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The role of parent-child interactions in the association between mental health and prosocial behaviour: Evidence from early childhood to late adolescence

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Keywords: mental health problems; prosocial behaviour; childhood; adolescence; Millennium Cohort Study; state-trait-occasion modelling

Introduction

Epidemiological studies have recently documented a spike in internalising and externalising mental health problems in child and adolescent populations (Bor et al., 2014; Collishaw, 2015). This evidence is in line with existing knowledge that suggests that many symptoms emerge during these crucial years of lifespan development (Blakemore, 2019). Internalising and externalising mental health symptoms are broad terms used to encompass emotional/affective (e.g., anxiety, depression) and behavioural (e.g., hyperactivity) symptoms of mental health (A. Goodman et al., 2010). Although child and adolescent mental health symptoms have been connected to both high and low prosociality (Scourfield et al., 2004), very few studies have comprehensively examined the extent to which development in mental health symptoms are related to prosociality in child and adolescent populations. Prosociality, defined as voluntary behaviour that aims to benefit another person (Eisenberg et al., 1999, 2015) by caring, showing empathy, and offering psycho-physical assistance. (Memmott-Elison et al., 2020), is a quality that is highly sought after in most societies (Carlo & Padilla-Walker, 2020). However, there is a paucity of studies on life-course interindividual and intraindividual differences in the links between mental health symptoms and prosociality accounting for the impact of the quality of the parent-child relationship.

Developmental theories suggest that the transactional relationships between parents and children are significant predictors of children's psychopathology (Hudson & Rapee, 2001) and prosociality (Eisenberg et al., 2015; Spinrad & Gal, 2018). Nevertheless, an additional issue, that is frequently disregarded by extant studies, is the role of the quality of parent-child interactions when examining the longitudinal links between mental health symptoms and prosociality. Therefore, in this study, we sought to address these evidence gaps from an early life-course developmental perspective by distinguishing between trait and state mental health symptoms and prosociality.

The directionality between internalising and externalising mental health and prosocial behaviour

Even though there is substantial evidence suggesting that prosociality may predict mental health symptoms, empirical evidence has also emerged indicating that mental health symptoms may also predict prosociality. In general terms, multiple studies have found that prosociality predicts lower mental health symptoms. For example, Haroz et al. (2013) showed that prosociality predicted lower anxiety and depression symptoms in adolescents. Similarly, other studies with young children and adolescents indicated that prosociality predicted less depressive symptoms (Perren & Alsaker, 2009) or that deficits in prosociality during childhood predicted a higher risk for the development of emotional mental health symptoms in adolescence (Donohue et al., 2020). In short, one strand of research supports a unidirectional effect from prosociality to mental health symptoms, with higher prosociality predicting lower mental health symptoms.

In contrast, evidence coming from other studies indicates that the directional relationship between symptoms and prosociality is more complex than it seems. Specifically, a recent study found a reciprocal relationship; that is, early prosociality predicted lower externalising problems and depression predicted lower prosociality (Padilla-Walker et al., 2015). The study by Davis et al. (2016) also indicated a negative reciprocal relationship. Surprisingly, though, some studies found that higher mental health symptoms were predicting higher prosociality (Plenty et al., 2015; Von Dawans et al., 2012), whilst other studies (McGinley & Evans, 2020; Nantel-Vivier et al., 2014; Schacter & Margolin, 2019) illustrated that adolescents with high levels of prosociality exhibited high mental health symptoms. Given the conflicting findings of preceding empirical evidence, the present study sought to address this issue by examining the long-term association of prosociality and mental health symptoms across the formative early years from a latent state-trait perspective.

Familial risk and promotive factors: Parent-child interactions

It is a well-known fact that familial factors have been connected to multiple developmental outcomes and can exert either a protective or harmful influence on children's mental health symptoms (Bayer et al., 2011; Katsantonis & Symonds, 2023). This idea is conceptually reinforced by the Relational-Developmental Systems theory (Lerner et al., 2015; Overton, 2013), which suggests that individual children's development is influenced by and influences parents' behavioural patterns (Lerner & Castellino, 2002). Thus, we would be remiss to not include relevant familial covariates of internalising and externalising mental health symptoms and prosociality.

Parent-child interactions have long been linked with child psychopathology (Hudson & Rapee, 2001). In the present study, three types of parent-child interactions are considered, namely child maltreatment, parent-child conflict, and parent-child closeness. Child maltreatment is conceptulised here as verbal and/or physical aggression (Straus et al., 1998). Parent-child closeness and parent-child conflict are two characteristic dimensions of parent-child relationships, according to the conceptual and analytical framework of Driscoll and Pianta (2011). Parent-child conflict refers to quarrels, disagreements, and conflict emotions (e.g., anger) (Laursen et al., 1998). In contrast, parent-child closeness is very similar to the concept of attachment, which includes secure relationships with parents characterised by warmth, caring, and communication (Ge et al., 2009; Yan et al., 2019).

