Psychological Need Frustration in Educational Settings: A Scoping Review

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Abstract

This review aims to provide an overview of the existing literature on Psychological Need Frustration (PNF) in educational settings. This followed Arksey and O'Malley's (2005) methodology for scoping reviews. Five major information providers, including Taylor and Francis, ScienceDirect, APA PsycArticles, EBSCO Host, and Scopus, were systematically searched using relevant keywords. A total of 54 articles in English were included in this review, published between 2011 and 2022, all of which considered PNF. Key findings include the predominance of studies examining the role of teachers in the development of PNF, with limited attention given to the potential impact of parents and peers. Furthermore, PNF is often examined as a second-order, aggregate-level factor, rather than examining the unique consequences of each dimension of PNF. Existing measures of PNF lack specificity for educational contexts, and most of the items are context-generic. Practical implications include the importance of recognizing the role of various social agents, including parents and peers, in the development of PNF, as well as the importance of developing educational domain-specific measures of PNF. The review also highlights the need for further research exploring PNF in specific educational contexts, such as flexible learning.

Keywords: Self-determination Theory, Education, Basic Psychological Needs

Introduction

Basic psychological needs are essential components of human behaviour and well-being. According to the Self-Determination Theory (SDT) (Ryan & Deci, 2017), three universal psychological needs are present in every person: autonomy, the need to experience a sense of choice in one's actions; competence, the need to feel a sense of mastery; and relatedness, the need to feel supported and being able to care for others. The satisfaction of these needs is critical to the optimal functioning of individuals in various settings, including educational environments.

In educational settings, teachers and other educators strive to create an atmosphere that supports and encourages the fulfilment of students' basic psychological needs (Adigun et al., 2023). However, sometimes, the opposite may occur. Psychological Need Frustration (PNF) refers to the inability of individuals to fulfil their basic psychological needs (Bartholomew et al., 2011). This may occur when educational environments fail to provide opportunities that allow individuals to make self-determined actions, develop mastery of skills, and feel active involvement, leading to adverse outcomes (Ryan & Deci, 2017).

PNF in educational settings can have far-reaching consequences on student motivation, engagement, and achievement. For instance, students who experience PNF may experience diminished motivation and disinterest in learning (Leo et al., 2022), and consequently become less likely to engage in academic activities (Adigun et al., 2023; Cheon et al., 2018; Jang et al., 2016). Such negative outcomes can also extend beyond academic settings and impact individuals' general well-being (Cordeiro et al., 2023).

Given the critical role of basic psychological needs in educational settings and the potential negative effects of PNF on students' academic and general well-being, it is essential to understand the existing research on PNF in educational environments, especially after a decade since the landmark scale development work of Bartholomew

et al. (2011). Therefore, the purpose of this research is to conduct a scoping review of the studies conducted on PNF in educational settings.

Scoping Review Questions

The main question that guided this scoping review is: What is known from the existing literature about the antecedents and consequences, as well as measurement of Psychological Need Frustration (PNF) of students in educational settings? Specifically, the review aimed to answer the following sub-questions:

1. What are the most frequently studied antecedents of PNF in educational settings?
2. What are the most common consequences of PNF in students in educational settings?
3. How has PNF been operationalized and measured in the literature?

By systematically examining and synthesizing the existing literature on PNF, this scoping review seeks to identify knowledge gaps, as well as potential avenues for future research and interventions. By clarifying the antecedents and consequences of PNF and the measurement methods used in educational settings, this review may help inform the development of interventions that promote the satisfaction of psychological needs, which can improve students' motivation, engagement, and well-being in academic settings.

In summary, this review explores PNF's causes and effects in education, evaluates its measurement, and suggests future research and intervention directions.

Methods and Materials

Following the methodology proposed by Arksey and O'Malley (2005), this scoping review proceeded in four stages after the scoping review questions were identified. The first stage involved identifying relevant studies, which was conducted using a comprehensive search strategy. A single set of keywords, "need thwarting + frustration + students", was used to search five information providers: Taylor and Francis (Social Science and Humanities Library), ScienceDirect (Freedom Collection), APA PsycArticles, EBSCO Host (Academic Search Complete), and Scopus.

