

## RESEARCH ARTICLE OPEN ACCESS

# The Relationships Between Trust Beliefs in Physicians by Children With Asthma, Those by Their Mothers and the Children's Medical Health

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## ABSTRACT

**Background:** The study examined whether there were linear and curvilinear relationships between the trust beliefs in physicians by the children, those by their mothers and the children's medical health. The study examined whether there were changes in those relationships across time.

**Methods:** The data gathered in a previous study were subjected to further analyses. One hundred and forty-three children with asthma (116 males,  $M_{\text{age}} = 12$  years and 7 months) and their mothers were administered standardized scales twice across 1 year. The scales assessed the children's trust beliefs in physicians, the mothers' trust beliefs in physicians, the children's quality of life and the children's adherence to prescribed medical regimes.

**Results:** Quadratic relationships were found between the children's quality of life and both their and their mothers' trust beliefs in physicians. The quadratic relationship increased over time. Linear relationships were found between trust beliefs in physicians and children's adherence to prescribed medical regimes.

**Conclusion:** Children with asthma are prone to a lower quality of life when they and their mothers hold very high, as well as hold very low, trust beliefs in physicians. Children's trust beliefs in physicians increase the probability of adherence to prescribed medical regimes.

## 1 | Introduction

The principle that interpersonal trust promotes adjustment (TPA) and health has dominated psychological theory from the beginning of the discipline of psychology (i.e., Erikson 1963). The more recent Centralist Approach to Trust (CAT; Rotenberg 2010; Rotenberg et al. 2023; Rotenberg, Manley, and Walker 2021) advances an opposing principle that poor psychosocial adjustment and health is a product of

the deviation from normative ranges of trust beliefs in others. Studies have investigated the contrasting implications of TPA and CAT across various psychosocial outcomes. Nonetheless, there has been no examination of whether they adequately explain the connection between trust in physicians and medical well-being. The current study filled in that gap in knowledge by a re-analysis of the data gathered by Rotenberg and Petrocchi (2018). Those researchers examined concurrent and longitudinal relationships between beliefs in physicians

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## Summary

- There are quadratic relationships between the quality of life with asthma and children's/mothers' trust beliefs in physicians.
- Those quadratic relationships increased over time.
- There were linear relationships between trust beliefs in physicians and children's adherence to prescribed medical regimes.
- Trust promotes adjustment and Centralist Approach to Trust differential accounted for the relationships.

by children with asthma, trust beliefs in physicians of their mothers and the children's medical health (quality of life and adherence to prescribed medical regimes). The re-analyses tested whether the relationships between trust beliefs in physicians and children's medical health were linear as predicted by the TPA or curvilinear (quadratic) as predicted by the CAT.

## 1.1 | Trust Promotes Adjustment Approach

The TPA has played a central role in major theories of social development (Erikson 1963; Ainsworth and Bowlby 1991; Bowlby 1969). According to these theories, trust in others forms in children due to responsive and nurturing parenting, subsequently influencing social competence as they develop. According to the Social Capital Theory (Rostila 2010) and the Social Learning Theory (Rotter 1980), trust is essential to a cooperative society and social functioning in society. Several lines of research yield support for the TPA. For example, trust beliefs in others are associated with lower levels of internalized and externalized maladjustment (Malti et al. 2013; Rotenberg, Manley, and Walker 2021) and with higher levels of psychosocial adjustment (Marciano, Petrocchi, and Camerini 2022; Rotenberg et al. 2015; Petrocchi et al. 2019, 2021). It has been found that generalized trust beliefs of older adults are associated concurrently and prospectively with their psychological well-being, life satisfaction, functional health and longevity (Barefoot et al. 1987, 1998; Kennedy et al. 1998; Miething, Mewes, and Giordano 2020; Nummela, Raivio, and Uutela 2012). Also, research has shown that adults' trust beliefs in physicians are associated concurrently and prospectively with their medical health including the quality of life and adherence to prescribed medical regimes (Birkhäuer et al. 2017; Sanford and Clifton 2022). In childhood, Rotenberg et al. (2008) found that elementary school children's trust beliefs in physicians were concurrently associated with their adherence to prescribed medical regimes. In a subsequent study, Rotenberg and Petrocchi (2018) found that trust beliefs in physicians by children with asthma and their mothers were linearly associated with their medical health including quality of life and adherence to prescribed medical regimes. It was found that the children's trust beliefs in physicians were prospectively and linearly associated with the children's medical health.