Evidence has revealed that early parent-child conflict is a non-negligible predictor of increasing mental health symptoms (Flouri et al., 2018; Parkes et al., 2016). Other studies have also demonstrated the deleterious influence of harsh parental discipline (Bøe et al., 2014; Flouri et al., 2018) on child mental health symptoms development. Additionally, studies indicate closeness with parents reduced the likelihood of developing mental health symptoms (Ge et al., 2009; Yan et al., 2019). Fewer studies have connected parent-child

closeness with better prosociality (Ferreira et al., 2016), whilst greater parent-child conflict (Li, 2021) and maltreatment (Yu et al., 2020) have been linked with less prosocial behaviour. Yet, the question remains whether these three indicators of parent-child interactions would predict children's and adolescents' stable mental health symptoms and prosociality.

Developmental considerations

From a developmental perspective, children's and adolescents' mental health symptoms display, as expected, significant variation across time with most children displaying low levels of mental health symptoms, and some children exhibiting high or moderate levels of mental health symptoms (Flouri et al., 2018; Papachristou & Flouri, 2020). Yet, these kinds of studies cannot quantify to what extent mental health symptoms are trait-like or subject to situational flux. Similarly, developmental studies suggest that prosociality is more malleable to change requiring some time before it can become more consistent. Prosociality is subject to increase across childhood and early adolescence with adolescents scoring typically higher on prosociality measures (Eisenberg et al., 2015; Malti & Dys, 2018). Although early prosociality skills emerge in the second year of life (Brownell, 2013), prosociality becomes more refined when children are 5 years old (Grueneisen & Warneken, 2022). A meta-analysis has shown that the association between prosociality and internalising mental health symptoms is stronger in early adolescence but wanes afterwards (Memmott-Elison et al., 2020).

The above raises the question of the extent to which mental health symptoms are stable or fluctuating across the formative years and how stable and occasion-specific prosociality may be connected to mental health symptoms from early childhood to late adolescence. In this study, we distinguish between four major developmental transitions (early to middle childhood; middle childhood to early adolescence; early to middle adolescence; middle to late adolescence). Different milestones are achieved in each period

and children are required to adjust to new expectations (e.g., primary vs. secondary vs. post-compulsory schooling; puberty; cognitive and emotional development, etc.) (Berk, 2012; Sawyer et al., 2018; Symonds et al., 2016). Thus, the present modelling allows us to disentangle the developmental relationship between mental health symptoms and prosociality across twelve years of life, whilst accounting for the role of the parent-child relationship.

A latent state-trait perspective on mental health and prosociality

Previous evidence did not consider that mental health symptoms and prosociality may be saturated by both a trait-like and an occasion-specific variance. Hence, a Latent State-Trait theory (LST) approach can help disentangle trait from occasion-specific variance.

It is logical to assume that children have a past level (either high or low) of mental health symptoms and prosociality and cannot be assessed in a situational vacuum, as the LST would claim (Steyer et al., 2015). Specifically, according to the basic tenet of LST human affect, cognitions, and behaviours (Geiser, 2020; Steyer & Schmitt, 1990) at a specific timepoint (called latent states- S_t) are a function of a stable disposition (trait- T), an occasion-specific residual that captures the effects of situational influences and/or the interaction between person x situational influences (O_t), and measurement error (ε_t) (Eid et al., 2017).

In the present study, the LST modelling decomposes the variance in children's mental health symptoms and prosociality into three latent components. The first is a time-invariant latent (trait) factor that reflects children's stable dispositions towards mental health symptoms and prosociality, whilst the second is an occasion-specific time-varying (residual) latent factor that reflects children's temporary developmentally-sensitive deviations from the latent trait capturing, thus, environmental-situational changes across occasions. Hence, relevant covariates should be included in the LST modelling to adjust the trait and occasion-specific

estimates for environmental-situational influences. Finally, the third latent component is the measurement error of the occasion factors.

Aims and hypotheses

Informed by the reviewed evidence, the following hypotheses were formulated as guidelines. Given that previous research indicated that the relationship between mental health symptoms and prosociality may be more complex than that covered by simple unidirectional effects, the first hypothesis was that internalising and externalising mental health symptoms and prosociality would be reciprocally related in the transitory developmental periods between childhood to adolescence (H1). Secondly, given the importance of warm and accepting parenting behaviours, we expected that early parent-child conflict and physical and psychological maltreatment would be negative predictors of prosociality and positive predictors of mental health symptoms (H2). Finally, it is hypothesised that parent-child closeness would be a positive predictor of prosociality and a negative predictor of mental health symptoms (H3).

Method

Dataset and Sample

The data come from a community sample of 10,703 children (50% females) from the Millennium Cohort Study (MCS- https://closer.ac.uk/study/millennium-cohort-study/). Most of the children belonged to the White ethnic group (82.15%). Other ethnic groups represented were the following: Pakistani and Bangladeshi (7.35%) and Black or Black British (3.27%), amongst others. The present sample comprises families and children that were interviewed at ages 5 (early childhood), 7 (middle childhood), 11 (early adolescence), 14 (middle adolescence), and 17 (late adolescence). An unbalanced sample design was adopted to account for longitudinal attrition. Predictors of longitudinal attrition included child sex,

ethnic minority status, lower parental occupation status, amongst others (Mostafa & Ploubidis, 2017).