To ensure that the search was up-to-date, the search engine was filtered to display only records from the year Bartholomew et al.' (2011) landmark scale development work was published up to the present (the date of the search was August 2, 2022). In addition, three key scale development papers (i.e., Bartholomew et al., 2011; Chen et al., 2015; Longo et al., 2016) were used as benchmarks to identify other related records. Specifically, Google Scholar was used to identify records that cited these scale development works. In total, the search strategy identified 7,568 records, which were then exported to a reference management software to remove duplicates and facilitate the screening process.

The second stage involved screening the identified records to determine their eligibility for inclusion. To be included in the review, an article had to meet five criteria: 1) the study had to involve students as participants and consider PNF in an educational context; studies that considered non-students, such as athletes and employees, were discarded, 2) the focus of the study had to be on PNF and had to be examined or explored within the framework of self-determination theory, 3) the study had to be conducted in educational contexts, with sports contexts only included if they involved students in physical education courses, 4) the study had to consider at least one outcome or one antecedent of PNF, and 5) the article had to be peer-reviewed and written in English, describing quantitative, qualitative, or mixed methods research; summaries, book reviews, and commentaries were excluded.

The screening process involved two levels of examination: examining titles and abstracts and examining full texts. After the screening process, a total of 54 studies met the inclusion criteria and were included in the scoping review. A flowchart of the identification and screening process of the articles included in the scoping review is presented in Figure 1. This figure provides a visual representation of the number of articles identified, screened, and included in the review, highlighting the different stages of the process.

The third stage involved charting the data from the 54 articles that met the inclusion criteria. Several data points were extracted from each article, and these were entered into columns in a Microsoft Excel spreadsheet. The extracted data points included the following: author/s and year, purpose, antecedent/s of PNF, PNF factorial structure (first-order factors or second-order factor), middle variables considered, PNF measures, outcome/s of PNF, study design (quantitative, qualitative, or mixed methods), participants and specific educational setting, and key findings.

After the data was extracted, the fourth stage was undertaken, which involved summarizing the data to address the specific questions of the scoping review. Four summaries were generated to present the findings, organized as follows: general characteristics of the included studies, antecedents of PNF, outcomes of PNF, and PNF measures.

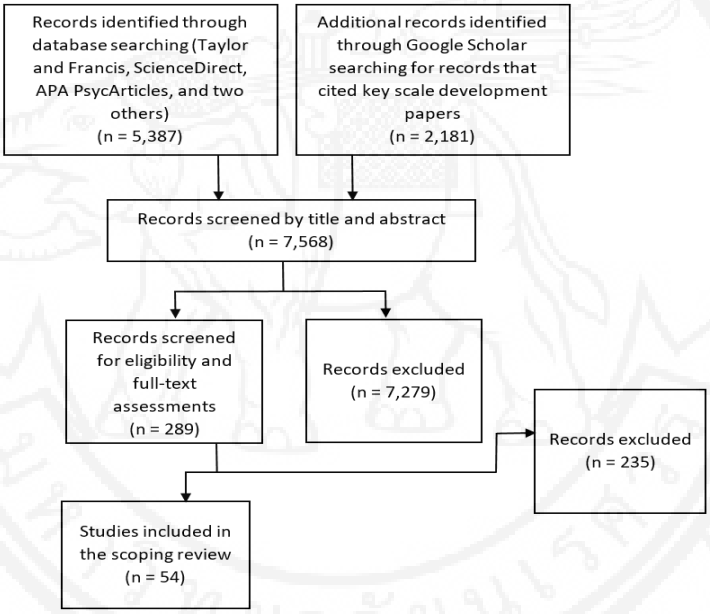

Figure 1 Flowchart of the Identification and Selection Process of Studies Included in the Scoping Review.

Results and Discussion

General Characteristics of the Included Studies

To obtain insights about trends in the characteristics of the included studies, the period covered by the scoping review (2011 to 2022) was divided into four clusters. Table 1 presents the number of studies included in each cluster and highlights trends in the research focus, study design, and participant characteristics. It can be seen that there has been a noticeable increase in research interest on Psychological Need Frustration (PNF) in educational settings in the last three years, with more than half of the studies (30 out of 54) being published during this time. However, it is worth noting that although the first measure of PNF was developed in 2011, it was not until 2015

that the first study specifically focused on PNF in educational settings was published. Indeed, as Vansteenkiste et al. (2020) noted, the PNF literature is relatively "still young".