## 1.2 | The Centralist Approach to Trust

The CAT (Rotenberg et al. 2023) conceptualizes trust as a continuum in which the deviation from the normative range of trust beliefs in others contributes to poor adjustment and poor health. According to CAT, extreme levels of trusting beliefs (very low and very high; see Lecciso et al. 2011) and related behaviours detract from normative and competent patterns of psychosocial functioning and concomitant health. Individuals with very low trust beliefs in others hold paranoid-like cognitions and engage in mistrusting behaviour (Bebbington et al. 2013; Wong, Freeman, and Hughes 2014) that predispose them to establish poor social relationships. Specifically, these individuals tend to attribute hostile intentions to provocation, engage in retaliatory aggression, experience anger and withdraw from social relationships. Individuals with very high trust beliefs in others experience incongruence between their trust beliefs and normative levels of trustworthiness in society. Therefore, they frequently experience disappointment and betrayal that results in interpersonal style composing anger and hypercritical social evaluation of others.

As support for the CAT, quadratic relationships have been found between trust beliefs in others and psychosocial adjustment across the life span. In contrast to children/adolescents with the midrange of trust beliefs, children/adolescents with extreme trust beliefs (very low and very high) have shown elevated loneliness, fewer friendships, lower levels of self-perceived social acceptance, higher levels of peer exclusion/rejection, higher levels of retaliatory aggression during childhood and adolescence (Betts, Rotenberg, and Trueman 2009; Rotenberg et al. 2005, 2013, 2014). In contrast to adults with the midrange of trust beliefs, adults with extreme trust beliefs (very low and very high) show higher levels of retaliatory aggression towards others, anger towards peers and poorer adjustment to residential care (Rotenberg, Patel, and Chmielowiec 2021).

The purpose of the current study was to re-examine the data gathered by Rotenberg and Petrocchi (2018) to test the implications of the TPA and the CAT for the relationship between trust beliefs in physicians by children with asthma, those by their mothers and the children's medical health. The results reported by Rotenberg and Petrocchi (2018) appeared to yield support for the TPA approach, but regression analyses were not carried out to test the competing predictions from the CAT. According to CAT, the children with asthma and their mothers who held very high trust beliefs in physicians would experience an incongruity between their expectations of the trustworthiness of physicians. As a result, they would experience disappointment, a sense of betrayal by physicians, and anger towards them. These experiences would undermine the children's quality of life and their motivation to adhere to prescribed medical regimes. Also, children with asthma and their mothers who held very low trust beliefs in physicians would manifest a very cynical view of physicians and thus be inclined to experience disappointment and anger. This orientation would undermine the children's quality of life and their adherence to prescribed medical regimes. Moreover, because interpersonal trust has been regarded as a reciprocal phenomenon (Betts et al. 2014), very high or very low trust beliefs in

physicians would negatively influence their interactions and the quality of the relationship.

Therefore, it was expected that there would be quadratic relationships between the children's medical health (quality of life and adherence to prescribed medical regimes) and the children's and their mothers' trust beliefs in physicians. Specifically, it was expected that poorer medical health would be shown by children with asthma when the children and their mothers held very high, as well as very low, trust beliefs in physicians than those who held the midrange of trust beliefs in physicians. A downward concave curve was expected.

### 1.3 | Changes Across Time

The CAT leads to the expectation that the relationship between trust beliefs in physicians and children's medical health would change over time. It is assumed in these formulations that persons' normative trust beliefs in physicians roughly correspond to the trustworthiness of physicians. Central to CAT is the principle that individuals with very high trust beliefs in others experience a violation of expectation accompanied by disappointment, a sense of betrayal and anger. Also, the CAT posits that individuals with very low trust beliefs in others hold cynical views, which undermine the quality of their interactions. In both cases, the pattern should become more prevalent with increasing social interactions over time. It was expected that the children and their mothers who held very high trust beliefs in physicians would experience increases in the violation of expectations accompanied by a sense of betrayal and disappointment. Also, it was expected that the children and their mothers who held very low trust beliefs in physicians would experience increases in the confirmation of their cynical view. Two consequences of those proclivities were expected. First, it was expected that the quadratic relationship between trust beliefs in physicians and the children's medical health would increase over time. Second, because of those increases, it was expected that there would be an overall decline in trust beliefs in physicians and the children's medical health.

