation and PF

(Dianah, 2018; Sairanen et al., 2012). To assess the contribution that particular motivational aspects such as need fulfilment may have on PF, this thesis will focus on basic needs as outlined by self-determination theory, which is theory of motivation that has been widely used in sport and other settings.

Self Determination Theory and Basic Psychological Needs

Self-determination theory (SDT; Ryan & Deci, 2000) is a broad framework of human motivation concerned with psychological growth, personality, and an individual's propensity towards development and fulfilment of associated psychological needs (Ryan et al., 1997). An assumption of the theory is that all humans possess an innate self-organising capacity towards self-actualization; however, this is largely influenced by the availability of facilitative resources within our immediate environment (Deci & Vansteenkiste, 2003; Ryan & Deci, 2002). SDT is comprised of six formal *mini-theories* that are coherently linked by the concept of basic psychological need (BPN) satisfaction and frustration (Standage & Ryan, 2020). The satisfaction of the three BPN dimensions of competency, relatedness, and autonomy, is considered to be essential for ongoing psychological growth, integrity, and wellbeing (Deci & Ryan, 2000). BPN have proven to be innate and universal (Deci & Vansteenkiste, 2003), as well as individually variable over time and context (Ryan & Deci, 2017). Although research around SDT has focused predominantly on *need satisfaction*, evidence has indicated low levels of need satisfaction being qualitatively different to the experience of *need frustration* (Cordeiro et al., 2016; Longo et al., 2016); in this regard, need frustration is defined as a negative state of personal feeling that one's needs are being actively undermined by others (Bartholomew et al., 2011). Feelings of *competency* involves one's perception of personal confidence in the effectiveness of their actions in having an impact on their immediate environment (Deci, 1975; Ryan et al., 2011). *Relatedness* concerns a reciprocated sense of respect, connection, and belonging that is experienced through meaningful interpersonal relationships with others (Baumeister & Leary, 1995; Deci et al., 2001). Finally, *autonomy* refers to being the perceived source of one's own decision

making and behavior (Ryan & Deci, 2002), with actions that are self-endorsed and volitional rather than controlled or compelled (Ryan et al., 2011). The application of SDT has been assessed extensively in sporting contexts, with coach autonomy supportive behaviour predicting all three basic needs (Coatsworth & Conroy, 2009). In addition, research findings have linked need satisfaction with improved autonomous motivation (Ntoumanis & Standage, 2009; Sylvester et al., 2018), persistence (Guzman & Kingston, 2012; Sarrazin et al., 2002), reduced athlete burnout (Hodge et al., 2008; Perreault et al., 2007), and performance outcomes (Sheldon et al., 2013).

The most widely used measure of BPN is the Basic Psychological Need Satisfaction scale (BPNSS; Deci & Ryan, 2000; Gagné, 2003), which has been adapted for use in a variety of different contexts. However, utilisation of the BPNSS in sporting contexts has demonstrated issues regarding model fit (Reinboth et al., 2004) and construct validity (Ng et al., 2011) within athletic samples. Due to these validity issues, Bhavsar et al. (2020) developed the domain specific Psychological Need States in Sport scale (PNSSS) that is made up of six dimensions; three for need satisfaction and three for need frustration. In addition to examining relationships between BPN and PF, the current study will further assess whether the inclusion of need frustration subscales adds to the prediction of PF in sporting contexts.

Relationship Between PF and BPN

Ryan (2021) has stated that “because SDT and ACT share numerous psychological processes (autonomy, values, mindfulness) and theoretical assumptions (person-centred and process-oriented perspectives), that integration of PF with concepts from SDT has implications for research and practice”. Several studies have examined the broader relationship between these two constructs using generalised PF and BPN measures (Appendix B). Howell and Demuynck (2023) assessed PF within the eudemonic activity model framework studying undergraduate students (*N* = 281) and found correlations between PF and both need satisfaction (*r* = .64) and need frustration (*r* = -.49). Gazla (2015) looked at PF and BPN in relation to goal pursuits and resilience within a community

sample (*N* = 191) and found a strong effect between the two constructs on a domain level (*r* = .63), with similar subscale results for PF and autonomy (*r* = .60), competence (*r* = .59), and relatedness (*r* = .34). Schele et al. (2021) assessed relationships around wellbeing outcomes in Swedish university graduates (*N* = 532) and found PF correlations with competence (*r* = .48), autonomy (*r* = .26), and relatedness (*r* = .25). Of note is the disproportionately stronger effect size of feelings of competence in relation to PF. Finally, during the initial validation of the PPFI, Kashdan et al. (2020) tested two separate samples and reported results of medium effect sizes across all three BPN with overall PF. Medium effect sizes were observed on a subscale level between the three BPN and the PF factors of acceptance and avoidance (negatively correlated), however all correlations concerning harnessing were non-significant with small effect sizes. In group one, subscale relations between avoidance strategies and feelings of competence outperformed other effects, while the relationship between competence and the PF domain score was also significantly higher than other associations, a result consistent with the Schele et al. (2021) study. In group two, the subscale relationship between autonomy and acceptance significantly outperformed the other domains.

