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ORIGINAL RESEARCH: ARTICLE

Comparing Basic Psychological Need Satisfaction in Temporary and Permanent Nurses: A Propensity Score Matching Approach

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Abstract

Despite ongoing discussions about the promises and perils of temporary agency employment, we lack a systematic understanding of its potential to satisfy basic psychological needs in essential occupations such as nursing. While some studies suggest that temporary agency nursing satisfies the need for autonomy, others indicate that it frustrates the needs for competence and relatedness. Previous research has rarely addressed factors influencing the choice of temporary agency employment, which could also confound its effect on psychological need satisfaction. This leaves it unclear whether this employment arrangement provides the expected advantages and disadvantages. To compare temporary nurses ($n = 116$) with permanent nurses ($n = 421$) while controlling for potential confounders, we analyzed cross-sectional survey data using a combination of propensity score matching and parametric and non-parametric group comparisons. In 105 matched pairs, we found no evidence for higher levels of satisfaction of the need for autonomy or lower levels of satisfaction of the need for competence among temporary nurses. However, we found evidence of lower levels of satisfaction of the need for relatedness among temporary nurses. This finding suggests that future research should investigate team dynamics among temporary and permanent nurses.

Keywords Self-determination theory · Temporary agency employment · Nurses · Autonomy · Competence · Relatedness

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The title of the New York Times Magazine article "Nurses have finally learned what they're worth" (Hilgers, 2022) highlights how many nurses turned to temporary agency employment during the COVID-19 pandemic to improve their working conditions. This trend has also received attention in academic research. In an interview study, nurses explained that switching from permanent to temporary employment helped them to prevent burnout (Gan, 2019), which is relatively common in this profession due to emotional labor and low levels of gratification (e.g., Braun et al., 2024; Hornung et al., 2018). This reasoning has been supported by a study among Finish nurses that reported higher levels of well-being and health among temporary nurses compared to permanent ones (Hult et al., 2022). However, a systematic review by Hünefeld and colleagues (2020) shows that temporary agency workers more generally tend to suffer from higher levels of depressive symptoms and fatigue than permanent workers. Likewise, a study among Taiwanese nurses indicated higher stress levels among temporary nurses (Yeh et al., 2007). Thus, findings on well-being effects of temporary agency nursing are inconsistent.

These inconsistencies may be better understood by considering the systematic differences between temporary and permanent nurses and the interactions of these differences. For example, it is possible that nurses with children prefer temporary agency work, hoping for more flexibility and congruence with care responsibilities. However, these systematic differences may also affect nurses' well-being. Various scholars have recognized the need to control for these systematic differences when studying the impact of employment arrangements (Hünefeld et al., 2020). Yet, the conventional approach of including control variables hardly allows for the consideration of more complex realities. For example, having children may not prompt nurses to opt for temporary agency work, yet in societies with rather conservative gender roles, this employment arrangement might be particularly appealing to women. Accounting for this interaction between gender and children using the conventional inclusion of control variables would be rather impractical and cost power. Propensity score matching, however, enables scholars to consider these complexities (Stuart, 2010). Our research therefore sheds new light on temporary agency nursing by applying a methodological approach that minimizes systematic differences, allowing us to attribute findings to the employment arrangement itself. More specifically, we reduce the impact of systematic differences by combining group comparisons with propensity score matching in a sample of Swiss nurses.

Another reason for the inconsistency of previous findings may be the use of generic outcome measures. Different employment arrangements may satisfy specific psychological needs (i.e., for autonomy, competence, or relatedness), which in turn determine well-being (e.g., Ryan & Deci, 2000; Trépanier et al., 2015; Vander Elst et al., 2012). While temporary agency employment may satisfy the need for autonomy, permanent employment may be more likely to fulfill the need for relatedness. Thus, rather than examining the effects on generic well-being outcomes, this study takes a more nuanced approach by examining the extent to which temporary agency employment allows nurses to satisfy their different psychological needs (De Cuyper et al., 2008; Hünefeld et al., 2020).

Theoretical Background

Psychological Need Satisfaction Related to On-Demand Nursing

Temporary agency employment promises nurses high levels of flexibility. This employment arrangement is characterized by a triangular co-employment relationship (De Cuyper et al., 2008; Simpson & Simpson, 2019; Spreitzer et al., 2017). As a specific group of temporary nurses, per-diem nurses, who are the focus of our study,[1] sign a contract with an agency that often includes a master agreement over zero hours, meaning they cannot claim work hours or benefits (Simpson & Simpson, 2019). Rather than having a fixed number of monthly working hours, these nurses are assigned to work for a few shifts in various hospitals where they are supervised by permanent nurses (Cappelli & Keller, 2013). In contrast, the employment relationship of permanent nurses involves only themselves and the hospital. This relationship usually provides them with an open-ended employment contract that guarantees them certain benefits and a certain number of regular working hours in a single unit (Spreitzer et al., 2017). Thus, these different employment conditions may also affect nurses' well-being and health.