## 2 | Method

### 2.1 | Participants

The attributes of the participants are reported in detail by Rotenberg and Petrocchi (2018). At Time 1 (T1), 199 children (136 males;  $M_{\text{age}} = 12$  years and 6 months,  $SD = 2$  years, ranging from 9 years to 14 years and 9 months) and their mothers were tested. The final sample tested at Time 2 (T2) approximately 1 year later was composed of 143 (116 males) with mean age = 12 years and 7 months ( $SD = 1$  year and 7 months, ranging from 8 years and 3 months to 15 years – and 10 months) and their mothers. The children and mothers were solicited from the University Hospital and child-asthma sites such as Asthma UK. There were no appreciable differences in any of the measures between the children and the mothers who were tested twice compared with those only tested at T1. Two post hoc power analyses were calculated with  $N = 143$  (sample size at T2),  $\alpha = 0.05$ , and a medium effect size of 0.07 as

the average effect size that emerged from our analyses. In the first estimation, a linear multiple regression: fixed model,  $R^2$  increase has been chosen with two tested predictors (either children's trust beliefs or mother's trust beliefs and the corresponding quadratic term). The actual power obtained was 0.8361, which is considered good. Including two covariates (age and gender) did not change the estimated power. In the second estimation, a repeated measures ANOVA has been used with the quality of life and adherence scores at the two time points as within-subject variables. The actual power obtained was 0.9999. To assess the severity of the children's asthma, the mothers and the children completed the Asthma Checklist (see Rotenberg and Petrocchi 2018). At Time 1 in the study, mothers reported that their children had asthma attacks twice a week ( $M = 4.92$ ,  $SD = 1.10$ , range 1–5) and missed school because of asthma attacks twice a week ( $M = 4.47$ ,  $SD = 1.03$ , range 1–5). The children reported that they were (a) very bothered by cough ( $M = 5.74$ ,  $SD = 1.11$ , range 1–7), (b) highly bothered by wheeze ( $M = 4.82$ ,  $SD = 1.23$ , range 1–7), (c) very bothered by tightness in the chest ( $M = 5.28$ ,  $SD = 1.21$ , range 1–7), and (d) frequently out of breath ( $M = 5.05$ ,  $SD = 1.43$ , range 1–7). The reports indicate that the asthma was severe.

There is evidence that mothers' reports of the asthmatic symptoms of their children are indicators of medical diagnosis of their children's asthma. For example, Hansen, Evjenth, and Holt (2015) found that there was concordance between mothers' reports of the asthma/asthma symptoms of their children and a detailed clinical evaluation of the children including a standardized clinical interview, a clinical examination, skin prick tests, blood samples, spirometry an exercise treadmill test (EIB test) and measurement of exhaled nitrogen oxide. Also, Plante et al. (2014) found concordance between mothers' reports of asthma in their children and clinical diagnoses of asthma, which included hospital admissions and ER visits. The current research received ethical approval from institutional (University) and national (National Health Service) organizations. The current data are available at [https://osf.io/s2gbd/?view\\_only=b120096bddef46fab672914fa21b0ab1](https://osf.io/s2gbd/?view_only=b120096bddef46fab672914fa21b0ab1).

### 2.2 | Measures

#### 2.2.1 | Trust Beliefs in Physicians by Children With Asthma and Their Mothers

Children answered the Children's Trust Beliefs in Physicians scale (CTBP; Rotenberg et al. 2008), while mothers to the Generalized Trust Beliefs in Physicians scale (Hall et al. 2002). These scales are described in detail by Rotenberg and Petrocchi (2018). Previous factor analysis of the items of the children's trust beliefs scale yielded the expected three factors (reliability  $\alpha = 0.50$ , emotional  $\alpha = 0.60$  and honesty  $\alpha = 0.55$ ). The resulting scale demonstrated acceptable internal consistency ( $\alpha = 0.60$  and 0.69 at T1 and T2, respectively) and stability by the correlation between the two testing times,  $r(141) = 0.36$ ,  $p < 0.001$ . The mothers' trust beliefs scale demonstrated acceptable internal consistency ( $\alpha = 0.64$  and  $\alpha = 0.68$  at T1 and T2, respectively) and stability over time,  $r(141) = 0.22$ ,  $p < 0.001$ .

