



# Perfectionistic parents are burnt out by hiding emotions from their children, but this effect is attenuated by emotional intelligence

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## ABSTRACT

Studies have revealed that parenting perfectionism, especially the dimension of perfectionistic concerns, is a substantial risk factor for parental burnout, but this association can be buffered by emotional intelligence. Less is known, however, about the underlying mechanism of these observations. This study examined an integrated model consisting of both the indirect path from perfectionistic concerns to parental burnout through expressive suppression, and the moderating effect of emotional intelligence in the association of both perfectionistic concerns and expressive suppression with parental burnout. We investigated this model in a sample of Polish parents ( $N = 439$ ). The results revealed that emotional intelligence buffered both the positive direct and indirect (through expressive suppression) effects of perfectionistic concerns on parental burnout, therefore supporting the model. In addition to expanding the understanding of the emotional experiences of perfectionistic parents, the present study also provides practical implications for treating and preventing parental burnout.

## 1. Introduction

The global rise of individualism (Santos et al., 2017) places a heavy burden on recent generations encouraging persons to compete with one another (Curran & Hill, 2019). Responding to this socially individualistic climate, more individuals than ever strive for perfection by setting excessively high personal standards and adopting overly critical self-evaluations, even in the most private aspects of life, such as in parenting (Snell et al., 2005). Parenting perfectionism has positive effects, such as increased parental engagement and self-efficacy (Lee et al., 2012). It also has negative aspects, however, such as the reinforcement of parental stress and the increased risk of parental burnout (Kawamoto et al., 2018; Lin, Szczygiel, et al., 2021; Sorkkila & Aunola, 2020; Szczygiel et al., 2020). This study focuses on parental burnout and takes a further step to shed light on the mechanisms that underlie the relation between perfectionistic concerns, considered a maladaptive aspect of parenting perfectionism, and parental burnout.

### 1.1. Parenting perfectionism and parental burnout

Parenting perfectionism (PP) is defined as perfectionism

contextualized in the parenting context. Following the factor analytic evidence of perfectionism, PP has been defined as a multidimensional construct encompassing two positively related superordinate dimensions: perfectionistic concerns (PC) and perfectionistic strivings (PS) (Smith et al., 2021; Stoeber & Gaudreau, 2017). PS contain the intention of setting high standards and self-oriented desires/struggles to be perfect. Usually, comorbid and overlapping with PS, PC includes doubts about one's own actions, concerns about making mistakes, a sense of discrepancy between one's standards and actual performance, and fears of negative evaluation from others if one fails to be perfect (Kawamoto et al., 2018; Lin, Szczygiel, et al., 2021).

Just as perfectionism has implications for an individual's well-being (Smith et al., 2020; Stoeber et al., 2021), PP has been shown to be crucial to parental maladjustment (e.g. Lee et al., 2012) or, specifically, to parental burnout (PB) – a globally widespread psychological syndrome including exhaustion in one's parental role, emotional distancing from children, loss of parental fulfilment, and contrast with previous parental self (i.e., feeling that one is not as good a parent as in the past; shame about one's parenting) (Roskam et al., 2018; Roskam et al., 2021). This is indeed worrying since PB has been shown to have detrimental consequences for both parents' and children's well-being, including suicidal

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and escape ideations and neglectful and violent behaviour towards one's child(ren) (Mikolajczak et al., 2019).

Previous studies conducted in both Western (Lin, Szczygiel, et al., 2021; Sorkkila & Aunola, 2020) and Eastern cultures (Kawamoto et al., 2018) have revealed a potent predictive effect of PP on PB. The two PP dimensions, however, have differential effects. While PC was robustly associated with a greater extent of PB, the association of PS with PB was found to be not only weaker but even insignificant when controlling for PC (Kawamoto et al., 2018; Lin, Szczygiel, et al., 2021). This suggests that PC is the dimension of PP that puts parents at risk of PB. Although much attention has been drawn to the positive association between PC and PB, the underlying mechanism remains unclear. In this study, we aim to address this line of inquiry. As described in the following sections, we focus on the role of emotion regulation parents employ during their interactions with the child(ren), and specifically expressive suppression, as a potential explanatory mechanism for the PC–PB link.