Measures

Internalising and Externalising Mental Health Problems and Prosocial Behaviour.

The parent-reported scores on the Strengths and Difficulties Questionnaire (SDQ) (R. Goodman, 1997, 2001; R. Goodman et al., 2000) were utilised across all waves. Although the SDQ scales are not specialised measures of a specific mental health disorder, the SDQ scales exhibit good sensitivity and specificity to detect symptoms of child psychopathology (Cocker et al., 2018). The SDQ has been designed based on the diagnostic criteria of the American Psychiatric Association (A. Goodman et al., 2010) and the scales can accurately predict some of the most common internalising and externalising mental health symptoms in child and adolescent populations in Britain (accuracy ranging between 89%-95%) (A. Goodman & Goodman, 2011; R. Goodman et al., 2000). Each scale of the SDQ is made up by five items. A sample item for the emotional scale is: "Nervous or clingy in new situations". A sample item for the conduct scale includes: "Often fights with other children". A sample item for the hyperactivity scale is: "Easily distracted, concentration wanders". A sample item for the peer problems scale include: "Rather solitary, tends to play alone". A sample item for the prosociality scale is: "Helpful if someone is hurt". SDQ items were scored using a three-point scale 1 "Not True", 2 "Somewhat true", and 3 "Certainly true". Appropriate reverse-scoring was conducted by the MCS team when deriving the scaled scores. The summed composite of each scale's items ranges from 1 to 10. The composite scores per scale were utilised as indicators. An index of internalising symptoms is formed as the summed composite of the emotional symptoms and the peer problems, whilst an index of externalising mental health symptoms is formed as the composite of conduct problems and hyperactivity (A. Goodman et al., 2010). Prosociality was measured using the prosociality scale of the SDQ.

Child physical and psychological maltreatment

The Straus Tactics Conflict scale (Straus, 2013, 2017) was administered to primary caregivers when the children were aged 5 years old. This scale measures harsh disciplinary practices and indexes physical and psychological maltreatment (Straus, 2013). A sample item is "Smack [the child]". The item response options range from 1 "Never" to 5 "Daily".

Parent-child relationship- Closeness and Conflict

The Parent-Child Relationship short form Pianta scale (Pianta, 1995) was administered to both caregivers when the children were 3 years old. An index of closeness was computed as the average of the primary and secondary caregivers' scores on the closeness subscale, whilst an index of conflict was computed as the average of the scores on the conflict subscale. A sample item for the closeness scale is "[the child] openly shares his/her feelings and experiences with me", whilst a sample item for the conflict scale is "[the child] easily becomes angry with me".

Covariates

In addition to the main variables, we introduced theoretically relevant covariates into the modelling to minimise the possibility of confounding bias. These covariates were the following.

Child's ethnicity. A six-category variable coded using the UK Census classification. It was recoded to reflect the ethnic majority (1 "white", 0 "otherwise).

Socio-economic status (SES). A five-category variable indexing families' income was coded using the Organisation for Economic Co-operation's equivalised quintiles ranging from 1 "lowest" to 5 "highest". The variable was derived when the children were aged 5 years old.

Family mental health problems (PMH). The Kessler 6 (K6) scale (Kessler et al., 2003, 2010), which is designed to screen general population samples for serious mental illness, was

administered to both the primary (>97% natural mothers) and secondary (>91% natural fathers) caregivers when the children were aged 5 years old. An index of each family's mental health symptoms was extracted in this study as the average of both parents' K6 scores. A sample item is "During the last 30 days, about how often did you feel so depressed that nothing could cheer you up?".

Statistical analyses

A modified version (Eid et al., 2017) of the State-Trait-Occasion (STO) model (Cole et al., 2005) was estimated. This model allows the statistical analyst to disentangle and calculate the proportion of stable time-invariant and occasion-specific variance, and to estimate cross-lagged and first-order autoregressive relationships that control for stable dispositions (LaGrange et al., 2011; Luhmann et al., 2011) for externalising and internalising symptoms, and prosociality. In the state-trait modelling, the autoregressive effects are also called "inertia" (Eid et al., 2017) since they describe within-person changes or stability.

The univariate STO modelling was conducted in the first instance separately for internalising symptoms, externalising symptoms, and prosociality to calculate the trait and occasion-specific variances. In contrast to the classical parameterisation of the STO model (Cole et al., 2005), we followed the revised LST that proposed a reparameterization with freely estimated trait loadings instead of constrained to unity (Eid et al., 2017; Steyer et al., 2015). By squaring the standardised regression coefficients for trait (T_t) and occasion (O_t), we computed the proportion of state variance in externalising and internalising symptoms, and prosociality that was accounted for by the latent trait and latent occasion residuals at each time point since all latent components were uncorrelated (Prenoveau, 2015, 2016).