### 2.2.2 | Adherence to Prescribed Medical Regimes by Children With Asthma

This scale is described in detail by Rotenberg and Petrocchi (2018). It entailed mothers rating on 5-point scales their children on seven commonly prescribed medical regime behaviours for asthma (e.g., using inhalers as required). The scale demonstrated acceptable internal consistency given the modest number of items ( $\alpha$ s=0.60 and 0.65 at T1 and T2, respectively) and stability by correlation between the two testing times,  $r(141)=0.38, p<0.001$ .

### 2.2.3 | Quality of Life of Children With Asthma

This was assessed by a 23-item Paediatric Asthma Quality of Life Questionnaire (PAQLQ; Juniper et al. 1993; Raat et al. 2005) assessing the troublesome problems that asthmatic children and adolescents experience in their daily lives. The PAQLQ successfully detects the quality-of-life changes in those patients who altered their health status either as a result of treatment or natural fluctuations in their asthma. The PAQLQ has been found to significantly correlate with the conventional asthma indices and with the general quality of life both cross-sectionally and longitudinally. In the current study, the PAQLQ demonstrated acceptable internal consistency ( $\alpha$ s=0.77 and 0.83 at T1 and T2, respectively) and significant stability by the correlation between the two-time points over the year,  $r(141)=0.72, p<0.001$ .

## 2.3 | Procedure

The children with asthma and their mothers completed the questionnaires 'online' by Smart Survey. The testing protocol is described in detail by Rotenberg and Petrocchi (2018). An online survey method was used in this research because the study needed to draw upon a hard-to-reach sample and provided anonymity. Regarding the latter, the online method gave the participants confidence they would not experience the consequences of participating in the study or any of the answers they provided.

## 2.4 | Strategy for the Analyses

First, regression analyses tested whether there were linear and curvilinear (i.e., quadratic) concurrent relationships between the trust beliefs in physicians by children or mothers and each of the two measures of medical health (quality of life and adherence to prescribed medical regimes) at each of the two testing times. Hierarchical regression analyses were utilized with the children's trust beliefs (or mothers' trust beliefs) entered in Step 1 and the square of the predictor entered in Step 2. The findings were the same and the non-centred findings are presented to provide information about the nature of the scores and their distribution. Second,  $z$ -tests on standardized betas (Clogg, Petkova, and Haritou 1995) were carried out to assess whether there were differences across time (T1 and T2) for the linear relationships and the quadratic relationships. Third, ANOVAs with repeated measures via generalized linear modelling were carried out to test whether there were changes in the measures across the two testing times. Rotenberg and Petrocchi (2018) have reported the

longitudinal relationships between trust beliefs in physicians and children's medical health. In particular, the structural equation modelling analysis showed that the children's trust beliefs in physicians predicted changes in their quality of life and adherence to prescribed medical regimes.