Previous studies have highlighted a lack of research addressing the relationship between BPN and PF (Gazla, 2015; Grégoire et al., 2012; Howell & Demuynck, 2023), and to date there has been no focused investigation in a sporting context. Analysis of subscales is uncommon in the literature, and in BPN research, satisfaction scales are by far the most predominantly studied, with exploration into need frustration still in its infancy. Although singular domain scores have conventionally been used to describe PF, it is only in the recent development of measures such as the PPFI that have broken PF into subcomponents. Explorations on this subdomain level are important as interpretation of broader domain scores has been considered somewhat misleading in the past (Costa et al., 1991). The majority of previous research has approached relationship directionality from the perspective of PF as the independent variable or predictor of need satisfaction (Gazla, 2015; Howell & Demuynck, 2023; Rolffs et al., 2018; Schele et al., 2021). Beyond that of targeted interventions (e.g., ACT), very little is known about the potential influencing factors of PF, with the exception of evidence

suggesting the positive effect of peer and professional support (increased relatedness) in team environments (Rice et al., 2016; Tindle et al., 2022). By contrast, Johles et al. (2020) has identified PF as a construct that can be measured both as an outcome and a process, while Goodman et al. (2021) proposed a reciprocal, mutually reinforcing relationship between BPN and PF, suggesting that when needs for autonomy and competence are satisfied, individuals' motivation to actively engage in present moment activities will increase. It is our intention to further examine PF as a dependent variable in its relationship with basic needs, as exploration from this perspective could potentially widen the scope of PF intervention, which has conventionally been targeted through programs delivered on an individual level.

Present Study

This study will address the following research questions: What influence does the fulfilment of basic psychological needs have on psychological flexibility in a sporting context? How do the three basic psychological need states relate to the three psychological flexibility constructs as measured by the PPFI? Does psychological need frustration add to the statistical prediction of psychological flexibility, over that of need satisfaction? More specifically it is hypothesised:

Higher levels of satisfaction of basic psychological needs will show a statistically significant association with higher levels of psychological flexibility.

Higher levels of satisfaction of the basic need competence will be show a statistically significant relationship with higher psychological flexibility.

When considered in relation to the other basic needs within multiple regression analysis, competence will show a statistically significant relationship with avoidance.

When considered in relation to the other basic needs within multiple regression analysis, autonomy will show a statistically significant relationship with acceptance.

Psychological need frustration will add unique variance to the statistical prediction of psychological flexibility over and above that of need satisfaction.

Method

Ethics and Pre-Registration

Ethics approval was granted by the University of Adelaide Human Research Ethics Committee (Approval Number 23/21). Study participation was undertaken on a voluntary and anonymous basis with participants free to withdraw at any time. No compensation or reward was offered. Only the research team involved in the study had access to the data. Details outlining the study were pre-registered through the Open Science Framework (https://osf.io/3qs5c).

Participants

Participants (*n* = 68) were recruited from the men's and women's senior squads of a single club competing in the South Australian National Football League (SANFL), a semi-professional football competition located in Adelaide, South Australia. All participants were required to be over the age of 18 and have an English language competency sufficient to comprehend the survey without assistance.

Material

Participants received printed versions of the participant information sheet, consent form, and psychometric survey (Appendix A). Hardcopy versions of the surveys were utilised to aid administration in a single setting and to facilitate participation, as previous studies in similar settings that utilized exclusively electronically administered surveys noted low rates of participation (Rutherford, 2021). The required sample size based on the results of a power analysis was not reached. Therefore, an online version was also made available via Qualtrics. Demographic information collected included self-reported age, gender, years playing sport, current squad, years under coach, years at club, injury status, and highest level of football reached.

Measures

Personalised Psychological Flexibility Index

The PPFI is a 19-item questionnaire consisting of five items per subscale. The three subscales measure acceptance, avoidance, and harnessing, with item responses combined for an overall PF score (with avoidance scores reversed). Questions are answered with reference to a self-specified meaningful goal. Four additional items assess potential covariates or moderators of that goal (Kashdan et al., 2020). All responses are recorded on 7-point Likert scales. Example items include: "I avoid the most difficult goal-related tasks" (avoidance subscale), "I accept things I cannot change about this goal" (acceptance subscale), and "I find unpleasant emotions useful for reaching this goal" (harnessing subscale). Previous findings have indicated good internal reliability ($\alpha = .84$; Rutherford, 2021). Kashdan et al. (2020) reported medium to large effect sizes for test–retest reliability and construct validity, and superior incremental validity compared to other PF measures when predicting striving-related outcomes.

Psychological Need States in Sport Scale

The PNSSS is a 29-item questionnaire measuring six separate subscales, autonomy satisfaction, autonomy frustration, competence satisfaction, competence frustration, relatedness satisfaction, and relatedness frustration. Responses are recorded on 7-point Likert scales with questions including: "I feel free to make choices with regards to the way I train" (autonomy), "I am able to overcome challenges" (competency), and "I like the people around me" (relatedness). Internal consistency values were above the recommended threshold, with Raykov's coefficients between .73 and .89 for all subscales (Bhavsar et al., 2020). The PNSSS is the only sport specific measure that assesses both need satisfaction and need frustration. Utilisation of sports specific measures is recommended due to evidence of measurement differences across contexts (Martin, 2008).