Table 1 General Characteristics of All Studies (N = 54 Studies)

Period Clusters	Study Designs	Educational Settings		
		University (n = 18)	High School (n = 31)	Primary (n = 5)
2011-2013	None	None	None	None
2014-2016	All Quantitative Studies (n = 11)	Amoura et al., 2015; Kanat-Maymon et al., 2015; Longo et al., 2016 (n = 3)	Cheon et al., 2016; Cordeiro et al., 2016a; Cordeiro et al., 2016b; De Meyer et al., 2016; Haerens et al., 2015; Hein et al., 2015; Jang et al., 2016; Liu & Chung, 2015 (n = 8)	None
2017-2019	All Quantitative Studies (n = 15)	Fang et al., 2017; Behzadnia et al., 2018; Tindall & Curtis, 2019 (n = 3)	Bartholomew et al., 2018; Burgueño et al., 2019; Cheon et al., 2018; 2019; Cronin et al., 2019; Filippello et al., 2019; García-González et al., 2019; Li et al., 2019; Liu et al., 2017; Tilga et al., 2019; Vandenkerckhove et al., 2019 (n = 11)	Earl et al., 2017 (n = 1)
2020-2022	Quantitative Studies (n = 23)	Behzadnia, 2021; Burgueño et al., 2022; Li et al., 2020; Lin & Chan, 2020; Neufeld et al., 2020; Hodis & Hodis, 2021; Janke, 2022; Martinek et al., 2021 (n = 8)	Adigun et al., 2023; Buzzai et al., 2021; Charlot Colomès et al., 2021; Cheon et al., 2022; Cordeiro et al., 2023; Krijgsman et al., 2021; Leo et al., 2022; Moreno-Casado et al., 2022; Santana-Monagas & Núñez, 2022; Tilga et al., 2020; Wang & Tsai, 2020; Warburton et al., 2020 (n = 12)	Adigun & Adams, 2023; Burgueño et al., 2023; Moè et al., 2020 (n = 3)
	Qualitative Studies (n = 3)	Englund et al., 2023; Spinks et al., 2023 (n = 2)	None	Pikkarainen et al., 2021 (n = 1)
	Mixed Methods (n = 2)	Carmignola et al., 2021; Schürmann & Quaiser-Pohl, 2022 (n = 2)	None	None

In terms of study design, the existing literature is dominated by quantitative studies, which comprise over 80% of the included studies. Qualitative and mixed methods studies have only recently begun to appear, and these have mainly been conducted in university settings. Regarding participant characteristics, the majority of studies (almost

two-thirds) focused on high school students, while only a few studies examined PNF in primary or middle school students. This may reflect the importance of understanding PNF in the adolescent age group, given the potential consequences for academic motivation, engagement, and well-being.

Overall, the trends observed suggest that there is still much to be explored in terms of the antecedents, consequences, and measurement of PNF in educational settings, particularly in the context of qualitative and mixed methods research and in younger student populations.

The Most Frequently Studied Antecedents of Psychological Need Frustration in Educational Settings

In SDT, basic psychological needs are thwarted in contexts that are controlling, meaning that individuals experience PNF due to "controlling" social experiences (Ryan & Deci, 2017). As a result, PNF (and need satisfaction) is not solely caused by objective reality but by the subjective interpretation of actions of socialization agents in one's social context (Vansteenkiste et al., 2019). Therefore, in this review, the social agents whose need-thwarting actions have been linked to PNF were mapped out.

Out of the 54 studies included in the review, only 33 explicitly investigated and explored the antecedents of PNF. The social agents involved in these studies were categorized into three groups: teachers, parents, and peers. Figure 2 presents a Venn diagram that maps out the social actors whose behaviors were considered critical to the subjective state of PNF.