## 3 | Results

### 3.1 | Regression Analyses of Concurrent Relationships

#### 3.1.1 | Children's and Their Mothers Trust Beliefs in Physicians at T1 and the Children's Quality of Life at T1

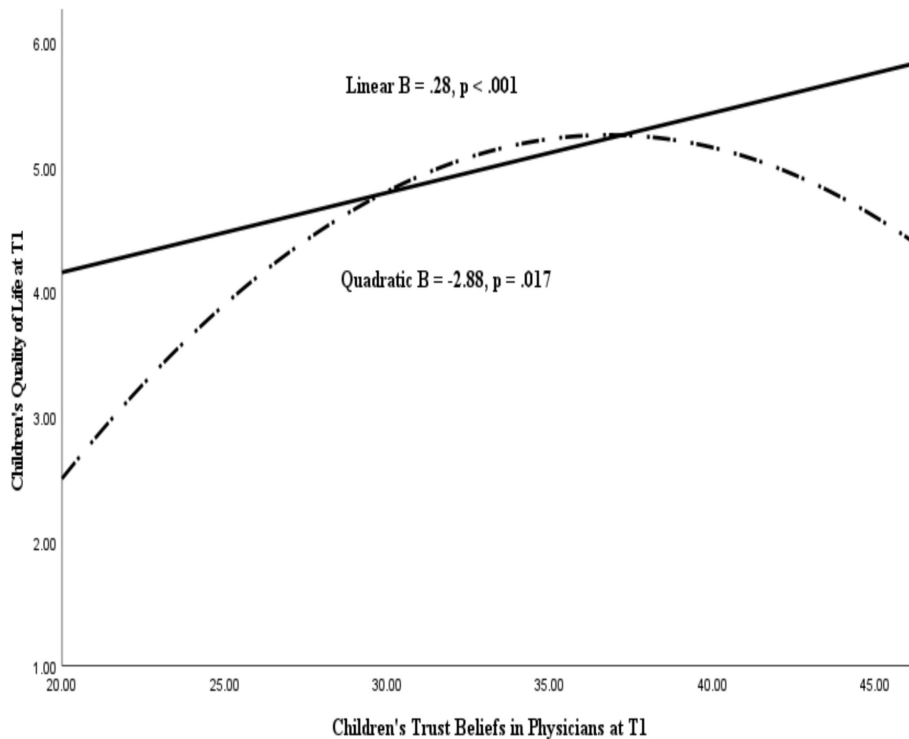
The regression analyses yielded linear and quadratic relationships between the children's trust beliefs in physicians at T1 and the children's quality of life at T1. This was qualified by a quadratic relationship (the slope and curve with standardized betas are shown in Figure 1). There was a similar linear relationship between mothers' trust beliefs in physicians at T1 and children's quality of life at T1. The linear relationship was qualified by quadratic relationships. Regarding the quadratic relationships at T1, children who held very high, as well as very low, trust beliefs in physicians showed lower quality of life than children who held the middle range of trust beliefs in physicians. Similarly, mothers who held very high, as well as held very low, trust beliefs in physicians had children who showed lower quality of life than mothers who held the middle range of trust beliefs in physicians. As expected, downward concave curves were found (the slope and curve with standardized betas are shown in Figure 2).

#### 3.1.2 | The Children's and Their Mothers' Trust Beliefs in Physicians at T2 and the Children's Quality of Life at T2

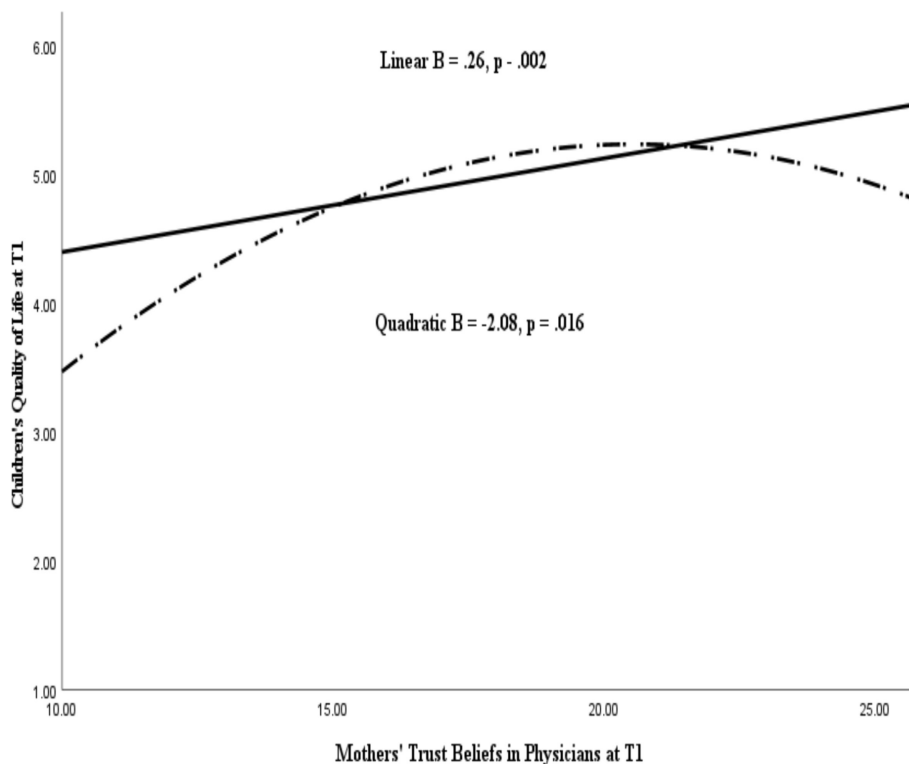
The regression analyses did not yield linear relationships but did yield quadratic relationships, between the children's trust beliefs in physicians at T2 and the children's quality of life at T2 (the slope and curve, with standardized betas, are shown in Figure 3). The regression analyses did not yield linear relationships but did yield quadratic relationships, between mothers' trust beliefs in physicians at T2 and the children's quality of life at T2 (the slope and curve with standardized betas are shown in Figure 4). Regarding the quadratic relationships at T2, the children showed a lower quality of life when they held very high, and very low, trust beliefs in physicians than the children who held the middle range of trust beliefs in physicians. Similarly, mothers who held very high, as well as held very low, trust beliefs in physicians had children who showed lower quality of life than mothers who held the middle range of trust beliefs in physicians. As expected, downward concave curves were found.