Procedure

Convenience sampling was employed due to the challenge of accessing professional and semiprofessional athletes. Initial data collection was conducted in-season during May 2023 at the clubrooms of an SANFL club. The club was initially contacted regarding player participation, this was followed by a coaching announcement, and an information session where a brief explanation of the study was provided verbally by the researcher. Players were informed of minimum age requirements and that participation in the study was voluntary. Information sheets and surveys were distributed, along with a consent form that was completed and submitted separately to maintain participant anonymity. Once completed, surveys were submitted in a sealed box that could only be accessed by the researcher. Regarding individual goal specification in the PPFI, athletes were instructed to identify a current sport-related goal. Commonly occurring goals included: “make senior squad debut”, “win the premiership”, “get drafted into the Australian Football League” and “improve a specific skill”. Additional data collection was conducted in the form of an online Qualtrics survey during June 2023, which was distributed to SANFL players via individual club administrators. Unfortunately, eligible online responses (n = 7) were insufficient to determine equivalence across survey modalities and thus not included in the final analysis.

Study Design and Data Analytic Plan

This study design was cross-sectional and conducted via observation of a single group. To determine minimum sample size, an a-priori power analysis was conducted using G*Power with a power (1-β) of .80, α = 0.05 and a total of five predictors. Based on a medium effect size from a previous similar study (Gazla, 2015), it was determined that approximately 92 participants would be required for regression analysis. Hardcopy survey data was manually entered into a Microsoft Excel spreadsheet, with data then exported to a comma-separated values (.csv) file. Items pertaining to sub-scales in both the PNSSS and PPFI were summed into factor scores. PPFI avoidance sub-scale items were reverse-scored when combined with the other subscales for an overall PF score; however,

the avoidance sub-scale was not reverse-scored when assessed as an independent subscale. All analysis were conducted using SPSS (v27) and JASP (v0.17.1) statistical software.

Results

Data Screening and Assumption Testing

A total of 78 participants completed the printed version of the surveys. Responses from eight participants were excluded due to specification of a goal unrelated to sport on the PPFI. A further two participants were excluded based on a large number of observed outliers on individual scale items indicating a pattern of extreme responding. The final number of eligible surveys (n = 68) fell short of the required sample size (N = 92), determined through the a-priori power analysis. Therefore, the study is underpowered for regression analysis and the results of this aspect of the report should be interpreted with caution. Missing data were analysed using Little's MCAR test (Little, 1988) and returned a non-significant result, indicating data was missing completely at random, X^2 (655) = 697.43, p = .122. No greater than 3% missing data was observed on a scale item level. Expectation Maximisation (Dempster et al., 1977) in SPSS was subsequently used to replace missing values. Outliers were assessed on a subscale level using the outlier labelling rule (Hoaglin & Iglewics, 1987). A total of 15 outliers were *winsorized* (Tabachnick & Fidell, 2013) and replaced with the closest value falling below the outlier labelling threshold.

The following assumptions for multiple regression outlined by Tabachnick & Fidell (2013) were observed. All data demonstrated linearity with residuals being equally spread over the predicted values of the predicted variable indicating homoscedasticity. Multicollinearity was not suggested as independent variable correlations were less than .85, and both Variance Inflation Factor (VIF) and tolerance statistics were at appropriate levels. Histogram and QQ-plots suggested normal distributions. However, four out of the ten variables returned significant Shapiro-Wilk tests, therefore data was considered to be non-normally distributed. Bootstrapping (based on 1000 samples) was used to calculate 95% confidence intervals. The Durbin-Watson statistic was 1.74 and non-significant,

indicating independence of residuals. Finally, internal consistencies were adequate except for the autonomy satisfaction and harnessing subscales which fell below the recommended 0.7 threshold. Internal consistencies, means and 95% confidence intervals can be found in Table 1.

Table 1

Variable Internal Consistencies, Means, Standard Deviations and 95% Confidence Intervals

	McDonald's ω	Mean (SD)	95% CI ^
Autonomy Sat	0.60	25.34 (4.09)	24.32, 26.30
Competence Sat	0.78	29.19 (3.23)	28.41, 29.96
Relatedness Sat	0.81	29.69 (3.66)	28.79, 30.56
Autonomy Frus	0.70	19.04 (5.18)	17.79, 20.25
Competence Frus	0.83	7.41 (3.24)	6.65, 8.19
Relatedness Frus	0.82	9.91 (3.98)	8.99, 10.84
Avoidance	0.79	12.18 (4.38)	11.15, 13.21
Acceptance	0.72	24.15 (3.47)	23.31, 24.87
Harnessing	0.66	18.90 (4.85)	17.75, 20.13
PF TOTAL	0.70	70.71 (8.38)	68.82, 72.90

Note. ^ Based on 1000 bootstrapped samples

Descriptive statistics

The mean age of participants was 21.48 (*SD* = 3.26), comprising of 44 males (64.71%), 16 females (23.53%), and 8 missing (11.76%). Average total years playing sport was 11.09 (*SD* = 4.84), average years under current coach was 2.07 (*SD* = 1.09), while average years at current club was 5.13 (*SD* = 3.07). Out of a total of 68 participants, 4 (5.88%) were currently injured. Further demographic information is presented in Table 2. Athletes participating in this study scored lower across PPFI measures compared to the findings of Rutherford (2021), with both studies measuring players competing in the SANFL (See Table 3).