Temporary agency nursing, particularly under zero-hour contracts, has been associated with high burnout rates (Acea-López et al., 2021), poor self-rated health (Farina et al., 2024; Wilson & McDaid, 2022), poor mental health (Henderson, 2019), and poor occupational well-being (Pesonen et al., 2024). These findings might be better understood by considering self-determination theory, which suggests that the satisfaction of basic psychological needs for autonomy, competence, and relatedness is an important determinant for workers' well-being and health (Ryan & Deci, 2000; Trépanier et al., 2015; Van den Broeck et al., 2016; Vander Elst et al., 2012). The need for autonomy is satisfied when workers perceive their actions as aligned with their values and interests, approve their own actions (Pesonen et al., 2024), and act with volition (Deci & Ryan, 2000). The psychological need for competence is satisfied when workers can demonstrate their abilities by seeking challenging tasks, mastering them, and achieving valued outcomes (Deci & Ryan, 2000), supported by guiding structures, supportive information, constructive feedback, and tolerance for errors (Legault, 2020). To satisfy the psychological need for relatedness, work should provide opportunities to feel connected to others and cultivate important social relationships (Ryan & Deci, 2000). To this date, we are not aware of any evidence of the extent to which temporary and permanent employment arrangements satisfy nurses' basic psychological needs for autonomy, competence, or relatedness.

Yet, studies using convenience samples from various occupations have provided mixed results regarding the question of whether employment arrangements differ in the extent to which they satisfy basic psychological needs (Bosmans et al., 2015; Vander Elst et al., 2012). Investigating a large convenience sample, Vander Elst and colleagues (2012) found that temporary workers reported lower levels of satisfaction of the need for competence compared to permanent workers, but similar levels of satisfaction of the other psychological needs. In contrast, Bosmans and colleagues

[1] To make the study more readable, we refer to them as temporary nurses in the following.

(2015), through in-depth interviews with temporary workers, revealed perceptions of social exclusion, with many temporary workers describing themselves as outsiders. Recently, Hood and Patton (2022) found similar levels of satisfaction concerning all three psychological needs when comparing temporary and permanent basic workers (e.g., cleaners) in UK hospitals. A potential explanation for this lack of differences is that temporary agency employment has become more prevalent in basic work segments (i.e., work that does not require formal job training), altering work-related expectations and normalizing temporary agency employment in these segments (Hood & Patton, 2022). It is important to note that these studies included either heterogeneous convenience samples or basic work samples.

In contrast, a homogeneous sample of nurses may yield different findings. While in basic work or more heterogeneous samples, temporary agency work might be used to bridge periods of unemployment or get into permanent employment (De Jong et al., 2009; Spreitzer et al., 2017), it seems reasonable to assume that nurses actively choose temporary work, viewing it as an attractive employment alternative. One reason for this may be that agencies try to attract the highly demanded nursing profession (for Switzerland, see Bundesamt für Gesundheit, 2024) by presenting temporary agency employment to them as an opportunity to accommodate their needs for flexibility and autonomy.

Temporary nurses should have comparatively high levels of autonomy regarding their workplace and schedule. Unlike permanent nurses, temporary nurses are not obliged to accept shifts, which should provide them with greater autonomy over their working hours (Vahle-Hinz, 2016). Moreover, temporary nurses may have more possibilities to adapt their workplaces to their needs: Temporary nurses who prefer to work in different environments may choose to work one day in pediatric care and another day in psychiatry. Likewise, those temporary nurses who prefer a specific type of facility (e.g., psychiatric care) can choose to work only in this environment, without being restricted to a specific geographic area or team (Gan, 2019). Thus, we hypothesize the following:

H1 Temporary nurses perceive higher levels of satisfaction of the need for autonomy than permanent nurses.

However, satisfying the need for autonomy may come with a trade-off regarding the fulfillment of other psychological needs (see also Marcellis et al., 2024; Sheldon & Niemiec, 2006). The satisfaction of the psychological needs for competence and relatedness might be particularly hampered by the constantly changing social work environments.

While temporary nurses may experience more competence due to self-directed learning that is required by constantly changing work environments (Gan, 2024), these constant changes may not necessarily present them with optimal challenges. For instance, constantly changing work environments rarely allows temporary nurses to develop, plan, and organize their work (Berg Jansson & Engström, 2022). Furthermore, supervisors may be less likely to invest in their learning and provide feedback due to the short periods temporary nurses work in a team. This argument is supported by a qualitative study in which temporary nurses reported receiving only general,

inconsistent feedback that varied in depth and quality (cf. Berg Jansson et al., 2020; Berg Jansson & Engström, 2022). Additionally, constantly changing work environments implies that learning becomes an individualized responsibility of temporary nurses (Berg Jansson et al., 2020). Finally, they have to rely on permanent nurses for basic information, which is at odds with their formal qualification (Wilkin et al., 2018). Therefore, we hypothesize the following:

H2 Temporary nurses perceive lower levels of satisfaction of the need for competence than permanent nurses.

Most empirical studies suggest that temporary nurses are poorly integrated into the teams they work with, which could impair their satisfaction of the need for relatedness (Cardone et al., 2021; Holm et al., 2016; Wilkin et al., 2018). A qualitative study suggested that temporary nurses are often treated as 'visitors' who rarely engage in collective decision-making, whereas permanent nurses have stable, long-term relationships with their colleagues and participate in collective processes (Berg Jansson et al., 2020). As 'new team members', temporary nurses may need more informational support from permanent nurses, who may respond to this need with reduced appreciation and efforts to integrate them into the team, given the substantial wage differences (Gahrmann & Klumb, 2024; Viitala & Kantola, 2016). Thus, we hypothesize the following:

H3 Temporary nurses perceive lower levels of satisfaction of the need for relatedness than permanent nurses.

Controlling for Systematic Differences between Temporary and Permanent Nurses

When considering the reasons why nurses choose temporary agency work, it is very likely that temporary and permanent nurses differ from one another systematically. Hünefeld and colleagues (2020) argued that various sociodemographic, personal, and work-related variables are associated with the decision to sign-up for temporary employment as well as various indicators of work-related well-being and health. This assumption is supported by empirical research. Three studies from different cultural contexts (Greece, Taiwan, and Finland) that focused specifically on the healthcare sector found that temporary nurses were more likely to be single, childless (Katsaouni et al., 2024; Yeh et al., 2007), and young (Hult et al., 2022; Yeh et al., 2007), compared to permanent nurses; they also had less work experience than permanent nurses (Yeh et al., 2007). The results regarding gender and education differed between these studies, indicating potential differences in gender norms and education systems.