Although the random-intercept cross-lagged model (RI-CLPM) has become a popular state-trait model for testing reciprocal relationships (Usami, 2021), it assumes that the latent

trait loadings are constant over the course of the development (Hamaker et al., 2015). However, this specification is incompatible with the revised LST, which suggests that, although changes in stable traits take longer to manifest, it is still possible that the construct under study can be malleable to change following learning, genetic programming, or life events (Steyer et al., 2015). Since the modified STO adheres to the revised state-trait theory (Eid et al., 2017; Luhmann et al., 2011), the univariate STO models were reconfigured into an extended STO with within-wave correlations and cross-wave lagged regressions (LaGrange et al., 2011; Luhmann et al., 2011). The cross-lag effects are also known as "spillover" or "carry-over" effects (Mulder & Hamaker, 2021) from one occasion-specific factor (O_t) at time t_x*-1* to that of the other variable in the system at time t_y. The latent trait factors were correlated to account for stable individual differences. The familial covariates were introduced as predictors of the latent mental health symptoms and prosociality traits.

Since STO modelling is performed under the structural equation modelling framework, all STO models were estimated using the robust maximum likelihood (MLR) estimator. Missing data were handled with full-information maximum likelihood (FIML) (Enders, 2022). Models' fit was evaluated using the conventional cut-off indices with values close to/above .95 in CFI along with RMSEA and SRMR values below .06 and .08, respectively, being considered as indicators of good fit (Hu & Bentler, 1999). To compare nested models, we evaluated each model based on the Bayesian Information Criterion (BIC) (Schwarz, 1978) since the BIC performs better compared to the conventional fit indices in selecting the "true" population model (Bollen et al., 2014). Lower BIC values indicate better-fitting models (Kline, 2023). Given the large sample, minor effects could reach statistical significance, thus, we set the alpha level at .01 and placed emphasis on the interpretation of standardised effect sizes to gauge the strength of the associations (Khalilzadeh & Tasci, 2017). Finally, we accounted for the MCS sampling weights, stratification, and clustering in

the modelling. Pre-processing of the datasets was conducted in Stata 16 (StataCorp., 2019), whilst STO modelling was performed with M*plus* 8.7 (Muthén & Muthén, 2017).

Results

Preliminary analyses

Descriptive statistics, such as means and SDs, and bivariate correlations were calculated for the main outcomes and covariates (Table 1).

Table 1. Descriptive statistics and latent bivariate correlations

Variable	1	2	3	4	5	6	7	8	9
1. ETHNIC	1								
2. SES	18***	1							
3. PMH	-.10***	-.27***	1						
4. PCR-CL	.03	.16***	-.16***	1					
5. PCR-C	-.02	-.09***	.26***	-.32***	1				
6. MAL	.07***	.01	.12***	-.06***	.30***	1			
7. Trait INT	-.07***	-.34***	.37***	-.26***	.36***	.22***	1		
8. Trait EXT	-.03	-.34***	.30***	-.30***	.41***	.41***	.79***	1	
9. Trait PRO	.01	.16***	-.17***	.30***	-.30***	-.29***	-.55***	-.75***	1
M (SD)	.88 (.32)	3.10 (1.42)	3.18 (3.17)	33.11 (2.23)	17.68 (5.17)	2.73 (.58)	-	-	-
MIN-MAX	0-1	1-5	0-24	7-35	8-40	1-5	-	-	-

Note: ETHNIC: Ethnic majority (White); SES: Family income; PMH: Parental MENTAL HEALTH SYMPTOMS(Kessler 6); PCR-CL: Pianta Closeness scale; PCR-C: Pianta Conflict scale; MAL: Straus Tactics Conflict scale; Trait INT: Trait internalising symptoms; Trait EXT: Trait externalising symptoms; Trait PRO: Trait prosocial behaviour; - not applicable due to latent factor structure

Variance partitioning in trait and occasion-specific components

In the first instance, univariate STOs displayed a good fit to the sample covariance matrices according to the fit indices (see Table 2).

Table 2. Fit indices for univariate STO models

STO Model	χ^2 (df)	CFI	TLI	RMSEA	SRMR
Internalising	2.53 (1)	1.00	1.00	.01	.00
Externalising	.74 (1)	1.00	1.00	.00	.00
Prosocial	1.07 (1)	1.00	1.00	.00	.00

Note: All chi-squares did not reach statistical significance.

Based on the STO modelling, it appears that internalising and externalising are more trait-like throughout adolescence, whereas prosociality tends to be more oscillating rather than trait-like across childhood till early adolescence (less than 50% of the variances explained by trait factor) and, afterwards, it is transformed into a more trait-like psychological construct that is still highly susceptible to situational flux. Both internalising and externalising symptoms are more trait-like. The decomposition of variances into states and traits is presented in Table 3.