### 1.2. The effect of perfectionistic concerns on parental burnout through expressive suppression

According to Gross's process model of emotion regulation, expressive suppression (hereafter suppression) refers to response-focused emotion regulation and encompasses the conscious and effortful inhibition of overt emotional expression when one is emotionally aroused (Gross, 2014). Research shows that suppression is one of the most commonly used emotion regulation mechanisms during emotion-abundant/emotion-dynamic parent-child interactions (Karnilowicz et al., 2019; Le & Impett, 2016; Waters et al., 2020). For this reason, and because suppression appears particularly relevant to the PC-PB relationship, this study focuses on this emotion regulation strategy. First, numerous studies demonstrate that the tendency to use suppression is common among perfectionists, particularly maladaptive perfectionists (i.e., overly concerned about mistakes; Bergman et al., 2007; Newman et al., 2019; Richardson et al., 2014). It is not surprising, as it has been reported that maladaptive perfectionists focus primarily on performance (e.g., showing correct emotions) and do not tolerate uncertainty (Kawamoto & Furutani, 2018). Second, research shows that concealing feelings contributes to chronic stress (Moore et al., 2008) and leads to burnout (Lin, Hansotte, et al., 2021). Thus, it can be predicted that excessive use of suppression is also associated with burnout in parenting.

Building on the above-mentioned findings, we propose that PC contribute to greater use of suppression during parent-child interactions, which in turn leads to higher PB.

### 1.3. The buffering effect of emotional intelligence

PB is not a product of a single "maladaptive" emotion regulation strategy or personality trait. According to the Balance between Risks and Resources theory of PB, this syndrome results from a chronic imbalance between risk and protective factors in the parenting domain (Mikolajczak & Roskam, 2018). Therefore, protective factors could theoretically compensate for the damage done by risk factors. Emotional intelligence (EI), the individual differences in the way people functionally identify, express, understand, regulate and use their emotions and the emotions of others (Mayer & Salovey, 1997; Petrides et al., 2016), is considered as one of the strongest protective factors against PB (Mikolajczak et al., 2018). Its protective effects hold true over and above socio-demographic factors (Bayot et al., 2020) and parents' personality traits (Szczygiel et al., 2020). More relevant to our study, Lin, Szczygiel, et al. (2021) demonstrated that EI not only predicts less PB over and above PC but also buffers PC's harmful effects on PB.

There is also evidence of a protective effect of EI on the suppression-PB relationship. Research indicates that suppression leads to an increase in negative emotions and physiological and psychological arousal (Gross, 2014), which, if prolonged, intensifies fatigue and leads to chronic stress (Lin, Hansotte, et al., 2021). Referring to the EI concept,

one can assume that parents high in EI have sufficient resources at their disposal to counter the consequences of suppression effectively (Peña-Sarrionandia et al., 2015). This line of reasoning is supported by findings demonstrating that EI enables individuals to identify emotionally laden stimuli, recognize their emotional states, understand their causes and consequences, and change them when they deem them detrimental to their well-being and goals (Petrides et al., 2016). This beneficial effect of EI has already been observed in organizational psychology research showing that EI buffers the harmful effects of suppression (Bechtoldt et al., 2011; Szczygiel, 2018).

### 1.4. The present study

The present study pursues two aims. The first is to examine whether the previously demonstrated link between PC and PB can be explained by an indirect path through suppression (see the model in Fig. 1). We propose that PC positively predicts PB through suppression (Hypothesis 1; H1). The second aim is to investigate whether EI acts as a resource to protect parents from the harmful effects of PC and suppression (see the model in Fig. 2). We hypothesise that EI buffers both the relation between PC and PB (Hypothesis 2; H2) and suppression and PB (Hypothesis 3; H3). Together, we predict that PC's indirect effect (through suppression) on PB will be contingent on parents' EI (Hypothesis 4; H4). Specifically, PC's indirect effect on PB depends on parents' EI in such a way that the relationships are stronger for parents low in EI and weaker for parents high in EI.