The literature on psychological need satisfaction points to similar confounders. For instance, gender, qualification, living situation, and family status have been found to be associated with the satisfaction of needs for autonomy, competence, and relatedness to varying degrees (Lataster et al., 2022). Taken together, the literatures on both temporary agency employment and psychological need satisfaction suggest that these variables may confound the relationship between employment arrange-

ments and the outcome variables (De Cuyper et al., 2008; Hünefeld et al., 2020; Lataster et al., 2022).

Therefore, we decided to hold these variables constant using propensity score matching. In line with previous literature, we considered the following to be potential confounders that could be included in the propensity score: Gender, children at home, living with a partner, partner's employment situation, qualification, work experience, and shift preferences. As matching creates an equal distribution of confounders between temporary and permanent nurses with the same value on the propensity score (Austin, 2011), we expect our analysis to estimate the effect of the employment arrangement on need satisfaction in an unbiased fashion.

Methods

Procedure

Data were collected between 2021 and 2022 as part of a larger Swiss research project that was approved by the ethics committee of the University of Fribourg (protocol number 2021 − 706). We recruited convenience samples of temporary and permanent nurses in the German-speaking regions of Switzerland via various stakeholders: We recruited temporary nurses via invitation messages that we sent to nurses who were registered in the largest temporary work agency specialized on healthcare in these regions. To recruit permanent nurses, we approached hospitals and professional associations, distributed flyers outside healthcare facilities, and launched a social media campaign. Additionally, we asked permanent nurses to inform potential participants about the study through their social networks. Participation in the study was voluntary. As an incentive, we raffled five CHF 200 vouchers among the participants and offered them personal feedback on the study results (for more information, see Gahrmann & Klumb, 2024; Klumb et al., 2024).

Depending on their employment arrangement, interested nurses received a link that led them to an online survey for temporary or permanent nurses. After informing the participants about the study and participation conditions, both surveys requested informed consent. Participants then completed questions on socio-demographic data and work-related aspects. All the variables assessed in this questionnaire can be found in Table 6 of the supplementary material, along with the reasons for including or excluding them as confounders. Finally, participants could enroll for a follow-up questionnaire that was not part of this study. Thus, our study has a cross-sectional design.

Measures

The questionnaires were provided in German. All questions, the except informed consent, could be skipped.

Employment Arrangement

Separate online surveys allowed us to distinguish between temporary nurses ($n = 216$) and permanent nurses ($n = 421$). To distinguish per diem nurses from other types of temporary nurses, we asked temporary nurses "How is your employment organized exactly?": Those who selected "Various hospitals book me for single shifts." were classified as per diem nurses ($n = 116$) and remained in our sample; nurses who responded "I work over multiple weeks or months in specific healthcare teams." were classified as travel nurses ($n = 92$) and were excluded from this study (aside eight temporary nurses who did not complete this question).

Psychological Need Satisfaction

Participants responded to twelve items that were adapted from the Basic Psychological Needs at Work Scale by Ryan (2016) on a 5-point Likert scale ranging from *not at all* (1) to *absolutely* (5). Each psychological need was covered by four items, two of which were reverse-coded. Regarding the need for autonomy (Cronbach's $\alpha = .66$), participants rated items such as "I feel my choices on my job express who I really am." With regard to the need for competence (Cronbach's $\alpha = .68$), participants responded to items such as "At work I feel capable at what I do." Regarding the need for relatedness (Cronbach's $\alpha = .85$), participants expressed their agreement with items like "I feel connected with my colleagues at work." Most fit indices of the confirmatory factor analysis were acceptable ($X^2(51) = 286.44$, $p < .001$; CFI = 0.87; RMSEA = 0.094; SRMR = 0.060; $N = 518$), and the three-factor model outperformed the alternative one-factor model ($\Delta X^2(3) = 401.11$; $p < .001$). Intercorrelations and descriptive statistics can be found in Table 1.

Potential Confounders

To measure potential confounders, we asked participants the following questions about their personal situation: "Which gender do you identify with?" (response options: *male*, *female*, and *diverse*), "How many children live in your household?", "Do you cohabit with a partner?" (response options: *yes* and *no*), and "Is your partner employed?" (response options: *yes* and *no)*. Additionally, we inquired on their professional situation, asking "What is your highest professional degree at the moment?" (response options: *no degree /currently in training*, *basic nursing diploma*, *federal*

Table 1 Intercorrelations and descriptive statistics for the unmatched sample ($N = 532$; below the diagonal) and the matched sample ($n = 210$; above the diagonal)

	Unmatched		Matched		*1*	*2*	*3*	*4*
	M	*SD*	*M*	*SD*				
Employment arrangement [a]					-	.01	.07	−.31***
Satisfaction of need for autonomy	3.37	0.66	3.41	0.68	.03	-	.46***	.47***
Satisfaction of need for competence	4.13	0.53	4.14	0.51	.07	.38***	-	.35***
Satisfaction of need for relatedness	4.08	0.70	3.92	0.71	−.32***	.44***	.24***	-

Note. [a] 0 = permanent nurses, 1 = temporary nurses.

diploma of higher education, *Bachelor's degree*, *degree in advanced studies*, *Master's degree*), and "For how long have you been working as a nurse? Please provide the number of years." Finally, we asked nurses, "Which shift do you prefer?" (response options: *morning shift*, *afternoon shift*, *evening shift*, *night shift*, *it depends*, and *no preference*).