#### 3.1.3 | Children's and Mothers' Trust Beliefs in Physicians and the Children's Adherence to Prescribed Medical Regimes at T1 and T2

There were linear relationships between trust beliefs in physicians and adherence to prescribed medical regimes at T1 and



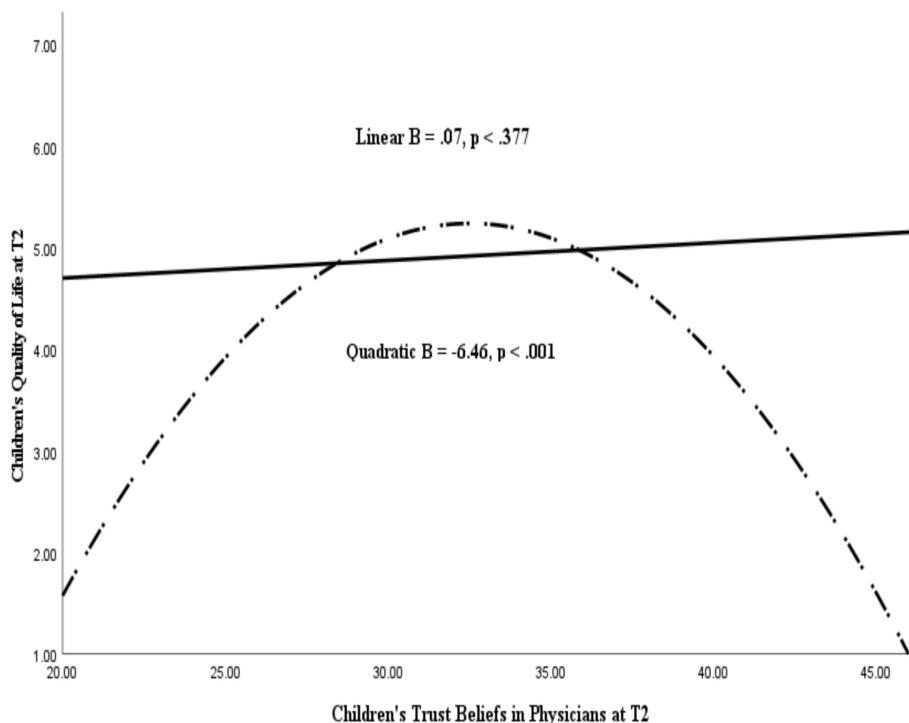
**FIGURE 1** | The linear and quadratic relationships between the children's trust beliefs in physicians at T1 and the children's quality of life at T1.



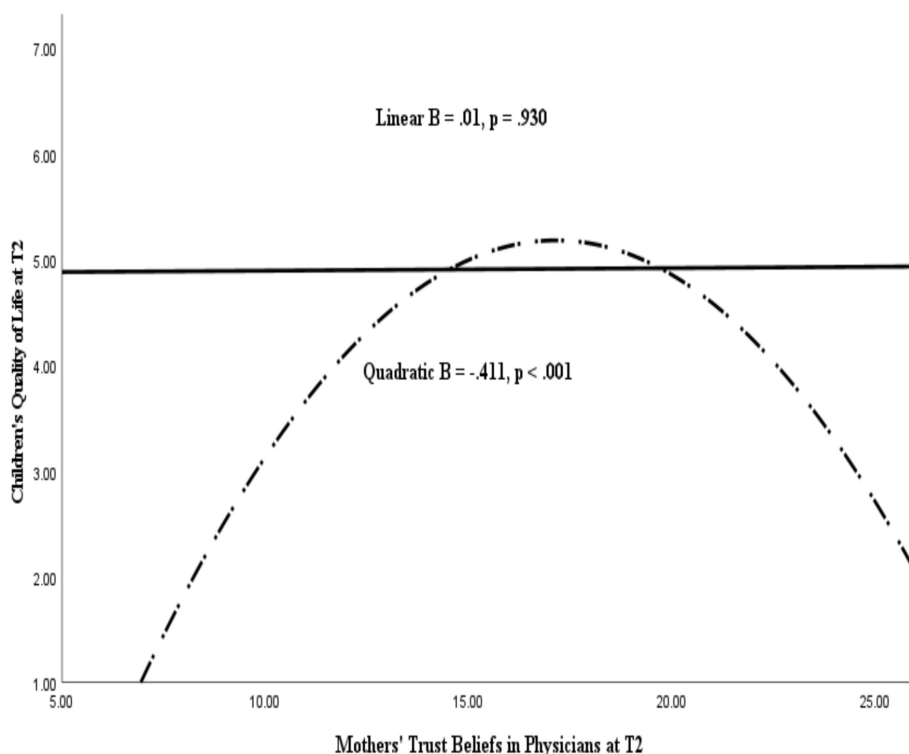
**FIGURE 2** | The linear and quadratic relationships between the mothers' trust beliefs in physicians at T1 and the children's quality of life at T1.