Table 2

Demographic Characteristics of Participants

Age			Years Under Coach		
	N	*%*		*N*	*%*
18 - 20	29	42.65	1	21	30.88
21-23	17	25.00	2	21	30.88
24-26	9	13.24	3	15	22.06
27-30	6	8.82	5	2	2.94
Missing	7	10.29	6	1	1.47
			Missing	8	11.77

Current Squad			Years At Club		
	N	*%*		*N*	*%*
Senior	29	42.65	1-3	20	29.41
Reserve	20	29.41	4-6	23	33.82
Split	5	7.35	7-9	8	11.77
Missing	14	20.59	10-12	9	13.24
			Missing	8	11.77

Years Playing Sport			Highest Level Reached		
	N	*%*		*N*	*%*
2-5	9	13.24	Local / SANFL Trial / SANFLW Trial	1	1.47
6-9	10	14.71	SANFL / SANFLW Juniors	7	10.29
10-13	19	27.94	State Team (Juniors)	8	11.77
14-18	17	24	SANFL / SANFLW Seniors	45	66.18
19-24	3	4.41	AFL / AFLW	6	8.82
Missing	10	14.71	Missing	1	1.47

League		
	N	*%*
SANFL	50	73.53
SANFLW	18	26.47

Table 3

Comparison of Current PPFI Scores to the Findings of Rutherford (2021)

	Current study	Rutherford (2021)
	Mean (SD)	Mean (SD)
Avoidance	12.18 (4.38)	12.50 (5.75)
Acceptance	24.15 (3.47)	26.60 (4.55)
Harnessing	18.90 (4.85)	20.70 (5.25)
PF TOTAL	70.71 (8.38)	74.85 (12.85)

Hypothesis Testing

Bivariate Correlations

Correlation analysis was used to assess the hypothesis that higher levels of satisfaction of the basic need competence would show a statistically significant relationship with higher PF. A moderate effect size was demonstrated, r (66) = .43, p < .001, CI [0.22, 0.60], supporting the hypothesis.

Table 4

Pearson's Correlations of Variables

	Autonomy Sat	Competence Sat	Relatedness Sat	Autonomy Frus	Competence Frus	Relatedness Frus	Avoidance	Acceptance	Harnessing
Autonomy Sat	—								
Competence Sat	0.38**	—							
Relatedness Sat	0.41***	0.57***	—						
Autonomy Frus	-0.15	-0.37**	-0.27*	—					
Competence Frus	-0.22	-0.45***	-0.42***	0.43***	—				
Relatedness Frus	-0.35**	-0.55***	-0.68***	0.39***	0.77***	—			
Avoidance	-0.17	-0.50***	-0.21	0.32**	0.41***	0.39**	—		
Acceptance	0.04	0.32**	0.001	0.01	-0.11	-0.12	-0.34**	—	
Harnessing	0.25*	0.11	0.08	0.01	-0.11	-0.07	-0.04	0.30*	—
PF TOTAL	0.25*	0.43***	0.13	-0.15	-0.30*	-0.27*	-0.65***	0.73***	0.68***

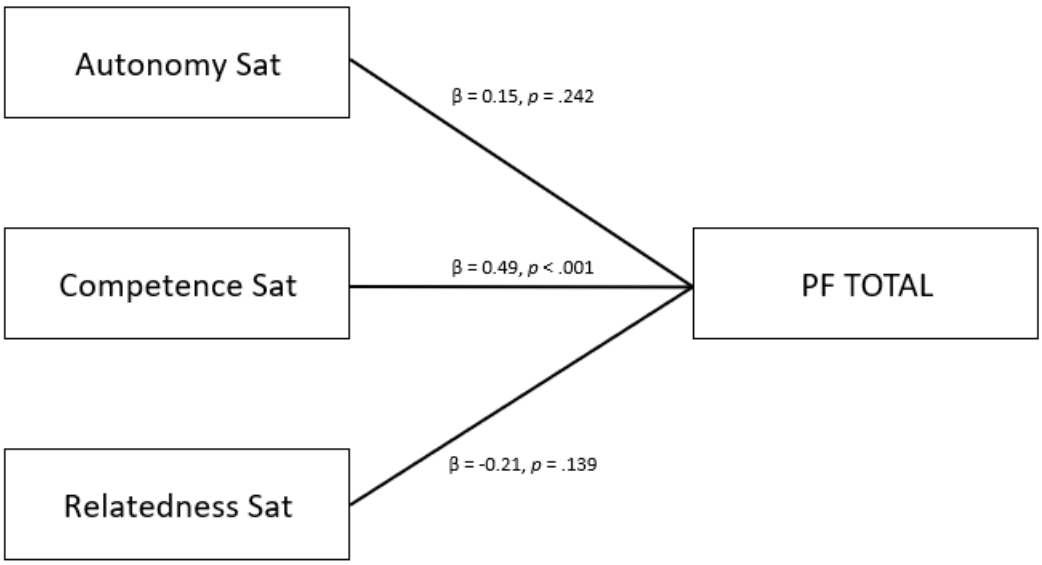
Note. * p < .05, ** p < .01, *** p < .001

Multiple Regression Analysis

Multiple regression analysis was used to test the hypothesis that higher levels of satisfaction of the three BPN will show a statistically significant association with higher levels of PF. Overall, the model (Figure 1) was statistically significant, F (3, 64) = 5.90, p < .001, accounting for 21.6% (CI [4.17, 35.23]) of the variance and supporting the proposed hypothesis. The Competence Satisfaction scale was the only significant contributor to the model.