Table 3. Decomposition of variances based on STO modelling

Developmental stage	Trait σ^2 (%) INT	Occasion σ^2 (%) INT	Trait σ^2 (%) EXT	Occasion σ^2 (%) EXT	Trait σ^2 (%) prosociality	Occasion σ^2 (%) prosociality
Age 5 (early childhood)	28	72	48	52	25	75
Age 7 (middle childhood)	42	58	62	38	41	59
Age 11 (early adolescence)	72	28	84	16	66	34
Age 14 (middle adolescence)	74	26	64	36	48	52
Age 17 (late adolescence)	42	58	50	20	36	64

Note: INT: Internalising symptoms; EXT: Externalising symptoms; Prosociality: Prosocial behaviour

Within-person developmental links between mental health symptoms and prosociality

The univariate STO models were reconfigured into an extended STO model as shown in Figure 1. Four alternative model specifications were estimated to determine which model formulation was the best. The first model (*Model A*) was a baseline unconstrained model. The trait factor loadings were constrained to unity resulting in a second model (*Model B*), which was the random-intercept cross-lagged panel model (RI-CLPM) (Hamaker et al., 2015). Additionally, equality constraints were imposed on the autoregressive parameters in *Model C*. Finally, the assumption of equal cross-lag coefficients within-wave was tested in *Model D*. As can be seen in Table 4, *Model A* is the most parsimonious solution. Thus, the estimates based on *Model A* are reported.

Table 4. Fit indices for STO model specifications with covariates

Model	Specification	Scaled X^2 (df)	CFI	TLI	RMSEA	BIC
A	**Baseline**	**516.60 (108)*****	**.99**	**.98**	**.02**	**729226.692**
B	RI-CLPM	748.61 (120)***	.98	.97	.02	729584.252
C	Equal autoregressive[a]	723.88 (117)***	.98	.97	.02	729506.812
D	Equal cross-lag coefficients[b]	686.18 (128)***	.98	.98	.02	729361.164

$^{***}p<.001$; a: autoregressions were constrained to equal; b: cross-lag coefficients at time *t* were constrained to equal.

Adjusting for covariates, the extended STO model indicated that prosociality latent occasion at time *t* was always cross-sectionally correlated with reduced internalising and externalising mental health problems at time *t* after partialling out the stable trait-like proportion of the variances. The internalising and externalising latent traits were negatively correlated with the latent trait of prosociality, which indicated that on average children's stable mental health problems were decreasing as children's stable prosociality were becoming more refined from childhood to adolescence. Greater occasion-by-occasion externalising deviations from the latent trait predicted less prosociality over time, whereas the effects of within-person internalising changes did not practically predict changes in later prosociality. Earlier within-person prosociality changes did not exert appreciable predictive effects on later internalising or externalising mental health symptoms. All in all, the present evidence suggests that only within-person externalising mental health symptoms are substantial risk factors against prosociality. The directional nature of the relationship between prosociality and mental health symptoms seems to be unidirectional.

Regarding the familial covariates, we found that there was no evidence of the impact of ethnicity on mental health symptoms and prosociality. A social gradient in prosociality and mental health symptoms was found, indicating that greater SES predicted greater prosociality and lower mental health symptoms. Greater parental mental health symptoms were predictive of greater child mental health symptoms but had a non-substantial effect on prosociality. Parent-child relationships characterised by closeness predicted greater prosociality and lower

mental health symptoms, whilst relationships defined by conflict and physical and/or psychological maltreatment predicted greater mental health symptoms and lower prosociality. The parameter estimates are comprehensively shown in Table 5.

Table 5: Standardised parameter estimates of the extended STO model with covariates (Model A)

Parameter specification	*β*	*t*	*p*-value
Autoregressive estimates- within-person fluctuations			
Internalising			
OINT1→OINT2	.24	7.92	.000
OINT2→OINT3	.18	6.81	.000
OINT3→OINT4	.32	10.05	.000
OINT4→OINT5	.45	18.41	.000
Externalising			
OEXT1→OEXT2	.18	3.91	.000
OEXT2→OEXT3	.30	7.72	.000
OEXT3→OEXT4	.43	13.38	.000
OEXT4→OEXT5	.50	22.75	.000
Prosocial behaviour			
OPRO1→OPRO2	.23	8.04	.000
OPRO2→OPRO3	.02	.69	.492
OPRO3→OPRO4	.20	6.47	.000
OPRO4→OPRO5	.32	12.00	.000
Within-wave (cross-sectional) correlations			
Internalising with Prosocial behaviour			
OINT1- OPRO1	-.09	-3.76	.000
OINT2- OPRO2	-.15	-6.21	.000
OINT3- OPRO3	-.14	-5.31	.000
OINT4- OPRO4	-.18	-9.47	.000
OINT5- OPRO5	-.17	-7.44	.000
Externalising with Prosocial behaviour			
OEXT1- OPRO1	-.24	-9.26	.000
OEXT2- OPRO2	-.29	-11.63	.000
OEXT3- OPRO3	-.33	-14.15	.000
OEXT4- OPRO4	-.37	-21.77	.000
OEXT5- OPRO5	-.38	-15.51	.000
Internalising with Externalising			
OINT1- OEXT1	.11	3.69	.000
OINT2- OEXT2	.22	7.57	.000
OINT3- OEXT3	.36	16.79	.000
OINT4- OEXT4	.33	18.18	.000
OINT5- OEXT5	.33	17.12	.000
Cross-lagged regressions (spillover effects)			
Internalising→ Prosocial behaviour			
OINT1→OPRO2	-.02	-.85	.395
OINT2→OPRO3	-.06	-2.21	.027
OINT3→OPRO4	-.02	-.781	.435
OINT4→OPRO5	-.06	-2.65	.008