It can be seen that almost all of the studies (29 out of 33) that investigated antecedents of PNF focused on teacher behaviors. This is understandable because teachers are salient socialization agents for students in face-to-face learning environments. However, the preponderance of studies examining teacher behaviors makes the Venn diagram unbalanced, suggesting that the unique and important need-thwarting behaviors of peers and parents are not yet fully explored and understood. This observation highlights the need for more research on the role of peers and parents in shaping the subjective experience of PNF in educational settings.

A particularly interesting observation is the type of teacher behaviors that have been examined in the literature. Among the 29 studies that focused on teacher behaviors, 26 (90%) of them examined autonomy-supportive and/or controlling teacher behaviors. This fixation on autonomy support and control is understandable, as Ryan and Deci (2017) have proposed that these factors determine the fate of individuals' basic psychological need satisfaction and frustration. However, two interesting directions have emerged that warrant further exploration.

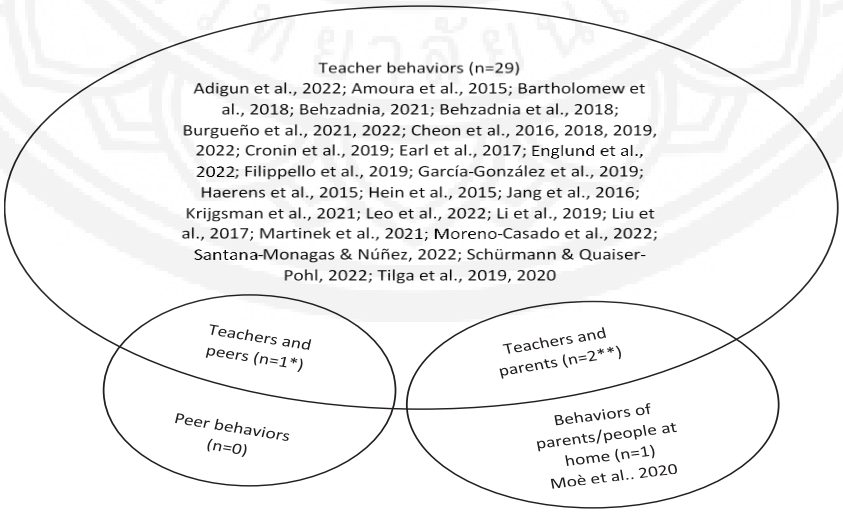

Figure 2 Map of the Studies Involving Social Agents' Behaviors as Antecedents of PNF (N = 33).

Note: *Adigun & Adams, 2023; **Charlot Colomès et al., 2021; Pikkarainen et al., 2021

First, in Adigun and Adams' (2023) quantitative study, they demonstrated that social relational factors, such as safety, closeness, and trust, were significant predictors of PNF. This finding suggests that the interpersonal dynamics between teachers and students may play a significant role in shaping the subjective experience of PNF in educational settings. Future research should continue to explore the role of social relational factors in shaping students' experiences of PNF. Second, Englund et al.' (2023) qualitative study found that, aside from controlling teaching environments, learning environment uncertainties may cause PNF. This highlights the importance of considering the broader context in which learning takes place and suggests that factors beyond the direct control of teachers may also influence students' experiences of PNF.

Taken together, these findings suggest that there is still much to discover about how PNF develops from students' social interactions with teachers, peers, and parents. The existing literature provides a strong foundation, but additional research is needed to fully understand the complexity of this issue and identify effective interventions for promoting psychological need satisfaction and reducing PNF in educational settings.

The Most Common Consequences of Psychological Need Frustration Among Students in Educational Settings

The studies included in the scoping review represent PNF in two ways: 1) as a set of first-order, primary factors, comprising autonomy frustration, competence frustration, and relatedness frustration, and 2) as a second-order, aggregate-level factor, a composite of all three first-order factors. Ryan and Deci (2017) have stressed that the three individual needs have separate, unique functions, suggesting that PNF can be studied as individual first-order factors. However, they also argue that the three needs "operate convergently" (Ryan & Deci, 2017), warranting studies on PNF (and psychological need satisfaction) at an aggregate level.