Figure 1

Psychological Need Satisfaction and Psychological Flexibility Multiple Regression Model



To test the hypothesis that competence satisfaction will show a statistically significant relationship with avoidance when considered in relation to the other basic needs, multiple regression analysis was used. The overall model was significant, $R^2 = 0.26$, CI [0.07, 0.39], F (3, 64) = 7.41, $p < .001$, with the Competence Satisfaction scale the only significant contributor to the model, β = -0.56, $p < .001$. Non-significant results were found for the Autonomy Satisfaction scale, β = -0.01, $p = .956$, and Relatedness Satisfaction scale, β = 0.11, $p = .430$. Results supported the hypothesis. Unstandardised betas and 95% confidence intervals can be found in Table 5 (Regression Model 1). To test the hypothesis that autonomy satisfaction will show a statistically significant relationship with acceptance when considered in relation to the other basic needs, multiple regression analysis was used. Overall, the model demonstrated a good fit, $R^2 = 0.16$, CI [0.01, 0.29], F (3, 64) = 3.91, $p < .05$. When considered together both the Autonomy Satisfaction scale, β = -0.037, $p = .776$, and Relatedness Satisfaction scale, β = -0.260, $p = -.521$, returned non-significant results, while the Competence Satisfaction scale was the only significant contributor to the model, β = 0.485, $p < .001$. Results failed to support the proposed hypothesis. Unstandardised betas and 95% confidence intervals can be found in Table 5 (Regression Model 2).

Table 5

Multiple Regression Unstandardised Betas and Bootstrapped 95% Confidence Intervals

Regression model	DV	Autonomy Sat *B* [CI]	Competence Sat *B* [CI]	Relatedness Sat *B* [CI]
1	Avoidance	-0.01 [-0.29, 0.26]	-0.76 [-1.17, -0.41]	0.14 [-0.2, 0.44]
2	Acceptance	-0.03 [-0.24, 0.26]	0.52 [0.23, 0.82]	-0.26 [-0.49, 0.02]

Hierarchical Multiple Regression

To test the hypothesis that psychological need frustration will add unique variance to the statistical prediction of PF over and above that of need satisfaction, hierarchical multiple regression analysis was conducted. The addition of Frustration scales to the initial model continued to demonstrate statistical significance, $R^2 = 0.24$, CI [0.02, 0.35], F (6, 61) = 3.28, $p < .01$; however, the Need Frustration scales only explained an additional 2.7% in variance, a statistically non-significant increase, $p = .536$. None of the Frustration variables were significant contributors to the model. Therefore, the results did not support the hypothesis. Moreover, Need Frustration scales were found to be statistically non-significant, $R^2 = 0.09$, CI [0.00, 0.21], F (3, 64) = 2.25, $p = .091$, when assessed as an independent model for effect on PF using a multiple linier regression model.

Supplementary Analysis

Further correlational analysis was conducted between BPN, PF and demographic categories. Only statistically significant results are reported. Years playing sport was showed a small effect size with both competence satisfaction, r (56) = .29, $p = .026$, CI [0.08, 0.50], and PF, r (56) = .29, $p = .029$, CI [0.07, 0.49]. Highest level of football reached displayed a small negative effect size with harnessing, r (65) = -.28, $p = .038$, CI [-0.49, -0.03].

Discussion

The aim of the current study was to explore the relationship between basic human psychological needs and PF for athletes within a team sporting context. Limited previous research has focused on the relationship between these two constructs, with no studies targeting an athletic population. Research findings largely supported initial hypotheses. Higher levels of BPN satisfaction were associated with higher levels of PF, a result in-line with previous findings (Gazla, 2015; Howell & Demuynck, 2023). As hypothesised, competence satisfaction exhibited the strongest relationship with PF, replicating previous findings (Kashdan et al., 2020; Schele et al., 2021). Additionally,

competence satisfaction also demonstrated a significant relative contribution to avoidance, supporting the initial hypothesis based on the findings of Kashdan et al. (2020). However, the hypothesis that there would be a positive relationship between autonomy satisfaction and acceptance was not supported. Finally, the addition of need frustration scales in hierarchical multiple regression failed to add to the statistical prediction of PF over and above that of need satisfaction, contradicting the initial hypothesis. Supplementary analysis of results indicated a significant effect of competence satisfaction on acceptance strategies. In addition, years playing sport demonstrated an association with both feelings of competence and PF. The harnessing subscale exhibited no significant relationships with any of the BPN subdomains, in keeping with the findings of Kashdan et al. (2020).