## 2. Method

### 2.1. Participants and procedure

A sample of 439 Polish parents ( $M_{age} = 38.09$  years,  $SD_{age} = 7.43$  years; 65.1% mothers) participated in this study. 79.3% of families were two-parent, 7.3% were single-parent, and the remaining 13.4% included step-families and multigenerational families. Among the participants, 16.4% had achieved a graduate degree, 56.9% had an undergraduate degree, 23.5% had achieved secondary school, and 3.2% had primary/basic vocational level for their highest educational level. Overall, the participants had from 1 to 4 children living with them. The sample's socio-demographic characteristics and the study procedure details are presented in the Online Supplementary Material (OSM).

### 2.2. Measures

Below we have provided basic information about the measures used in the study. A comprehensive description of the instruments can be found in the OSM.

#### 2.2.1. Parental burnout

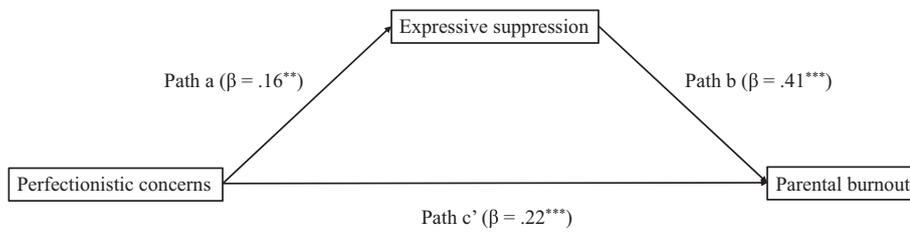
PB was assessed with the Parental Burnout Assessment (PBA, Roskam et al., 2018; Polish version by Szczygiel et al., 2020). The PBA is a 23-item questionnaire (e.g. 'I feel completely run down by my role as a parent'). Items are rated on a 7-point Likert scale: from 0 (*never*) to 6 (*every day*). Scores were calculated by summing up the items.

#### 2.2.2. Emotional intelligence

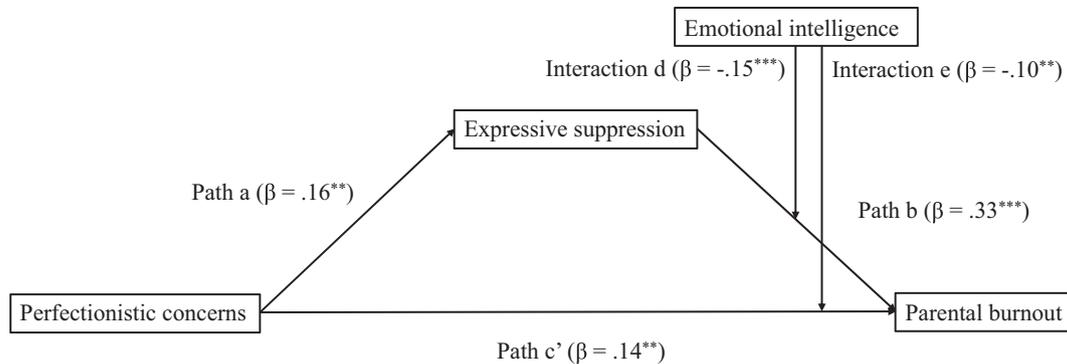
EI was measured with the Trait Emotional Intelligence Questionnaire-Short Form (TEIQue-SF, Petrides, 2009; Polish version by Szczygiel et al., 2015). This is a 30-item questionnaire (e.g. 'Expressing my emotions with words is not a problem for me'). Items are rated on a 7-point Likert scale: from 1 (*completely disagree*) to 7 (*completely agree*). Scale scores were calculated by averaging all the items, after appropriate items were reversed.

#### 2.2.3. Parenting perfectionism

PP was measured with a brief 6-item questionnaire developed by Lin,



sents the effect of perfectionistic concerns on parental burnout when expressive suppression is controlled. The summary of regression coefficients for the concerned paths figured in the parentheses.  $\beta$  = standardized regression coefficient. \*\* $p \leq .01$ . \*\*\* $p \leq .001$ .



**Fig. 2.** The framework and the results for the model encompassing emotional intelligence as moderator and the indirect path from perfectionistic concerns to parental burnout through expressive suppression.