When the existing studies included in the scoping review were examined, 27 out of 38 studies (or 71%) that examined specific consequences of PNF considered PNF as a composite, second-order variable. This observation suggests that while there is some debate regarding the appropriate level of analysis for PNF (Milyavskaya & Koestner, 2011; Milyavskaya et al., 2013), a majority of studies have tended to focus on the second-order, aggregate level of PNF. However, this does not negate the importance of studying the individual first-order factors, as each may have unique consequences for students' well-being and academic success. The review of the tested consequences (or outcomes) was done separately for studies that examined PNF as a second-order factor and as a set of first-order factors.

Table 2 outlines both the positive and negative outcomes associated with aggregate-level PNF. Several studies have found that PNF is a determinant of controlled motivation and amotivation, as well as maladaptive behaviors and negative well-being markers, including academic dishonesty, oppositional defiance, antisocial behavior, anxiety, depression, and negative affect. These outcomes are sometimes referred to as the "dark side" of PNF.

Table 2 Consequences of PNF Conceptualized as a Second-order Factors (N = 27)

Outcomes	Dark Side of Student Functioning	Bright Side of Student Functioning
Motivational Outcomes	(+) Controlled Motivation (Bartholomew et al., 2018; Burgueño et al., 2019; Cordeiro et al., 2023; Haerens et al., 2015; Leo et al., 2022; Vandenkerckhove et al., 2019)	(-) Autonomous Motivation (Amoura et al., 2015; Bartholomew et al., 2018)
	(+) Amotivation (García-González et al., 2019; Bartholomew et al., 2018; Burgueño et al., 2019; Cheon et al., 2016; Haerens et al., 2015; Leo et al., 2022)	(+) Autonomous Motivation (Cordeiro et al., 2023)

Table 2 (Cont.)

Outcomes	Dark Side of Student Functioning	Bright Side of Student Functioning
Behavioral Outcomes	(+) Academic Fraud (Kanat-Maymon et al., 2015); Oppositional Defiance (De Meyer et al., 2016); Antisocial Behavior (Cheon et al., 2018; 2022); School Refusal Behavior (Filippello et al., 2019); Disaffection (Vandenkerckhove et al., 2019)	(-) Prosocial Behavior (Cheon et al., 2018)
Ill-being/ Well-being Outcomes	(+) Anger (Hein et al., 2015); Ill-being (Cordeiro et al., 2016b; 2023); Negative Affect (Behzadnia et al., 2018; Liu et al., 2017; Vandenkerckhove et al., 2019); Homework Stress (Moè et al., 2020)	(-) Subjective Vitality (Liu et al., 2017); Positive Affect (Behzadnia et al., 2018); Health-related Quality of Life (Tilga et al., 2019; 2020); Well-being (Cordeiro et al., 2023)
Others	(+) Student Disengagement (Adigun et al., 2023; Jang et al., 2016); Acceptance of Cheating (Cheon et al., 2018)	(-) Student Engagement (Cheon et al., 2016); Knowledge Gain (Behzadnia et al., 2018); Life Satisfaction and Meaning in Life (Lin & Chan, 2020); Intention to Return to Physical Activity (Behzadnia, 2021); Teaching Self-efficacy (Burgueño et al., 2022)

Note: *Significant Direct Links Only; (+) Positive Association; (-) Negative Association

On the other hand, a number of studies have also found that PNF is negatively associated with autonomous motivation, prosocial behaviors, and positive well-being markers, including subjective vitality, life satisfaction, and health-related quality of life. These outcomes are sometimes referred to as the "bright side" of PNF.

It is worth mentioning that the findings regarding the consequences of aggregate-level PNF are in line with the propositions of SDT, which suggest that PNF, being a state in which one is obstructed from fulfilling their basic psychological needs, can lead to diminished motivation, non-optimal functioning, and psychological ill-being.

However, the picture becomes more complex when examining the outcomes associated with first-order PNF. These studies (N = 11) are outlined in Table 3, along with path coefficients, to provide a better appreciation of the complexity of the findings. The outcomes associated with first-order PNF are not as straightforward and clean as those associated with aggregate-level PNF. These findings suggest that the individual needs (autonomy, competence, and relatedness) may have distinct and differential effects on student outcomes, which highlights the importance of examining PNF at both the aggregate and individual levels.