Externalising→ Prosocial behaviour			
OEXT1→OPRO2	.00	.11	.914
OEXT2→OPRO3	-.11	-4.09	.000
OEXT3→OPRO4	-.15	-4.94	.000
OEXT4→OPRO5	-.11	-3.68	.000
Prosocial behaviour→ Internalising			
OPRO1→OINT2	-.02	-.87	.382
OPRO2→OINT3	-.01	-.51	.607
OPRO3→OINT4	-.01	-.50	.617
OPRO4→OINT5	.01	.39	.693
Prosocial behaviour→Externalising			
OPRO1→OEXT2	-.04	-1.61	.107
OPRO2→OEXT3	.00	-.03	.974
OPRO3→OEXT4	-.07	-2.35	.019
OPRO4→OEXT5	-.02	-1.11	.269
Internalising→Externalising			
OINT1→OEXT2	-.05	-2.30	.021
OINT2→OEXT3	.03	1.21	.227
OINT3→OEXT4	.04	1.64	.100
OINT4→OEXT5	.07	3.62	.000
Externalising→Internalising			
OEXT1→OINT2	-.03	-1.21	.227
OEXT2→OINT3	.09	3.56	.000
OEXT3→OINT4	.16	6.41	.000
OEXT4→OINT5	.09	4.19	.000
Trait correlations			
Trait internalising- Trait prosocial	-.31	-7.69	.000
Trait externalising- Trait prosocial	-.45	-14.76	.000
Trait internalising- Trait externalising	.50	14.36	.000
Covariate effects			
Ethnicity			
Trait internalising	-.04	-2.14	.032
Trait externalising	.00	-.21	.834
Trait prosocial behaviour	.01	.80	.425
SES			
Trait internalising	-.22	-12.28	.000
Trait externalising	-.25	-14.58	.000
Trait prosocial behaviour	.08	4.56	.000
Parental mental health			
Trait internalising	.23	12.15	.000
Trait externalising	.11	5.81	.000
Trait prosocial behaviour	-.04	-2.50	.012
Parent-child relationship- closeness			
Trait internalising	-.13	-6.13	.000
Trait externalising	-.16	-8.50	.000
Trait prosocial behaviour	.24	9.45	.000
Parent-child relationship- conflict			
Trait internalising	.22	10.47	.000
Trait externalising	.22	13.34	.000
Trait prosocial behaviour	-.15	-7.21	.000
Child physical and psychological maltreatment			
Trait internalising	.14	7.31	.000
Trait externalising	.35	22.73	.000
Trait prosocial behaviour	-.24	-13.78	.000

Note: $OINT_t$: Occasion-specific internalising factors, $OEXT_t$: Occasion-specific externalising factors, $OPRO_t$: Occasion-specific prosocial factors; alpha level set at .01.

---FIGURE 1---

Discussion

The developmental links between mental health symptoms and prosociality in the early life course are far from clear. Additionally, extant studies exploring the relationship between internalising and externalising mental health symptoms and prosociality reached inconclusive results regarding the directional nature of this association. Furthermore, the role of parent-child interactions is largely overlooked, even though developmental theory suggests that parenting behaviours influence children's developmental outcomes (Lerner & Castellino, 2002). Thus, we deployed advanced STO modelling (Cole et al., 2005; Eid et al., 2017) coupled with nationally representative data to estimate the associations between internalising and externalising mental health symptoms and prosociality, and to explore the effects of parent-child interactions from early childhood to late adolescence. To the best of our knowledge, no previous study has examined these developmental relationships across the formative years.

The relation between mental health symptoms and prosociality

The findings of the modelling indicated that internalising and externalising mental health symptoms in children and adolescents were more trait-like in adolescence rather than subject to situational flux. In contrast, prosociality appeared to be influenced more by situational circumstances during childhood, whilst it became more stable in early adolescence, confirming theoretical tenets suggesting that prosociality becomes more refined later in adolescence (Eisenberg et al., 2015; Malti & Dys, 2018).

Although preceding evidence indicated that prosociality is a negative predictor of mental health symptoms (Donohue et al., 2020; Haroz et al., 2013; Memmott-Elison et al., 2020; Perren & Alsaker, 2009), the *within-person transient longitudinal* findings suggested that the regression coefficients from earlier prosociality to subsequent internalising or externalising mental health symptoms were very weak and did not reach statistical significance at the .01 level, adjusting for the covariates. This finding is unique since a substantial corpus of evidence has come to light indicating an appreciable predictive effect of prosociality on internalising and externalising mental health symptoms (Donohue et al., 2020; Haroz et al., 2013; Perren & Alsaker, 2009).

Regarding the flow of effects from transient internalising and externalising symptoms to prosociality, we found that only transient (within-person occasion-specific) changes in externalising mental health symptoms were predicting lower prosociality, and this effect held only from middle childhood onwards. Although a meta-analysis suggested that the association between prosociality and internalising symptoms was stronger in early and middle adolescence (Memmott-Elison et al., 2020), our cross-sectional findings did not confirm this since the cross-sectional transient correlations were of negative but of similar magnitude throughout the developmental period. The longitudinal results also did not confirm this since the coefficients from early internalising to later prosociality were very weak and did not reach statistical significance.