When addressing the observed relative contribution of competence satisfaction on PF, it may be beneficial to consider how the definition of competence fits into the current conceptualisation of PF. Competence is defined as an individual's perception of their own capacity to affect outcomes (Ryan et al., 2011). It is conceivable that if an individual has a greater belief in their own abilities, they are more likely to approach challenging situations (those that require greater PF) with an increased confidence in their capacity to overcome that situation. Additionally, they are more likely to employ active strategies (acceptance and harnessing) in these challenging situations, due to a greater belief in their ability to execute such strategies effectively.

Although the results support the relationship between feelings of competence and PF dimensions, the overall findings are not consistent with previous studies that have found a significant correlation between autonomy satisfaction and PF (Gazla, 2015; Kashdan et al., 2020). Two explanations could be considered regarding this disparity. Firstly, internal consistency for the autonomy satisfaction subscale is lower than expected (ω = 0.60), indicating a possible lack of reliability in measurement. Secondly, athletes may differ in their need requirements compared to general population samples. For example, team sport athletes may be more accustomed to

relinquishing autonomy to authority figures (e.g., coaches and leaders) and therefore may rely more heavily on feelings of personal competency, rather than autonomy, when utilising PF strategies during challenging situations.

The results regarding the inclusion of need frustration scales, and their failure to add to the incremental validity of the PNSSS, bring into question the utility of the measurement of need frustration in the prediction of PF levels in athletes. These results could be explained through evidence supporting a distinctiveness between need satisfaction and frustration domains. Previous research has highlighted that while overlapping, need satisfaction may be distinct from need frustration (Bartholomew et al., 2011), and that the presence of need frustration does not simply imply low need satisfaction (Vansteenkiste & Ryan, 2013). Need frustration, but not need satisfaction, has been shown to have a unique effect on biological markers of stress anticipation (Bartholomew et al., 2011) and may lead to *compensatory behaviours* such as diminished self-control and rigid behavioural patterns (Vansteenkiste & Ryan, 2013). These behavioural patterns may provide individuals with a sense of predictability and security; however, they may also be inflexible behavioural processes. It may be the case that need frustration is more closely related to psychological *inflexibility*, which is defined as an inhibition to the extent to which a person is able to consider what is of value to them, and where congruent goals are failed to be committed to (Hayes et al., 2012). As measurement of PF in the current study was conducted using the PPFI, an inventory designed to address the negative affect measurement of previous PF measures, it is likely that results would fail to indicate a relationship between need frustration and PF within Kashdan's current conceptualisation.

As few studies have observed BPN as a predictor to PF there is limited discussion around theoretical mechanisms behind the relationship. As SDT is a framework for human motivation, it is plausible that any observed relationship between BPN and PF could be attributed to the underlying effect of motivation on both constructs. Motivation itself concerns the energizing, direction,

regulation, and persistence of behavior (Ryan & Deci, 2017), and is considered a crucial element in behaviour change settings where the occurrence of positive outcomes is dependant largely on an individual's active engagement and investment in change (Ryan et al., 2011). SDT stipulates that as BPN are satisfied more autonomous forms of motivation are facilitated, enabling a greater persistence, commitment, and effort towards desired behaviours (Ryan et al., 1997; Ryan & Deci, 2000). This definition is pertinent to the current conceptualisation of PF (Kashdan et al., 2020), where valued goal and outcome pursuit is considered a key part of PF. As the PF dimensions of acceptance and harnessing are both considered *active* strategies (Kashdan et al. 2020), it could be plausible that the effectiveness of such adaptive processes (in the presence of challenging experiences) would be largely impacted by the strength of an individual's motivation towards their desired outcome, and motivation to achieve any personally significant goal. Conversely, Deci and Ryan (2000) state that when BPN are thwarted, individuals will tend to adapt "immature psychological defences", potentially those more closely aligned with *passive* avoidance strategies. Several studies have observed strong effects between motivation and PF in both health (r = .89; Sairanen et al., 2012) and workplace (r = .63; Dianah, 2018) settings.

Ultimately, the results obtained in this study are useful in gaining a better understanding of how team environmental factors, defined through BPN theory, can have an influence over PF in athletes. Additionally, it is hoped that these results can provide an expanded understanding of how to increase PF in athletes. Young athletes in particular could benefit from improved psychological interventions as evidence has indicated the majority of young athletes identified as *talented* fail to progress to sub-elite sporting levels (Abbott & Collins, 2002). The identification and implementation of effective strategies to enhance PF in athletes could provide a great benefit in both clinical and applied settings. Typically, psychological interventions designed to enhance both PF (such as ACT) and performance outcomes, have been delivered on an individual level (Birrer et al., 2012). The results of the current study suggest a positive relationship between BPN and PF could prove valuable as BPN have been shown to be largely affected by environmental factors (Gazla, 2015; Ryan & Deci,

2000) and can therefore be manipulated at a group, as opposed to an individual, level. Additionally, studies assessing the influence of coaching behaviours have identified coaches as having the most prominent impact on player development (Eime et al., 2019), mental toughness (Gucciardi et al., 2009), and ability to perform under pressure (Maher et al., 2020). These findings would suggest that greater coach education regarding the benefits of need satisfaction, and the implementation of strategies designed to increase need satisfaction among athletes, could serve to nurture PF in players on a team-wide level.