Note. Calculated from Regression Model B, path a denotes the effect of perfectionistic concerns (i.e. the predictor) on expressive suppression (i.e. the mediator). Calculated from Regression Model D, Path b represents the effect of expressive suppression on parental burnout (i.e. the outcome) when perfectionistic concerns are controlled, path c' represents the effect of perfectionistic concerns on parental burnout when expressive suppression is controlled, interaction d is the regression coefficient of interaction term of emotional intelligence and expressive suppression, and interaction e is the regression coefficient of interaction term of emotional intelligence and perfectionistic concerns. The summary of regression coefficients for the concerned paths figured in the parentheses.  $\beta$  = standardized regression coefficient. \*\* $p \leq .01$ . \*\*\* $p \leq .001$ .

Szczygiel, et al. (2021). This questionnaire consists of two subscales: perfectionistic concerns (3 items; e.g. 'As a parent, if I failed in part, it's as bad as if I failed completely') and perfectionistic strivings (3 items; e.g. 'I aim to be a perfect parent'). Items are rated on a 5-point scale from 1 (does not match me at all) to 5 (matches me perfectly). Scale scores were calculated by averaging the responses to the items associated with each perfectionism dimension.

#### 2.2.4. Suppression

Suppression was assessed using a 5-item questionnaire developed based on a pilot study. The pilot study involved 34 mothers and 29 fathers, who were asked to list freely five emotions that parents should not express in the presence of their children. After the exclusion of synonymous terms, the final list of emotions includes rage, irritation, nervousness, anger and impatience. These emotions were extracted to constitute the Parental Emotional Suppression Scale, which assesses the extent to which parents suppressed each emotion when interacting with their child(ren) in the past 3–4 weeks (e.g. 'Over the past 3–4 weeks, how often have you refrained from expressing rage while interacting with your child(ren)'). Items are rated on a 7-point Likert scale from 0 (never) to 6 (always). Scale scores were calculated by averaging the items.

### 2.3. Analysis strategy

The analyses were conducted with IBM SPSS 25.0 and PROCESS macro 3.5 (Hayes, 2018). First, we tested the indirect effect of PC on PB via suppression (H1) by PROCESS macro (Model 4 indexed in Hayes (2018); see Fig. 1). To calculate the indirect effect, one should analyse a

**Fig. 1.** The framework and the results for the model encompassing the indirect path from perfectionistic concerns to parental burnout through expressive suppression.

Note. Calculated from Regression Model B, path a denotes the effect of perfectionistic concerns (i.e. the predictor) on expressive suppression (i.e., the mediator). Calculated from Regression Model C, path b represents the effect of expressive suppression on parental burnout (i.e. the outcome) when perfectionistic concerns are controlled, and path c' represents the effect of perfectionistic concerns on parental burnout when expressive suppression is controlled.

model in which both PC (path c' in Fig. 1) and suppression were regressed (path b in Fig. 1) on PB, and a model in which PC was regressed on suppression (path a in Fig. 1). We used the product-of-coefficients with the bootstrapping method (producing 95% bias-corrected confidence intervals) to test the significance of the indirect effects from 5000 resamples of the data.

Second, we inspected the model encompassing the moderation effects of EI on the effects of PC (H2) and suppression (H3) on PB, as well as the conditional indirect effect (via suppression) of PC on PB depending on the EI levels (H4) by PROCESS macro (Model 15 as indexed by Hayes (2018); see Fig. 2). To calculate such effects, in addition to the model in which PC was regressed on suppression (path a in Fig. 2), a model in which PC (path c' in Fig. 2), suppression (path b in Fig. 2), EI, and the interaction terms (of both PC and EI and suppression and EI; interaction terms d & e in Fig. 2) were all regressed on PB should be further analysed. Throughout all analyses, following Hill et al.'s (2010) suggestion, we also set PS as a covariate to test PC's unique effect to control the effect of the overlap between the two perfectionism dimensions. When inspecting the moderation effects, in order to avoid multi-collinearity, all variables that define products were mean-centered before creating interaction terms.