T2 both for the children and for their mothers at each time (see the correlations by Rotenberg and Petrocchi 2018). The regression analyses did not yield appreciable quadratic relationships

between adherence to prescribed medical regimes at T1 or T2 and trust beliefs in physicians by either the children or their mothers at each of the two testing times.



**FIGURE 3** | The linear and quadratic relationships between the children's trust beliefs in physicians at T2 and the children's quality of life at T2.



**FIGURE 4** | The linear and quadratic relationships between the mothers' trust beliefs in physicians at T2 and the children's quality of life at T2.

### 3.2 | Differences in the Linear and Quadratic Relationships Across Time

The linear relationship decreased over time between children's trust beliefs in physicians and their quality of life,  $z = 2.917$ ,  $p = 0.002$ . Also, the linear relationship decreased over time

between mothers' trust beliefs in physicians and the children's quality of life,  $z = 7.16$ ,  $p < 0.001$ . The quadratic relations increased over time in the quadratic relationship between the children's trust beliefs in physicians and their quality of life,  $z = 279.68$ ,  $p < 0.001$ . Also, the quadratic relationship increased over time between mothers' trust beliefs in physicians

**TABLE 1** | Differences in the measures over time.

	<i>F</i> with <i>p</i>	Partial eta square	M at T1 (SD)	M at T2 (SD)
Children's trust beliefs in physicians	$F(1, 142) = 57.83, p < 0.001$	0.289	34.68 (0.29)	32.09 (0.31)
Mothers' trust beliefs in physicians	$F(1, 142) = 79.34, p < 0.001$	0.358	19.52 (0.24)	16.98 (0.22)
Children's quality of life	$F(1, 142) = 12.41, p < 0.001$	0.080	5.09 (0.07)	4.91 (0.07)
Children's adherence	$F(1, 102) = 73.56, p < 0.001$	0.341	3.59 (0.05)	3.17 (0.04)

and the children's quality of life,  $z = 182.29, p < 0.001$ . There were no appreciable changes in the linear or quadratic relationships between trust beliefs in physicians by the children or their mothers and the children's adherence to prescribed medical regimes.

### 3.3 | Changes in Trust Beliefs in Physicians and Children's Medical Health Across Time

The results of the ANOVAs with corresponding means are shown in Table 1. There were decreases across time (T1 to T2) in children's trust beliefs in physicians, mothers' trust beliefs in physicians, children's quality of life and children's adherence to prescribed medical regimes. Once adding children's gender and age to the ANOVAs with the corresponding children's trust beliefs in physicians and children's adherence, gender is the only significant variable with females reaching higher scores than males.

## 4 | Discussion

The study provides evidence for both the Trust Promotes Adjustment (TPA) and the Centralist Approach to Trust (CAT) as accounts of the relationships between the trust beliefs in physicians by the children with asthma, those of their mothers, and the children's medical health (quality of life and adherence to prescribed regimes). Linear relationships were found between the children's trust beliefs in physicians and their quality of life at Time 1 and adherence to prescribed medical regimes at both testing times. Moreover, linear relationships have been found between mothers' trust beliefs in physicians and children's quality of life at T1 and adherence to prescribed medical regimes at both testing times.