Strengths and Limitations

As far as the author is aware, this is the first study to assess the relationship between BPN and PF in an athletic context. The semi-professional status and age profile of participants is considered a strength of this research due to the inherent difficulties in the access and assessment of high-level adult athletes. Additionally, this is only the second study to examine BPN and PF relationships on a subdomain level and is the first to view the effect of these associations when considered in relation to each other. Furthermore, this research has added to the small amount of evidence regarding the utility of Need Frustration scales within the PNSSS.

The current study was limited by a small sample size (n = 68). As the a-priori power analysis determined a required minimum of 92 participants, results are considered insufficient for obtaining reliable regression equations, and increases the chances of Type II errors. Therefore, any conclusions gained through analysis must be considered cautiously. In addition, while internal consistency figures were at adequate levels, the subscales of autonomy support and harnessing were slightly lower than what is considered acceptable. Although no incomplete surveys were submitted, participation rates, particularly for the online version, were very low, potentially due to lack of interest (on behalf of individual players and SANFL club officials) or the required time commitment. Furthermore, demographic information supplied in the hard copy surveys was often left blank, limiting the possibility of exploratory analysis around demographic characteristics. As goal specification for the

PPFI was unsupervised, non-sports specific goals were supplied in some cases (thus deemed unusable), as well as goals that may be considered unrealistic and not aligning with coach or peer expectations. As this study has a cross-sectional design, it is subject to the limitations inherent in such designs: it cannot provide a complete picture of fluctuations in athletic experience across the different phases of a season and does not allow for the assessment of test-retest reliability. As the study is correlational in nature, no causal relationships can be inferred. Self-report measures, while valuable in providing insight on participant perception, can be prone to social desirability bias (Adams et al., 2005). These measures also require a level of insight and awareness from an individual around their own emotional responses to accurately respond to scale items concerning those responses (Ciuk et al., 2015). Additionally, it is worth considering the effect of recent performance results on self-perception, particularly competence levels and the overall need for PF strategies. Limitations around generalisability are also evident due to the study's narrow focus on athletes, competing at a semi-professional level, participating in one particular sport, with a narrow age range, and within the same club environment. Furthermore, while this study focused on athletes within a team environment, previous research has indicated differences between how team sport and individual sport athletes manage emotions and perceive pressure (Castro-Sánchez et al., 2018). Finally, the study was limited to an Australian sample, and consideration should be given to evidence around the effect of culture in both emotional regulation (Ford & Gross, 2019) and coping skills in sport (Puente-diáz & Anshel, 2005).

Future Directions

Although the current study has identified a potential relationship between BPN and PF, future studies should address several methodological shortcomings. Larger sample sizes are required for reliable analysis, along with longitudinal studies to evaluate the effectiveness of intervention programs and to assess stability of constraints over time. Further research focusing on the theorised associations presented in this study could investigate different forms of motivation as the mediator

between BPN and PF to gain a clearer understanding of underlying causal mechanisms and directionality. In addition, pre-post studies utilising interventions designed to increase BPN could be conducted to determine whether such programs ultimately influence PF levels in athletes. Previous findings have indicated the effectiveness of such interventions on BPN (Franco & Coterón, 2017). Additional environmental influences on BPN and PF, such as coach behaviour, should also be considered, due to the significant impact found between coaching and goal-directed self-regulation in athletes (Grant & Cavanagh, 2011). Furthermore, the role and influence of PF on athlete performance should be investigated due to the pertinence of performance outcomes within sporting contexts. Additional research to assess the reliability, validity, and predictive value of need frustration scales in the prediction of PF should also be considered. Finally, generalizability of the BPN and PF relationship should be assessed across demographics such as age, gender, culture, experience, and individual sport characteristics.

Summary and Conclusion

The present study supports previous findings indicating a relationship between basic psychological need satisfaction and PF. Findings extend the literature to a focus on athletes in a team sporting environment. Results further highlight the relative contribution of competence satisfaction on psychological flexibility broadly as well as on a subdomain level. It is hoped that these findings may lead to more informative, team-wide based practices to enhance psychological flexibility in sporting contexts, with the ultimate aim of improving performance outcomes in athletes.