Sample

Initially, 116 temporary and 421 permanent nurses participated in our study. Eighty-four percent of the nurses were female ($n=451$), and fifteen percent were male ($n=78$). On average, the nurses were 40.92 years old ($SD=11.81$).[2] The majority of nurses lived with their partner (61%; $n=329$). Most nurses did not live with children (66%; $n=357$).

Most participants held a federal diploma of higher education (44%; $n=234$), a degree in advanced studies (26%; $n=141$), or a Bachelor's degree (11%; $n=58$). Nurses reported an average work experience of 18.82 years ($SD=11.04$). All temporary nurses worked as regular nurses without any additional responsibilities. Among permanent nurses, the majority also worked as regular nurses without additional tasks (65%, $n=275$). Some held a team leader position (18%, $n=77$), had additional responsibilities (e.g., in training; 8%, $n=34$), were part of management (4%, $n=16$), or held a division lead position (3%, $n=11$).

Only two of the temporary nurses had not worked as permanent nurses before. Temporary nurses reported working in this employment arrangement for 3.33 years on average ($SD=3.58$), which is a share of their average work experience of 17.13 years ($SD=10.45$). To understand the motives behind choosing one employment arrangement over another, we assessed how voluntarily temporary nurses chose their employment arrangement and whether they would prefer a permanent position if they had the choice, using a Likert scale ranging from *not at all* (1) to *very much* (5). Additionally, we explored their motives through clustering and counting responses to the open question "Why do you arrange your work through a temporary agency?". Indeed, 91% of the temporary nurses reported that their decision to work for an agency was a voluntary one ($n=106$).[3] However, approximately 21% of the temporary nurses reported that they would prefer a permanent position if they had the choice ($n=24$).[4] These responses align with the motives for temporary nursing stated in the open question: None of the respondents suggested that they were unable to find *any* job as a permanent nurse. However, the conditions of the available permanent positions did not meet the nurses' expectations and needs (e.g., flexibility).

Among permanent nurses, a small share had experience in temporary nursing (14%; $n=57$). Most of them had worked as temporary nurses for about a year (44%;

[2] Due to a technical error, we could collect data on this variable for only 59% of the sample. Therefore, we did not include the variable in our propensity score.

[3] These 91% refer to temporary nurses who selected either *pretty much*(4) or *very much* (5) in response to the question how voluntarily they chose their employment arrangement.

[4] These 20% refer to temporary nurses who selected either *pretty much* (4) or *very much* (5) in response to the question whether they would prefer a permanent position if they had the choice.

$n = 25$); seventeen permanent nurses had worked as temporary nurses for at least two years (30%); and ten nurses had worked as temporary nurses for less than a year (18%). Among the permanent nurses who had work experience as a temporary nurse, the most common responses to the question "Why did you decide to work as a permanent nurse?" were (financial) security, social integration in the team, and interest in specializing on specific healthcare populations.

Analysis

To reduce the impact of confounders when estimating the effect of temporary agency nursing, we combined propensity score matching with group comparisons in *R*Studio. Consequently, our analysis involved multiple preparation steps alongside the comparison of matched groups. These preparation steps included theoretically and empirically selecting confounders to be included in the propensity score, estimating the propensity score in line with our main interests, and selecting an appropriate matching method.

We compared the matched groups using paired *t*-tests, or Wilcoxon tests in cases of non-normal distributions. Since we tested three hypotheses on multiple distinct, yet interrelated outcome variables, we adjusted the *p*-values using a Bonferroni correction. Power was then calculated using G*Power version 3.1.9.7 (Faul et al., 2007). To approach the multivariate nature of our outcomes, we conducted a robustness check in which we applied a closed testing strategy using a principal component analysis (robustness check 1). Additionally, we tested our hypotheses in a sample that was matched using a less restrictive matching approach (robustness check 2).

Results

Propensity Score Matching

Selecting Confounders for the Propensity Score

To select relevant confounders, we combined theoretical and statistical approaches: First, we selected confounders that previous research had identified as being related to both the choice of an employment arrangement and levels of psychological need satisfaction (VanderWeele, 2019): Gender, children at home, living with a partner, partner's employment situation, qualification, years of work experience, and shift preferences. Then we reduced this set of confounders statistically by regressing the employment arrangement on these potential confounders. More specifically, we conducted a backward exclusion on a binomial logistic regression, keeping variables that met the criterion of $p < .15$ (Schafer & Kang, 2008). As shown in Table 2, qualification, children at home, and gender met this criterion and were thus included in the propensity score.

Then we inspected the mean differences and frequencies for the variables, their interactions, and the corresponding propensity score in the unmatched sample (see

Table 2 Results of binomial logistic regression with employment arrangement as outcome for the selection of confounders