## 3. Results

### 3.1. Preliminary analyses

Table 1 shows descriptive statistics, Cronbach's alpha and correlations between study variables. Both dimensions of PP and suppression were positively related to PB. EI was negatively related to PB, PP

**Table 1**  
Descriptive statistics, Cronbach's  $\alpha$ , and correlation among study variables.

Variables	<i>M</i>	<i>SD</i>	$\alpha$	1	2	3	4
1 Perfectionistic concerns	2.59	0.94	0.71				
2 Perfectionistic strivings	3.05	0.99	0.81	0.53**			
3 Emotional intelligence	4.94	0.50	0.88	-0.25**	-0.15**		
4 Expressive suppression	2.98	1.18	0.85	0.18**	0.14**	-0.20**	
5 Parental burnout	28.34	26.66	0.97	0.32**	0.23**	-0.42**	0.46**

\*\*  $p \leq .01$ .

dimensions and suppression. Moreover, when controlling the effect of PC on PB, the relation between PS and PB disappeared, whereas the relation between PC and PB remained significant when controlling the effect of PS (see Regression Model A in Table 2). These results allow sole focus on the effect of PC in the following analyses.

**3.2. Testing the path from perfectionistic concerns via suppression to parental burnout**

Regression analysis revealed that PC positively predicted suppression (see Regression Model B in Table 2), which in turn positively predicted PB; nevertheless, the residual direct effect of PC remains significant (see Regression Model C in Table 2). The product-of-coefficients with the bootstrapping method further revealed a significant positive indirect effect of PC on PB through suppression ( $\beta = 0.06, b = 1.81, \text{bootstrapped } SE = 0.74, \text{bootstrapped } 95\% \text{ CI of } b = [0.42, 3.38]$ ), thereby confirming *H1* and supporting the model presented in Fig. 1.

**3.3. Testing the moderating role of emotional intelligence in the perfectionistic concerns-parental burnout relationship**

The interaction terms of PC and EI, as well as suppression and EI, both significantly predicted PB (see Regression Model D in Table 2). Simple slope tests revealed that the positive predictive effects of PC on

PB decreased to insignificant, as EI increased from low ( $\beta = 0.25, b = 6.99, SE = 1.52, 95\% \text{ CI of } b = [3.99, 9.98]$ ) to high ( $\beta = 0.04, b = 1.13, SE = 1.65, 95\% \text{ CI of } b = [-2.11, 4.36]$ ) (see Fig. 3a for interaction plot). Moreover, the positive predictive effects of suppression on PB decreased as EI increased from low ( $\beta = 0.48, b = 10.78, SE = 1.07, 95\% \text{ CI of } b = [8.66, 12.89]$ ) to high ( $\beta = 0.18, b = 4.08, SE = 1.24, 95\% \text{ CI of } b = [1.64, 6.51]$ ), although they remained significant (see Fig. 3b for interaction plot). These results supported our *H2-3*.

The index of moderated mediation did not pass through zero (index of moderated mediation =  $-1.29$  with bootstrapped  $SE = 0.70$  and  $95\% \text{ CI} = [-2.92, -0.21]$ ), which indicates that, in line with *H4*, the indirect effect of PC on PB through suppression was significantly different among participants with low and high EI. In particular, the conditional indirect effect of PC on PB via suppression decreased as EI increased from low ( $\beta = 0.07, b = 2.08, \text{bootstrapped } SE = 0.84, 95\% \text{ bootstrapped CI of } b = [0.53, 3.81]$ ) to high ( $\beta = 0.03, b = 0.79, \text{bootstrapped } SE = 0.44, 95\% \text{ bootstrapped CI of } b = [0.06, 1.74]$ ), although it remained significant. The significant conditional indirect effect supported our *H4*.

These results supported *H2-4* and, thus, our model presented in Fig. 2.

**4. Discussion**

The increasing demands placed on today's parents put them under considerable and unprecedented pressure (Curran & Hill, 2019). By

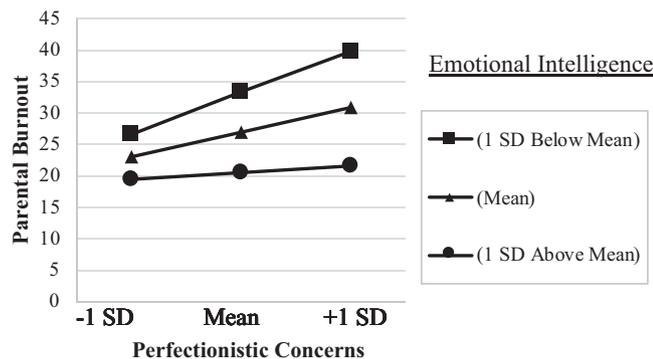
**Table 2**  
The summary of multiple regressions.