Table 3 Consequences* (with Path Coefficients) of PNF Conceptualized as First-order Factors (N = 11)

Author/s and Year	Outcome/s	AF	CF	RF
Cordeiro et al. (2016a)	Somatization	.12	NS	.20
	Depression	NS	.29	.34
	Anxiety	NS	.16	.22
Cordeiro et al. (2016b)	Ill-being	NS	.41	.26
Longo et al. (2016)	Ill-being	.18	.28	.38
	Well-being	-.11	-.08	-.15
Earl et al. (2017)	Active Disengagement	NS	NS	NE
	Subjective Vitality	NS	-.51	NE
Fang et al. (2017)	Intrinsic Motivation in Subsequent Course	NE	U	NE
Tindall & Curtis (2019)	Ill-being	.07	.22	.31
	Positive Affect	-.01	-.13	-.18

Table 3 (Cont.)

Author/s and Year	Outcome/s	AF	CF	RF
Buzzai et al. (2021)	Academic Engagement	-.28	NS	NS
Carmignola et al. (2021)	Subjective Vitality	-.42	-.21	NS
Charlot Colomès et al. (2021)	Academic Adjustment	-.12	-.15	-.42
	Social Adjustment	NS	-.30	NS
	Personal-emotional Adjustment	NS	-.24	-.34
Hodis & Hodis (2021)	Comprehension Apprehension	-.019	.220	.104
	Perceived Communication Competence	NS	.125	NS
Martinek et al. (2021)	Intrinsic Regulation	-.51	-.28	.11
	Identified Regulation	-.45	-.27	NS
	Introjected-approach Regulation	-.21	NS	.10
	Introjected-avoidance Regulation	.18	.29	NS
	External Regulation	NS	NS	.15
	Subjective Vitality	NS	-.28	-.10

Note: *Significant Direct Links Only; AF = Autonomy Frustration; CF = Competence Frustration; RF = Relatedness Frustration; NS = Not Significant; NE = Not Examined in the Study; U = Curvilinear Relationship

Upon examining Table 3, it becomes clear that examining the dimensions of PNF individually can provide a good amount of information, compared to when PNF is considered as an aggregate. By looking at the path coefficients, some interesting patterns emerge. For example, in predicting subjective vitality, Competence Frustration (CF) was consistently associated with it, but not Autonomy Frustration (AF) or Relatedness Frustration (RF) (Carmignola et al., 2021; Earl et al., 2017; Martinek et al., 2021). This finding aligns with Charlot Colomès et al.' (2021) work, which found that only CF consistently and significantly predicted academic, social, and personal-emotional adjustment. Another interesting finding concerns academic engagement and disengagement. CF failed to account for both, while AF was a significant predictor of academic engagement but not disengagement (Buzzai et al., 2021; Earl et al., 2017). These findings demonstrate the importance of examining the dimensions of PNF separately, as they may have differential effects on student outcomes.

The patterns of associations among the first-order dimensions of PNF suggest that the three needs have distinct and unique functions in determining negative student outcomes. These findings are consistent with SDT, which proposes that autonomy, competence, and relatedness are separate and unique needs that each contribute to optimal functioning (Ryan & Deci, 2017).

It is important to note that while examining the effects of PNF at the aggregate level provides a broad understanding of the construct, examining the primary levels of PNF can provide more nuanced insights into how each need contributes to student outcomes. By examining the effects of each dimension of PNF separately, researchers and practitioners can gain a better understanding of how to promote psychological need satisfaction and reduce PNF in educational settings. Therefore, it is valuable to consider both aggregate-level and first-order PNF in future research and interventions aimed at promoting positive student outcomes.

The Operationalization and Measurement of Psychological Need Frustration

Among the 51 studies that included quantitative elements, 48 of them measured PNF using one of four commonly used measures: Chen et al.' (2015) Basic Psychological Need Satisfaction and Need Frustration (BPNSNF) scale, Bartholomew et al.' (2011) Psychological Need Thwarting Scale (PNTS), Sheldon and

Hilpert's (2012) Balanced Measure of Psychological Needs (BMPN), and Longo et al.' (2016) Need Satisfaction and Frustration Scale (NSFS).