Thus, the above finding is incongruent with previous evidence suggesting a reciprocal relationship between mental health symptoms and prosociality (Davis et al., 2016; Padilla-Walker et al., 2015). Hence, H1 was rejected. In short this means that children and adolescents with high prosociality scores usually displayed lower mental health symptoms cross-sectionally, but this occasion-specific beneficial effect is not consolidated longitudinally. It ought to be noted, though, that the present approach decomposed the state

mental health and prosociality variances into stable and transient components, which means that we looked at changes separately within and between individuals over time which is not compatible withprevious approaches.

Moreover, we inspected the latent trait correlations, which described children's general dispositions (Luhmann et al., 2011) towards mental health symptoms and prosociality. The trait correlation describes the relationship between children's symptom and prosociality levels across the whole developmental period (ages 5 to 17), which is conceptually similar to a correlation between "averaged" symptom and prosociality scores. Some preceding studies indicated that high prosociality may exhibit co-occurrence with high mental health symptoms (Nantel-Vivier et al., 2014; Plenty et al., 2015; Schacter & Margolin, 2019; Von Dawans et al., 2012), that is, the association might be positive. However, the present modelling results did not support this. The extended state-trait modelling revealed that the correlations between the latent trait prosociality and internalising and externalising mental health symptoms were negative and reached high statistical significance. The trait-level correlation was slightly stronger for externalisisng symptoms, which is in line with past findings (Memmott-Elison et al., 2020). This suggests that individuals who *consistently* demonstrate high prosociality from age 5 to age 17 generally *tend* to have low internalising and externalising mental health symptoms. In other words, children and adolescents that have an innate dispositional mechanism to be highly resilient and have low scores on mental health symptoms usually have high prosociality from early childhood to late adolescence. This reinforces the need to teach young children the value of prosociality in terms of empathy, kindness, being helpful if others are hurt, and volunteering, since this may have a buffering effect against the development of mental health symptoms. Nevertheless, given the absence of strong and statistically significant within-person regression coefficients from prosociality to internalising and externalising symptoms (see Table 5), we need to also place emphasis on

other factors (e.g., parent-child interactions, socio-economic status), beyond prosociality, to improve children's and adolescents' mental health in the community.

The role of parent-child interactions in the development of mental health symptoms and prosociality

Most importantly, we also examined the impact of the parent-child interactions on children's stable dispositions for internalising and externalising mental health symptoms, and prosociality. The analyses revealed that high-quality parent-child interactions in the form of increased closeness, reduced conflict and physical and psychological maltreatment can be very important protective factors against internalising and externalising symptoms and can foster increased prosociality.

Our findings corroborate with previous results from survey (Laursen et al., 1998; Lougheed et al., 2022; Yan et al., 2019) and behaviour genetics (Burt et al., 2005) studies showing that having a conflicting parent-child relationship (e.g., struggling with each other, sneaking or manipulative child behaviour, bad mood) can harm children's mental health and has been linked with membership of high-risk developmental trajectories. Similarly, being physically and/or psychologically maltreated has been linked with greater mental health difficulties (Coe et al., 2020) and reduced prosociality (Cicchetti & Toth, 2005; Yu et al., 2020). Nevertheless, there is a paucity of studies exploring the links between closeness and mental health symptoms, and prosociality, but the the few studies suggest a protective effect (Ge et al., 2009), which is also confirmed here. However, past research has not clarified to what extent these early childhood parent-child interactions were predictive of *stable* internalising and externalising symptoms, and prosociality across the early years (ages 5 to 17). In other words, greater closeness has sustained long-lasting benefits, whilst greater conflict and maltreatement have deleterious long-lasting effects.

Covariate effects on mental health symptoms and prosociality

Although not of main interest here, the following were found regarding the covariates. Specifically, a social gradient was identified in both internalisisng and externalsising symptoms, which confirmed preceding evidence (Katsantonis & Symonds, 2023; Patalay & Fitzsimons, 2018). In contast to past evidence (Piff et al., 2010), we found that higher SES was connected to greater prosociality in the long-term. Finally, we noticed a relatively small effect of family mental health symptoms on both stable child symptoms and prosociality. In contrast to earlier evidence in the UK (Johnston et al., 2013), this suggests weak support for a hypothesis of intergenerational transmission of mental health.

Strengths and limitations

The present study has some significant strengths. For instance, the large representative sample, the long-term longitudinal design spanning the early formative life course, and the advanced analytic techniques are among the advantages of this work. Nevertheless, the present approach also has some limitations. For example, the sample is not diverse enough and does not represent all ethnic groups. Additionally, we recognise that the measures utilised are not perfect indicators of mental health symptoms and prosociality, though, it is hard to counterargue that robust representative samples spanning twelve years of the early life span are hard to come by. Additionally, the relations between mental health symptoms and prosociality merit further investigation with other established measures and clinical populations to cross-validate the present findings. Finally, an adolescent self-report may have provided more reliable data on adolescents' internalising symptoms (Sourander et al., 1999).