Variables	$\beta$	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	95% CI of <i>b</i>	
						LL	UL
<b>Regression Model A</b>							
Outcome: Parental burnout							
Perfectionistic concerns	0.28	7.39	1.50	5.29	0.000	4.98	10.88
Perfectionistic strivings	0.08	2.26	1.43	1.58	0.115	-0.55	5.07
F(2, 436) = 27.21***; R <sup>2</sup> = 0.11; adjusted R <sup>2</sup> = 0.11							
<b>Regression Model B</b>							
Outcome: Expressive suppression							
Perfectionistic concerns	0.16	0.19	0.07	2.80	0.005	0.06	0.33
Perfectionistic strivings	0.06	0.07	0.07	1.02	0.307	-0.06	0.20
F(2, 436) = 8.27***; R <sup>2</sup> = 0.04; adjusted R <sup>2</sup> = 0.03							
<b>Regression Model C</b>							
Outcome: Parental burnout							
Perfectionistic concerns	0.22	6.12	1.37	4.47	0.000	3.43	8.81
Expressive suppression	0.41	9.36	0.94	9.95	0.000	7.51	11.21
Perfectionistic strivings	0.06	1.63	1.29	1.26	0.209	-0.92	4.17
F(3, 435) = 55.19***; R <sup>2</sup> = 0.28; adjusted R <sup>2</sup> = 0.27							
<b>Regression Model D</b>							
Outcome: Parental burnout							
Perfectionistic concerns	0.14	4.06	1.26	3.21	0.001	1.57	6.54
Expressive suppression	0.33	7.43	0.87	8.50	0.000	5.71	9.14
Emotional intelligence	-0.24	-12.77	2.12	-6.10	0.000	-16.94	-8.59
Perfectionistic concerns × Emotional intelligence	-0.10	-5.85	1.92	3.05	0.002	-9.62	-2.08
Expressive suppression × Emotional intelligence	-0.15	-6.69	1.52	-4.39	0.000	-9.69	-3.70
Perfectionistic strivings	0.05	1.24	1.17	1.05	0.293	-1.07	3.54
F(6, 432) = 50.42***; R <sup>2</sup> = 0.41; adjusted R <sup>2</sup> = 0.40							

Note.  $\beta$  = standardized regression coefficient. *b* = unstandardized regression coefficient. CI = confidence interval. LL = lower limit. UL = upper limit.

\*\*\*  $p \leq .001$ .

a.



b.

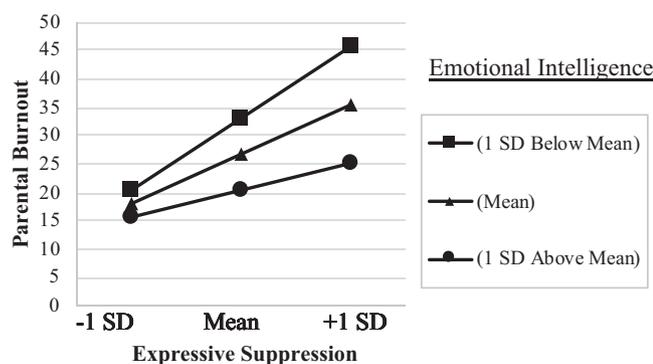


Fig. 3. Interactional plots.

a. Interactions between emotional intelligence and perfectionistic concerns. b. Interactions between emotional intelligence and expressive suppression.

succumbing to a demanding parenting culture, parents set ever-higher expectations for themselves and strive to be perfect in their parenting role, often paying for these efforts with fatigue, stress and eventually exhaustion (see Lin, Hansotte, et al., 2021). A growing body of evidence demonstrates that PP, especially its PC dimension, is associated with PB (Kawamoto et al., 2018; Lin, Szczygieł, et al., 2021). The present study was designed to examine the underlying mechanism linking PC and PB.