While many of the studies adapted these measures to the educational context, very few authors made significant modifications to the original items. Instead, authors often simply modified the opening stem to reflect the educational setting. For example, some authors changed the stem from "In my sport..." to "In my physical education classes..." (Leo et al., 2022) or "In my classes during the degree/master's program" (Burgueño et al., 2022). Three items with the highest factor loadings from each of these measures are shown in Table 4.

As can be seen in Table 4, these four measures are similar in terms of having items for the usual tripartite structure of the PNF construct: Autonomy Frustration (AF), Competence Frustration (CF), and Relatedness Frustration (RF). The items representing each PNF dimension are also just in equivalent forms. For example, for AF, Bartholomew et al. (2011) have an item that says, "I feel pushed to behave in certain ways" and Chen et al. (2015) have a similar item that says, "I feel forced to do many things I wouldn't choose to do" and Longo et al. (2016) with "I feel forced to follow directions regarding what to do". Another example, this time for RF, Bartholomew et al. (2011) have an item that says, "I feel I am rejected by those around me" and Longo et al.' (2016) have an equivalent item that says, "Sometimes, I feel a bit rejected by others".

Table 4 Items Used to Measure PNF in the Existing Literature

	The PNTS-Sports	The BMPN	The BPNSNF Scale	The NSF Scale
AF	- I feel under pressure to agree with the training regimen I am provided - I feel obliged to follow training decisions made for me - I feel pushed to behave in certain ways	- I had to do things against my will - I had a lot of pressures I could do without - There were people telling me what I had to do	- I feel forced to do many things I wouldn't choose to do - I feel pressured to do too many things - Most of the things I do feel like ''I have to''	- I feel I am prevented from choosing the way I carry out tasks - I feel forced to follow directions regarding what to do - I feel under pressure to follow standard procedures
CF	- There are situations where I am made to feel inadequate - There are times when I am told things that make me feel incompetent - There are occasions where I feel incompetent because others impose unrealistic expectations upon me	- I experienced some kind of failure, or was unable to do well at something - I struggled doing something I should be good at - I did something that made me feel incompetent	- I feel insecure about my abilities - I feel like a failure because of the mistakes I make - I feel disappointed with many of my performance	- I doubt whether I am able to carry out my tasks properly - I sometimes feel unable to master hard challenges - Occasionally, I feel incapable of succeeding in my tasks
RF	- I feel others can be dismissive of me - I feel other people dislike me - I feel I am rejected by those around me	- I was lonely - I felt unappreciated by one or more important people - I had disagreements or conflicts with people I usually get along with	- I feel the relationships I have are just superficial - I feel that people who are important to me are cold and distant towards me - I feel excluded from the group I want to belong to	- Sometimes, I feel a bit rejected by others - On occasions, I feel people are a bit cold towards me - I feel a bit alone when I'm with other people

Note: AF = Autonomy Frustration; CF = Competence Frustration; and RF = Relatedness Frustration

A more important observation is that the measures used in the included studies are not specifically designed for measuring PNF in the educational domain. The PNTS, for example, was obviously designed for athletes, while the BMPN, BPNSNF, and NSFS were intended for generating domain-generic PNF scores. However, need-based experiences can vary across different life domains and episodes (Deci & Ryan, 2008; Milyavskaya & Koestner, 2011; Milyavskaya et al., 2013). Therefore, it is essential to use domain-specific measures of PNF, which adequately circumscribe the domain of functioning in question. Simply modifying the wording of items or adding a stem without considering the unique need-thwarting experiences in the context may present serious content validity issues. Furthermore, in line with the SDT assumption of dialectical interaction and experience dependence (Ryan & Deci, 2017), PNF specific to the educational setting may be argued as closely tied to socialization agents' need-thwarting behaviors. Therefore, an educational domain-specific measure of PNF should include descriptions of relevant need-thwarting behaviors of social agents specific to the educational domain.