Implications

The present findings have significant implications for practice and research. Given that many researchers and organisations invest in mental health interventions that target social-emotional skills and prosociality (Bohlmeijer et al., 2021; Datu et al., 2022; Totzeck et al., 2020; Weare, 2010), the present results would suggest that we need more effective interventions for long-lasting impact.

Additionally, within-person prosociality did not appear to have any within-person protective long-term effects on internalising and externalising mental health symptoms in this community sample. Thus, we needfuture robust longitudinal studies to extend and deepen the current findings and identify which, if any, aspects of prosocial behaviour might be beneficial for different groups of children and which other variables could promote resilient or psychopathological outcomes.Furthermore, the study found that within-person externalising symptoms (disobedience, fighting, lying, cheating, being overactive and distracted) predicted reduced within-person prosociality over time. As a tentative suggestion,educators and parents could consider clearly outlining social norms and school rules to improve good relationships andminimise environmental distractions."

Based on the current findings, it is also suggested that family-based parenting training interventions may be appropriate, especially in high-risk settings, to reduce the risk of mental health symptoms and prosociality deficits. Finally, knowledge of the current developmental findings is also pertinent for mental health professionals, since the modelling results would indicate that thorough screening for mental health symptoms *and* prosociality difficulties should be accompanied by a screening of the parent-child interactions.

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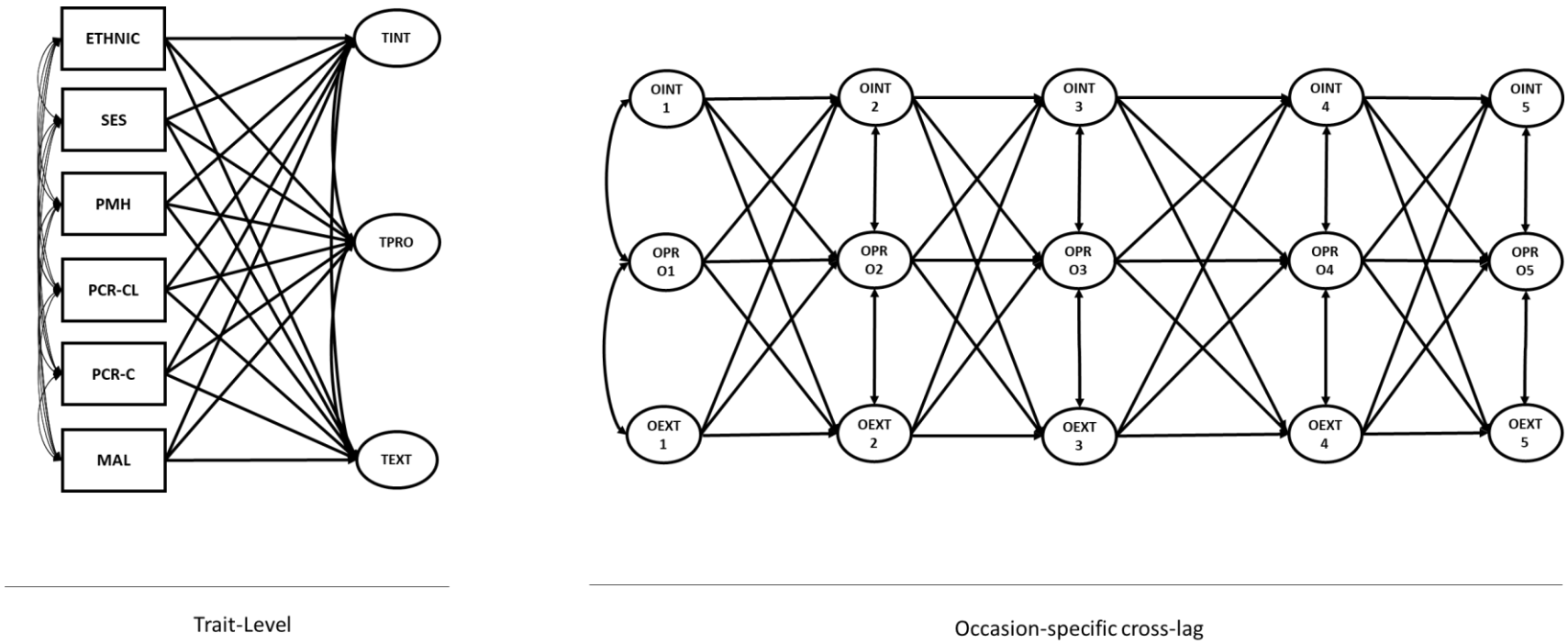

Figure 1. Path Diagram of Extended Latent STO Model

Note: ETHNIC: Ethnic majority (White); SES: Family income; PMH: Parental mental health symptoms(Kessler 6); PCR-CL: Pianta Closeness scale; PCR-C: Pianta Conflict scale; MAL: Straus Tactics Conflict scale;

TINT: Trait internalising symptoms; TEXT: Trait externalising symptoms; TPRO: Trait prosocial behaviour; $OINT_t$: Occasion-specific internalising factors, $OEXT_t$: Occasion-specific externalising factors, $OPRO_t$: Occasion-specific prosocial factors; Reduced diagram for clarity purposes;