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Appendix A. Hardcopy Survey

Age (in years):	**League:** □ SANFL □ SANFLW **Gender:**
Total years playing football:	**Over the past year I've played most games in:** □ Seniors | □ Reserves | □ Around half / half
Number of seasons under current coach:	**Number of seasons at football club (including development squads):**
Are you currently unable to participate in training or games due to injury and/or illness? YES / NO If YES, please indicate the nature of the injury (e.g., ACL rupture) _____ and how long you have been unable to participant for (in days)_____	**Highest level reached:** □ Local / SANFL Trial / SANFLW Trial □ SANFL / SANFLW Juniors □ State Team (Juniors) □ SANFL / SANFLW Seniors □ State Team (Seniors) □ AFL / AFLW

Please rate how much you agree (or disagree) with the following statements, answer as honestly as possible, and remember that the survey is anonymous. **In football, I…**	Strongly Disagree			Neither Agree or Disagree			Strongly Agree
1. Feel free to make choices with regards to the way I train	1	2	3	4	5	6	7
2. Feel pushed to behave in certain ways	1	2	3	4	5	6	7
3. Feel that I am capable	1	2	3	4	5	6	7
4. Feel like a failure	1	2	3	4	5	6	7
5. Feel supported	1	2	3	4	5	6	7
6. Feel disliked	1	2	3	4	5	6	7
7. Have a say in how things are done	1	2	3	4	5	6	7
8. Feel forced to follow training decisions	1	2	3	4	5	6	7
9. Feel skilled	1	2	3	4	5	6	7
10. Feel useless	1	2	3	4	5	6	7
11. Feel cared for	1	2	3	4	5	6	7
12. Feel excluded	1	2	3	4	5	6	7
13. Have the freedom to make training decisions	1	2	3	4	5	6	7
14. Feel forced to do training tasks that I would not choose to do	1	2	3	4	5	6	7
15. Am able to overcome challenges	1	2	3	4	5	6	7
16. Feel incapable	1	2	3	4	5	6	7
17. Feel connected	1	2	3	4	5	6	7
18. Feel isolated	1	2	3	4	5	6	7
19. Pursue goals that are my own	1	2	3	4	5	6	7
20. Feel excessive pressure	1	2	3	4	5	6	7
21. Feel confident that I can do well	1	2	3	4	5	6	7
22. Feel hopeless	1	2	3	4	5	6	7
23. Feel accepted	1	2	3	4	5	6	7
24. Feel ignored	1	2	3	4	5	6	7
25. Feel like I can be myself	1	2	3	4	5	6	7
26. Must do what I am told	1	2	3	4	5	6	7
27. Feel that I am good	1	2	3	4	5	6	7
28. Like the people around me	1	2	3	4	5	6	7
29. Feel dismissed	1	2	3	4	5	6	7

Instructions: Please take a few moments to think of an important goal that you are working on.

This goal can be in any area of your life, but it must be one and only one goal. Don't choose too quickly. Take a few moments to think about it. After you choose the goal, please write it in the following blank:

_____.

For each statement below, select the rating that best describes YOUR thoughts and feelings about this goal.

	Strongly Disagree			Neither Agree or Disagree			Strongly Agree
1. This goal is central to my life.	1	2	3	4	5	6	7
2. I find this goal challenging.	1	2	3	4	5	6	7
3. I feel stressed pursuing this goal.	1	2	3	4	5	6	7
4. I experience negative emotions while pursuing this goal (such as anxiety, frustration, guilt, anger, disappointment).	1	2	3	4	5	6	7
5. I avoid the most difficult goal-related tasks.	1	2	3	4	5	6	7
6. I put off pursuing this goal when I could be doing a more enjoyable task.	1	2	3	4	5	6	7
7. When I feel stressed pursuing this goal, I give up.	1	2	3	4	5	6	7
8. I get so caught up in thoughts and feelings that I am unable to pursue this goal.	1	2	3	4	5	6	7
9. When I feel discouraged, I let my commitment for this goal slide.	1	2	3	4	5	6	7
10. I accept the setbacks while pursuing this goal.	1	2	3	4	5	6	7
11. While pursuing this goal, I try to accept my negative thoughts and feelings rather than resist them.	1	2	3	4	5	6	7
12. I am willing to experience negative thoughts and emotions related to this goal.	1	2	3	4	5	6	7
13. I accept things I cannot change about this goal.	1	2	3	4	5	6	7
14. While pursuing this goal, I can observe unpleasant feelings without being drawn into them.	1	2	3	4	5	6	7
15. When faced with obstacles related to this goal, my frustration serves to energize me.	1	2	3	4	5	6	7
16. I find worrying helpful to solving goal-related problems.	1	2	3	4	5	6	7
17. When people distract me from this goal, I use any anger that arises to stay focused.	1	2	3	4	5	6	7
18. I get motivated by guilt when I fail to meet my own expectations pursuing this goal.	1	2	3	4	5	6	7
19. I find unpleasant emotions useful for reaching this goal.	1	2	3	4	5	6	7

Appendix B. List of Measures Used in PF and BPN Studies

Study	PF Measure	BPN Measure
Howell & Demuynck (2023)	Multidimensional Psychological Flexibility Inventory (Rolffs et al., 2018)	Basic Psychological Need Satisfaction and Frustration scale (Chen et al., 2015)
Gazla (2015)	Acceptance and Action Questionnaire-II (Bond et al., 2011)	Basic Psychological Need Satisfaction scale (Deci & Ryan, 2000)
Schele et al. (2021)	Work-related Acceptance and Action Questionnaire (Bond et al., 2013)	Need Satisfaction and Frustration scale (Aurell et al., 2016)
Kashdan et al. (2020)	Personalised Psychological Flexibility Inventory (Kashdan et al., 2020)	Balanced Measure of Psychological Needs scale (Sheldon & Hilpert, 2012)