Another interesting observation is that many of the items have vague statements about the social agents involved in the state of PNF. For example, in the PNTS, there is an item for relatedness frustration that says, "I feel others can be dismissive of me" but it is not clear as to who these "others" might be. Because teachers, peers, and parents can all potentially affect PNF in educational settings (Adigun & Adams, 2023; Charlot Colomès et al., 2021; Moè et al., 2020; Pikkarainen et al., 2021), it can be confusing for students when responding to items like this. When students respond to the item, some may recall their relationships with their teachers, while others may refer to their relationships with peers. In a recent related study, Fedesco et al. (2019) were aware of this nuance when they examined relatedness satisfaction. They believed that relatedness satisfaction can be separated based on its two sources: teachers and peers. Therefore, they measured relatedness satisfaction with teachers and relatedness satisfaction with peers, and their measurement model showed good fit for a four-factor psychological need satisfaction (along with autonomy satisfaction and competence satisfaction). This underscores the need for educational domain-specific measures of PNF that explicitly describe relevant need-thwarting behaviors of social agents unique to the domain.

Lessons Learned for Future Research and Practice

Five important lessons are described here that have implications for future research directions and practical applications:

1. Research on how PNF develops and what factors affect it is an active, ongoing area. This is evidenced by the increasing number of studies that have been conducted in the past few years. This suggests that the study of PNF is a dynamic field that is constantly evolving.

2. The existing literature on PNF in educational contexts is primarily focused on teachers and instructors as the major socialization agents. While this is understandable, it also means that the role of other socialization agents such as parents and peers has not been fully explored. In more specific educational contexts, such as remote or home-based flexible learning, students may be particularly impacted by their home environment and peers, highlighting the need for further exploration in this area.

3. The social factors that contribute to PNF have mainly been linked to PNF as a second-order factor. However, this may overlook the unique consequences of each dimension of PNF. As discussed above, examining the individual dimensions of PNF may provide a more nuanced understanding of how social agents contribute to PNF.

4. PNF is closely tied to the social context in which it occurs. This means that specific behaviors of social agents, including teachers, parents, and peers, can contribute to the development of PNF. This highlights the

importance of examining the social context in which PNF occurs and the role of different social agents in the development of PNF.

5. No study has been conducted to explore how PNF develops in flexible modes of learning. This is an important gap in the literature, as flexible learning has become increasingly important after the world experienced the COVID-19 pandemic. Understanding how teachers, parents, and peers contribute to PNF in this context is critical for developing effective interventions to address PNF in post-COVID iterations of flexible learning.

Existing measures used to measure PNF may not be sufficiently context-specific. While these measures are designed to be domain-generic and can be adapted for specific contexts, they may not capture the unique experiences and socialization practices that contribute to PNF in specific domains, such as education. As discussed above, developing measures that are more context-specific and experience-dependent may provide a more accurate assessment of PNF in educational contexts.

Limitations

While this scoping review offers crucial insights into the existing research on PNF in educational settings, there are some limitations that necessitate consideration. Firstly, the review was confined to studies published in English, possibly excluding pertinent studies in other languages. This could impact the overall comprehensiveness of the review, as valuable research in non-English languages could have been overlooked. Secondly, the review cut-off was in August 2022, potentially resulting in the omission of more recent studies. Given the fast-paced evolution of the PNF research field, any novel and significant studies post this cut-off may have been missed, limiting the currentness of the review. Thirdly, the review did not incorporate research from educational databases, like ERIC, which could have added to the breadth of the study. The exclusion of these resources might have resulted in missing out on certain relevant studies that could potentially deepen our understanding of PNF in educational contexts. Moreover, the review was particularly focused on the educational context, without considering the application of PNF research in other sectors like healthcare or organizational settings. This narrow focus can limit the wider applicability of the review findings. Lastly, the review did not conduct a quality assessment of the included studies. While this approach is not uncommon for scoping reviews, it leaves room for potential influence by studies of varied quality on the findings. Future reviews could consider incorporating a quality assessment for a more robust understanding of the research.

Conclusion

Overall, the scoping review provided a comprehensive overview of the current state of research on PNF in educational contexts and highlighted the need for more context-specific research to advance our understanding of this important construct. The findings of this scoping review can serve as a starting point for future research and can inform the development of more effective interventions to promote learners' basic psychological need satisfaction and well-being in educational contexts.

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