		85%-CI			Nagel-kerke R^2
	OR	LL	UL	*p*	
Step 1					
Constant	-1.54	-3.07	-0.21	.116	.18
Low qualification	1.20	0.69	1.70	<.001	
Children at home	-0.48	-0.89	-0.09	.080	
Gender (female)	-0.44	-0.87	0.00	.142	
Partner's employment [a]	-0.37	-1.67	0.65	.639	
Living without partner	0.36	-0.67	1.67	.649	
Work experience	-0.00	-0.02	0.01	.932	
Flexible shift preference	0.27	-0.42	1.01	.586	
Specific shift preference	0.27	-0.34	0.95	.540	
Step 2					
Constant	-1.30	-2.72	-0.09	.147	.18
Low qualification	1.19	0.69	1.70	<.001	
Children at home	-0.49	-0.90	-0.10	.075	
Gender (female)	-0.44	-0.86	0.01	.147	
Partner's employment [a]	-0.37	-1.67	0.65	.636	
Living without partner	0.37	-0.66	1.68	.643	
Work experience	-0.00	-0.02	0.01	.887	
Step 3					
Constant	-0.93	-2.10	0.10	.216	.15
Low qualification	1.35	0.88	1.81	<.001	
Children at home	-0.56	-0.95	-0.17	.041	
Gender (female)	-0.53	-0.95	-0.10	.069	
Partner's employment [a]	-0.12	-1.19	0.78	.858	
Living without partner	0.09	-0.82	1.17	.892	
Step 4					
Constant	-0.84	-1.29	-0.42	.005	.15
Low qualification	1.36	0.90	1.83	<.001	
Children at home	-0.58	-0.97	-0.20	.032	
Gender (female)	-0.52	-0.93	-0.09	.074	
Partner's employment [a]	-0.06	-0.40	0.28	.797	
Step 5					
Constant	-0.87	-1.28	-0.48	.002	.15
Low qualification	1.35	0.89	1.80	<.001	
Children at home	-0.56	-0.94	-0.19	.031	
Gender (female)	-0.52	-0.93	-0.09	.075	

Note. Permanent nursing is the reference category.

[a] Partner's employment situation.

Table 3). Temporary nurses were more likely to be male, have no children, and have no more than a basic nursing diploma.

Table 3 Standardized mean differences and frequencies for the propensity score, included confounders, and their interactions in the unmatched samples

	Standardized mean difference	$n_{temporary}$ (%)	$n_{permanent}$ (%)
Propensity score	0.433	107	397
Female gender [a]	-0.152	86 (80%)	343 (86%)
Children at home [a]	-0.278	24 (22%)	135 (34%)
Low qualification [a]	0.353	22 (21%)	25 (6%)
Male gender X no children at home	0.261	18 (17%)	28 (7%)
Male gender X children at home	-0.227	3 (3%)	26 (7%)
Female gender X no children at home	0.037	65 (61%)	234 (59%)
Female gender X children at home	-0.197	21 (20%)	109 (27%)
Male gender X high qualification	0.100	18 (17%)	52 (13%)
Male gender X low qualification	0.139	3 (3%)	2 (1%)
Female gender X high qualification	-0.372	67 (63%)	320 (81%)
Female gender X low qualification	0.313	19 (18%)	23 (6%)
No children at home X high qualification	-0.047	63 (59%)	243 (61%)
No children at home X low qualification	0.357	20 (19%)	19 (5%)
Children at home X high qualification	-0.295	22 (21%)	129 (32%)
Children at home X low qualification	0.026	2 (2%)	6 (2%)

Note. Positive standardized mean differences suggest a higher share of people in the group of temporary nurses than in the group of permanent nurses.

[a] As all variables were dichotomized, the standardized mean differences for the category not shown is the same but with the opposite sign (e.g., high qualification has a standardized mean difference of -0.353).

Estimating the Propensity Score and Matching

Before estimating the propensity score using the MatchIt package version 4.5.5 (Greifer, 2024b), we removed cases with missing values on the selected confounders and the outcome variables from the sample (Choi et al., 2019). Then, we computed a logistic regression analysis to estimate the propensity score.

In the next step, propensity score matching required us to select the matching method that produced the best matches. We limited the variety of potential matching methods in advance based on theoretical considerations: If researchers are interested in the general effect of a treatment (here: the employment arrangement), they choose methods suitable for estimating the average treatment effect (ATE). However, as we were interested in the effect of the decision for temporary nursing on the temporary nurses, we chose methods that were suitable for estimating the average treatment effect on the treated – the temporary nurses in our case (ATT; Stuart, 2010). Estimating the ATT requires researchers to identify permanent nurses who are as similar as possible to the temporary nurses, and to discard permanent nurses who cannot be matched. We applied six matching methods that are suitable for estimating the ATT (Stuart, 2010): 1:1 nearest neighbor matching without replacement, full matching with a probit link, optimal matching, 1:1 nearest neighbor matching with replacement, full matching with logit link, and 1:1 nearest neighbor matching without replacement with a caliper of 0.1.

To compare the matching performance of these methods, we selected the following matching criteria: The average and maximum standardized mean difference

Table 4 Performance of different matching methods

Matching method	diff_{CS}		$diff_{PS}$	n_{temp}	n_{perm}
	Max.	*M*			
No matching	0.357	0.058	0.433	107	397
1:1 Nearest neighbour matching without replacement	0.057	0.000	0.019	107	107
1:1 Nearest neighbour matching with replacement	0.025	-0.004	0.009	107	76.8
1:1 Nearest neighbour matching without replacement with a caliper of 0.1	0.000	0.000	0.000	105	105
Optimal matching	0.057	0.000	0.019	107	107
1:3 Nearest neighbour matching without replacement	0.328	0.036	0.344	107	321
Full matching with a probit link [a]	0.008	-0.003	-0.000	107	109.6
Full matching with logit link [a]	0.024	-0.008	-0.001	107	106.3

Note. In binary confounders, the mean standardized mean difference for both categories is zero (e.g., it is -0.1 for male and 0.1 for female gender). As all confounders were binary variables, we omitted the negative values of the variables when calculating the mean.

[a] As using weights is recommended for full matching, we report the effective sample size here.