As evidence for CAT though, the re-analyses yielded quadratic relationships between the children's trust beliefs in physicians, those of their mothers and their quality of life. As expected, children with asthma showed lower quality of life when they and their mothers held very high, as well as very low, trust beliefs in physicians than those with midrange trust beliefs in physicians. As further support for CAT, there were the quadratic quality of the curves increased over time. As expected, these were downward concave curves. Furthermore, as expected, trust belief in physicians and children's health measures decreased over time. The analyses did not yield, however, a quadratic relationship between the children's trust beliefs in physicians, those of their mothers and the children's adherence to prescribed medical regimes.

The findings regarding trust beliefs in physicians and children's quality of life are consistent with two psychosocial processes outlined by CAT. First, children and their mothers who hold very high trust beliefs in physicians experience an incongruity between their trust expectations of physicians and the trustworthiness of physicians that results in disappointment, a sense of betrayal, and anger. Second, children with asthma and their mothers who hold very low trust beliefs in physicians have a very cynical view of physicians which promotes disappointment and anger. These processes are dynamic, and thus, the observed quadratic quality of the relationship increases over time. These processes affected children's quality of life, rather than adherence to prescribed medical regimes, likely because they have a primary effect on the psychosocial aspect of the children's medical health. The adherence to prescribed medical regimes may be more directly related to the physical survival of the children. However, the observed decrease over time in adherence may be the result of an indirect effect of the extreme trust beliefs in physicians on the children's quality of life. This hypothesis warrants examination.

The current findings complement the quadratic relationships found between trust beliefs in others and psychosocial adjustment both in children (Rotenberg et al. 2005, 2014) and adults (Rotenberg, Patel, and Chmielowiec 2021). The current findings are unique, though, because they demonstrate a quadratic relationship between trust beliefs and children's medical health as assessed by their quality of life. Broadly, the findings show that both the TPA and CAT are useful in understanding how the medical health of children with asthma is related to the children's and their mothers' trust beliefs in physicians. TPA primarily accounts for the relationships about the children's adherence to prescribed medical regimes whereas CAT accounts for the relationships about the children's quality of life.

### 4.1 | Limitations With the Current Research and Future Directions

The relationships reported by Rotenberg and Petrocchi (2018) yield evidence of longitudinal relationships between children's trust beliefs and their medical health. However, those findings yield evidence of probable causality. Regarding the current re-analysis, the observed shifts over time in the quadratic quality of curves between the children's quality of life and the measures of trust beliefs in physicians are not evidence for causality.

In future, researchers could include other measures of adherence in the designs such as records maintained by physicians (e.g., respiratory peak). Researchers could carry out a longitudinal investigation involving a longer period than the one examined in the current study. The design could include an examination of the specific causes of linear and curvilinear such as disappointment with the trustworthiness of the medical treatment provided by physicians. Latent growth curve analyses could be carried out on data gathered for at least three-time points. This would test the extent to which trust beliefs in physicians predicted trajectories of medical health in children with asthma. Finally, research could examine the relationships between medical health and trust beliefs in physicians by children with other serious illnesses (e.g., cancer) and by both of their parents.

## 4.2 | Implications

The findings obtained by the current re-analysis complement those observed by Rotenberg and Petrocchi (2018) who found that the medical health of children with asthma is linearly related to their (and mothers') trust beliefs in physicians. The findings advance those results, though, by showing that children with asthma are inclined to experience a poor quality of life when they and their mothers hold very low trust beliefs, as well as very high trust beliefs, in physicians. This novel knowledge in the field of paediatric medicine could inform future efforts to implement strategies that moderate those trust beliefs to improve the medical health of children with asthma. Moreover, similar strategies could be applied to other adult-child relationships, wherein the adult serves in a professional capacity with specific tasks related to the child's well-being, such as social workers (Petrocchi et al. 2018). Such interventions hold promise for enhancing outcomes and quality of life across various contexts where trust dynamics play a crucial role in health and well-being.

### Author Contributions

**Serena Petrocchi:** investigation, funding acquisition, conceptualization, writing – original draft, writing – review and editing. **Ken J. Rotenberg:** conceptualization, investigation, funding acquisition, methodology, writing – original draft, writing – review and editing, project administration, supervision.

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### Ethics Statement

The study has been approved by the North-West 1 Research Ethics Committee of the University Hospital of North Staffordshire NHS Trust (10/H1017/53).

### Conflicts of Interest

The authors declare no conflicts of interest.

### Data Availability Statement

The data supporting this study findings are available upon request from the corresponding author (S.P.).

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