As expected, positive correlations were observed between PB and both PP dimensions. Yet, the correlation between PS and PB became insignificant when controlling for the effect of PC, while the correlation between PC and PB remained significant when controlling for the effect of PS. Importantly, the results revealed that parents high on PC in the current sample used more suppression when interacting with their child (ren), which in turn is associated with PB. These results are consistent with those obtained by Tran and Rimes (2017), who demonstrated that suppression mediates the relationship between maladaptive perfectionism and symptoms of depression.

The results of our study support the model in which EI buffers both the effects of PC and suppression on PB, as well as the indirect effect of PC on PB through suppression. These results corroborated Lin, Szczygieł, et al.'s (2021) findings that overly self-critical parents who over-focus on their imperfections (high PC) but who are high in EI experienced fewer PB symptoms than parents low in EI. The present study went a step further by showing that, on the one hand, this protective effect held true over and above suppression, and, on the other hand, this protective

effect was partly due to an indirect effect via suppression. Parents high in PC are more likely to use suppression and hence are exposed to greater vulnerability to PB. Yet, this indirect effect of PC, especially the path from suppression to PB, was buffered by higher EI. These findings provide both practical implications and suggestions for future research directions.

Regarding practical concerns, there is no doubt that one best way to avoid the negative consequences of PP is to alert parents to the burdens of excessively high personal standards and overly critical self-evaluations (Winnicott, 1992). As an alternative, our research suggests that avoiding/minimising the costs of high PC and suppression is possible when parents have sufficient personal resources at their disposal, namely EI (Lin, Szczygieł, et al., 2021). Therefore, psychological help should be targeted at improving emotional skills encompassed by EI, with particular emphasis on emotion regulation. Recent findings are optimistic in their indication that EI training targeting basic emotional competencies (identification, understanding, regulation, and use of emotions) is effective even within a relatively short time: four group training sessions of two and a half hours (see Kotsou et al., 2019).

The limitations of the current study set out three directions for future research. First, our data relied solely on self-report instruments administered at the same time as a cross-sectional design. Therefore, statements of causal relationships should be put forward with caution until these results are replicated in a cross-lagged research design. Second, the current findings can only be interpreted within the independent/Western (Polish) cultural context. In fact, the effect of suppression may be moderated by one's cultural self-construal (Le & Impett, 2013). Unlike their independent counterparts, interdependent parents may experience suppression as a way to regulate emotions that feel authentic, enhance personal well-being and, thus, mitigate the risk to PB (Le & Impett, 2013). Future research could replicate our findings in different cultural contexts to extend generalisability. Third, only one specific emotion regulation was investigated. As our results show, suppression only partially mediated the PC–PB relationship. It is, therefore, likely that other emotion regulation strategies may explain the remaining direct effect of PC on PB. Pursuing research on the effects of different emotion regulation strategies on the PC–PB relationship would certainly expand our understanding of the emotional experiences of perfectionist parents.

## 5. Conclusion

The current study demonstrates the nature of the relationship between the PC dimension of PP and PB when emotion regulation and EI are considered. The findings support an integrated model in which EI buffered positive effects of both PC and suppression on PB, as well as the indirect effect of PC via suppression on PB.

## CRedit authorship contribution statement

Both authors (Gao-Xian Lin and Dorota Szczygieł) contributed equally to the paper; their names are in alphabetic order.

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## Availability of data and material

The study reported in this article was not formally preregistered. However, the database of study variables and the supplementary material have been made available on a permanent third-party archive, Open Science Framework: [https://osf.io/env5m/?view\\_only=d0235ebf1c374fcbaf81110e38a286af](https://osf.io/env5m/?view_only=d0235ebf1c374fcbaf81110e38a286af).

## Code availability

Not applicable.

## Protections of research participants

The study was carried out in accordance with the provisions of the World Medical Association Declaration of Helsinki. All study procedures were approved by the Ethics Committee of the SWPS University of Social Sciences and Humanities Poland, WKE/S 2021/4/VI/103, by which human subjects' protection is ensured.

## Declaration of competing interest

There are no conflicts of interest.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.paid.2021.111187>.

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