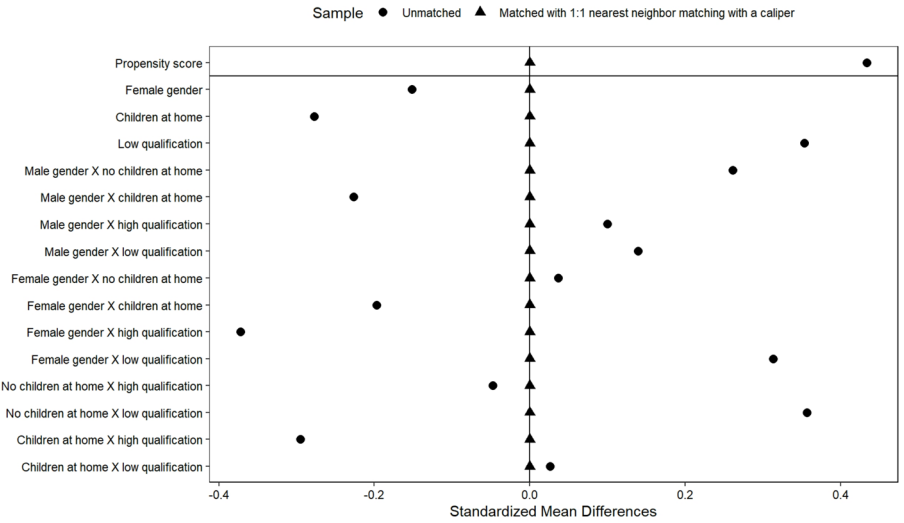

Fig. 1 Balance plot showing standardized mean differences before and after matching

between both samples and the final sample size (Stuart, 2010). Thus, we calculated the standardized mean differences for the six matching methods and the unmatched sample based on the propensity scores, the included confounders, and the interactions between these confounders (Austin, 2007; Greifer, 2024a). Table 4 shows how the performance of all six methods regarding our criteria.

As shown in Table 4, nearest neighbor matching with a caliper of 0.1 performed best. This procedure resulted in all matching criteria being zero. To gain detailed insights into matching performance, we compared the performance of this matching method to the unmatched sample regarding all confounders and their interaction. As shown in Fig. 1, 1:1 nearest neighbor matching with a caliper of 0.1 reduced the stan-

Table 5 Results of the paired group comparisons

	Temporary nurses		Permanent nurses		$t(104)/z$	p	Cohen's d/r	Power
	M/Md	*SD*	*M*/Md	*SD*				
Satisfaction of need for autonomy [a]	3.50		3.50		-0.486	1.000	0.03	0.06
Satisfaction of need for competence	4.18	0.51	4.11	0.51	1.006	.950	0.10	0.17
Satisfaction of need for relatedness [a]	3.75		4.25		4.809	<.001	0.44	0.99

Note. Permanent nurses were coded as 0 and temporary nurses as 1.

[a] Testing the assumptions of *t*-tests indicated violations of the normality assumption. Therefore, results of a paired Wilcoxon test are reported. Instead of the mean, we report a median.

dardized mean difference to zero for all confounders, interactions, and the propensity score.

A drawback of the chosen matching method was that we had to discard two temporary nurses (i.e., the group of interest) and 292 permanent nurses (i.e., the control group). Therefore, we provided descriptive statistics on the matched and the unmatched samples in Table 7 of the supplementary material.

Estimating the Effects of Temporary Agency Nursing in Group Comparisons

Based on the remaining 210 nurses, we created 105 pairs and included them in a paired *t*-test to account for the matching (Austin, 2008). Before, we tested whether the data met the requirements for parametric paired *t*-tests. According to significant Shapiro-Wilk tests, the requirement for normality was violated regarding satisfaction of needs for autonomy and relatedness. Therefore, we calculated Wilcoxon tests to compare the paired groups of nurses regarding these outcomes.

Table 5 shows the descriptive statistics for both groups and the results of the paired *t*-test and the Wilcoxon tests, including Bonferroni-corrected two-sided *p*-values. We expected higher levels of satisfaction of the need for autonomy (H1) and lower levels of satisfaction of needs for competence (H2) and relatedness (H3) among temporary nurses. Contrary to H1 and H2, we did not find evidence of higher levels of satisfaction of the need for autonomy or lower levels of satisfaction of the need for competence among temporary nurses. In line with H3, we found evidence of lower levels of satisfaction of the need for relatedness among temporary nurses.

Robustness Checks

Robustness Check 1

To account for the correlations between our outcome variables, we created a composite variable and determined a testing order similar to that of closed testing (Lehmann & Romano, 2022; Marcus et al., 1976). Traditionally, closed testing requires researchers to test hypotheses in a predetermined order and stop as soon as the first

test is not significant. However, since this robustness check was conducted post hoc, we determined the testing order based on the data.

More specifically, we ran a principal component analysis on the three outcomes to determine the order in which to test our hypotheses, and to extract values from the first component that could be used as composite variable (Tabachnick & Fidell, 2013). Following our post-hoc closed testing protocol, we first tested to what extent permanent nurses differed from temporary nurses regarding the composite variable. Then, we proceeded with the outcomes based on their loading on the first component: Autonomy (-0.61), relatedness (-0.56), and competence (-0.56). Comparing the nurses regarding the composite variable revealed no significant difference ($t(104) = 1.330$, $p = .187$, $d = 0.13$, $1\text{-}\beta = 0.26$). Thus, the procedure was stopped.

Robustness Check 2

A main criticism of using a caliper to estimate the ATT is that it might result in a loss of participants. In fact, two members of the treated group (i.e., temporary nurses) were discarded. Therefore, we repeated the outcome analysis using the dataset that was matched based on 1:1 nearest neighbor matching as a robustness check. The results of this robustness check did not differ substantially from those of the main analysis (see Table 8 of the supplementary material).

Discussion

Our study addressed calls to control for confounders when comparing different employment arrangements regarding effects on well-being and health (De Cuyper et al., 2008; Hünefeld et al., 2020). In the healthcare context, we found no evidence for the promise that temporary agency employment satisfies the need for autonomy to a greater extent than permanent employment. Similarly, we found no difference regarding satisfaction of the need for competence. However, in line with our expectation, we found significantly lower levels of satisfaction of the need for relatedness among temporary nurses.

Theoretical Implications

In the following, we discuss potential explanations for our findings taking into account pragmatic reasons, intergroup dynamics, and person-environment fit. These considerations allow us to understand temporary agency employment within an organizational context.

Our findings can be understood through the lens of the *practical challenges* faced by healthcare teams when integrating temporary nurses. As newcomers, temporary nurses require ongoing instruction and supervision, particularly since hospitals may use different documentation systems and different hospital units may demand specific training and experience (e.g., psychiatric care requires different skills than emergency medicine). This need for instruction potentially has three interconnected consequences: First, supervisors weigh efforts and challenges involved in instructing

and training temporary nurses against their prospective team tenure, often deciding to invest minimal effort in temporary nurses (for qualitative evidence, see Bajorek & Guest, 2019). Second, when considering the necessity of instruction, supervisors may provide temporary nurses with less autonomy and less complex tasks (see also Berg Jansson & Engström, 2022). In turn, temporary nurses may experience reduced autonomy during their shifts, which could offset the effect of scheduling flexibility on the satisfaction of their need for autonomy. Third, temporary nurses might interpret the supervisor's low efforts as a lack of interest in themselves as a person, which could be seen as a negative equivalent of the hypothesis that instrumental support also functions as emotional support (Semmer et al., 2008). These pragmatic reasons may explain the lacking differences in terms of autonomy and competence as well as the significantly lower levels of satisfaction of the need for relatedness among temporary nurses.

Intergroup dynamics between temporary and permanent nurses might explain lower levels of relatedness among temporary nurses. These dynamics may unfold in nursing teams, where temporary nurses receive instructions and collaborate with members of their assigned ward (i.e., team; e.g., Berg Jansson & Engström, 2022). Teamwork is a very common setting in healthcare facilities, enabling nurses to care for multiple patients simultaneously, react to emergencies swiftly, and assist each other with difficult tasks (O*NET OnLine, 2025). However, permanent nurses in these teams may be aware of the advantages of temporary nursing: High pay and personalized work scheduling provide resources in neoliberal capitalism that give nurses access to additional resources (Hobfoll, 2014). Observing these benefits in temporary nurses, who are potentially less qualified to work in their ward, permanent nurses might develop stereotypes portraying temporary nurses as being incompetent and cold (Fiske, 2018). These stereotypes might strengthen their tendency to exclude these nurses from their team activities (Cuddy et al., 2007). In turn, temporary nurses may become less interested in relating to permanent nurses. This highlights that potential dynamics should be considered by research and practitioners who are responsible for integrating temporary nurses into teams.

Person-environment fit (Caplan, 1987) is commonly used to explain why temporary agency employment satisfies the needs of those who choose this employment arrangement. Regarding the non-significant finding concerning the needs for autonomy and competence, we cannot rule out a selection into temporary agency employment as an explanation. Potentially, nurses who experience more competence through self-directed learning from diverse challenges select themselves into temporary agency employment, where they are confronted with a broad range of learning opportunities in constantly changing work environments. At the same time, nurses who want to specialize in a specific field of healthcare may prefer permanent employment, where they can refine their skills and knowledge on specific patient groups in a stable work environment. This mastery may also be rewarded with more responsibility. However, we found no evidence of this selection effect in terms of relatedness. If temporary nurses preferred fewer social relationships at work, one would expect them to be as satisfied as permanent nurses in terms of relatedness. Instead, we found a small, significant difference between temporary and permanent nurses, indicating

that temporary employment was related to lower levels of satisfaction of the need for relatedness.

Implications for Policy and Practice

Overall, our results imply that temporary agency employment satisfies nurses' psychological need for relatedness to a lower degree than permanent employment. This finding has implications for workers, unions, healthcare organizations, and, ultimately, patients.

Our findings underline the problematic interpersonal situations that temporary agency employment can foster within organizations. This situation affects both temporary and permanent nurses, as well as their representatives (i.e., unions), in two ways: First, temporary nurses may compromise their well-being, especially with respect to needs for relatedness. To overcome these effects, temporary nurses may seek to satisfy their need for relatedness outside of work or reconsider permanent employment. Yet, temporary nurses may not necessarily feel free to choose permanent employment (e.g., due to the need for higher salaries and care obligations). Second, temporary agency employment may undermine the team climate and potential for organizing. Sociological discussions already cautioned against temporary agency employment due to its potential to divide the workforce (Brinkmann et al., 2006).

As healthcare requires high levels of teamwork, organizations and patients alike may benefit from a shift towards more permanent employment in the healthcare sector. To make permanent employment more attractive, it is necessary to consider the main motives for temporary employment: High salaries and flexibility (Honekamp, 2020). Increasing salaries and providing permanent nurses with greater flexibility may (re-)attract temporary nurses to permanent employment. As nurses' freedom to choose permanent positions might be restricted by personal and structural factors (e.g., care responsibilities), organizations and policymakers should support the creation of attractive permanent positions. Rather than allowing profit-driven personnel companies to influence this sector, policymakers should consider the health effects of employment arrangements when discussing new regulations and laws. Likewise, organizations may adjust salary levels and offer flexible working hours instead of spending money on agency fees.

Limitations and Strengths

The strengths and limitations of our study provide directions for future research. First, while we saw the homogeneity of our sample as a strength, it can also be viewed as a limitation in terms of generalizability to other national and occupational contexts. Indeed, Swiss nurses can be considered as a WEIRD sample (i.e., Western, educated, industrialized, rich, democratic; Henrich, 2010; Schimmelpfennig et al., 2025): Switzerland is an industrialized, rich, democratic country. Its central location in Europe and its high income levels (OECD, 2024) have been attracting workers from neighboring countries (e.g., 34.4% of the workforce had a nationality other than Swiss in 2024; Federal Statistical Office, 2025). At the same time, Switzerland is known for its combination of conservatism and economic liberalism in favor of corpora-

tions (e.g., Burkhalter, 2011; Eichenberger, 2019). Thus, it seems plausible that our findings are limited to countries with similar political and economic situations (e.g., Liechtenstein, Norway, or the United States). Likewise, nurses are highly educated and demanded, especially in aging societies. Consequently, they may easily find new employment in- and outside temporary work. Such a high employability is rarely found among temporary agency workers outside of nursing (Hood & Patton, 2022), suggesting that nurses are more likely to accept these employment arrangements for other reasons than the lack of permanent positions. Therefore, our findings could be generalized to occupations with similar levels of employability (e.g., information technology experts). To understand the extent to which structural aspects (e.g., regulations, economic situation) and occupational aspects (e.g., prestige or tasks) affect temporary agency employment and thus limit the generalizability of studies like ours, a systematization based on a systematic review would be useful.

Second, we managed to maximize control over person-level confounders by using propensity score matching with a caliper. While high control over confounders could be seen as a strength in light of the literature on temporary agency employment (De Cuyper et al., 2008; Hünefeld et al., 2020), this reduced our samples size and the statistical power. As this limitation could also explain the non-significant results, researchers who are interested in using propensity score matching to maximize control over confounders should try to recruit larger samples.

Third, as with any propensity score matching study, it is possible that we did not measure important confounders. For instance, we did not include the strength of the three psychological needs in our propensity score. While previous studies on psychological need satisfaction rarely assessed need strength (van Hooff & De Pater, 2019), future research on employment arrangements would benefit from including it in propensity scores. This approach may provide unbiased findings on the idea that choosing temporary nursing is a matter of person-environment fit (i.e., nurses with a lower need for relatedness choose temporary agency work). Furthermore, age would be an important confounder, as previous studies have shown temporary nurses to be younger than permanent nurses (Hult et al., 2022; Yeh et al., 2007). Likewise, the economic situation and the workload before the decision for or against temporary nursing could be relevant confounders because these variables might explain why nurses choose temporary agency nursing and which references they have when they evaluate their current economic and workload situations. Finally, the specialization in nursing could be an interesting confounder because different specializations involve different tasks and levels of patient-nurse relationships. For example, psychiatric nurses support therapeutic measures whereas nurses in emergency rooms react quickly. These differences might affect the choice of the employment arrangement as well as the evaluation of psychological need satisfaction.

Future Research

Our findings suggest three additional directions for future research. First, it might be interesting to study temporary agency employment as a developing phenomenon. Such a developmental perspective would allow researchers to observe cohort and longitudinal effects, which may give insights into whether normalization, increases,

and regulations of temporary agency employment alter the effects on psychological need satisfaction, and how these patterns evolve over time (Hood & Patton, 2022).

Second, psychological need satisfaction regarding relatedness could be an interesting mediator between temporary agency employment and work-related health and well-being. This would provide important insights into how temporary agency employment is associated with the development of burnout (Acea-López et al., 2021), a risk that up to 20.5% of the nurses face (Taris et al., 2005). By applying propensity score matching to longitudinal data, this research could test mediator hypotheses and approach causality regarding both paths: Temporary agency employment and psychological need satisfaction, and psychological need satisfaction and work-related health and well-being. These models would also enable comparisons between different mediators (Wilson & McDaid, 2022).

Third, the lower level of satisfaction of the need for relatedness among temporary nurses suggests that future research should investigate team dynamics in relation to temporary agency work. As temporary agency nursing may attract certain demographic groups more strongly than others, this research should use faultlines to capture interaction effects of demographic characteristics and employment arrangements (Meyer et al., 2014). Additionally, this research should measure the extent to which team members are aware of differences in terms of employment arrangements (Shemla et al., 2016).

Conclusion

Nurses and their well-being are vital for the functioning of healthcare in our societies. The current shortage of nurses has evoked a debate about potential solutions, such as recruiting nurses from abroad or using temporary nurses. Our study examined the impact of one of these solutions – temporary nursing – on nurses' psychological need satisfaction. Our findings provide evidence for a problematic implication of increasing the workforce through temporary agency nursing: There is no evidence of the suggested advantage of the increased autonomy while there is evidence of low levels of relatedness. These findings raise the question of which alternatives to temporary agency employment align better with the nurses' needs. Occupational health psychology should provide unbiased findings on how these alternatives affect nurses' physical and mental health and well-being. Otherwise, stakeholders who benefit from such alternative employment arrangements (e.g., temporary work agencies) will skew the debate in favor of their profit interests. To reduce bias, propensity score matching may provide a useful method for future studies on alternative employment arrangements.

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Declarations

Ethics Approval and Informed Consent This study was approved by the ethics committee of the University of Fribourg (protocol number 2021 − 706). Study participants gave their consent in study participation and publication of resulting data.

Competing Interests The authors report that there are no competing interests to declare.

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