

Word Count: 6421

Tables: 5

Figures: 1

The Relationship Between Physical Illness and Internalizing Symptomatology in a  
Transdiagnostic Clinical Sample of Youth

An Honors Thesis for the Department of Psychology

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Tufts University, 2018

## **Acknowledgements**

First, I would like to thank Dr. John Weisz and the Harvard Laboratory for Youth Mental Health for the contribution of data to my thesis. This research was made possible via funding from the Connecticut Department of Children and Families to the Weisz lab. I would also like to thank my advisor and thesis chair, Dr. Alexander Queen, for his unwavering support and advice.

Additionally, I would like to acknowledge the contributions of Dr. Gabriela Rodríguez and Dr. Kerri Modry-Mandell for participating in the process. Last, the support of my family and friends over the past year has been invaluable.

## Abstract

**Objective:** Chronic physical health conditions affect the daily lives and functioning of many children. Prior research has consistently demonstrated that children with chronic physical illnesses report elevated anxiety and depressive symptoms compared to controls. However, less is known about how the presence and number of physical illnesses affects internalizing symptomatology in treatment-seeking children with diagnosed emotional and behavioral disorders. The present study was designed to further investigate the relationship between physical illness and internalizing symptomatology in a transdiagnostic sample of children receiving community outpatient mental health treatment for internalizing and externalizing disorders.

**Method:** Two hundred and sixty-two treatment-seeking children ages 7-15 years old ( $M = 10.79$ ,  $SD = 2.48$ ) and their caregivers completed a demographic questionnaire, the Child Behavior Checklist (CBCL), and the Youth Self-Report (YSR) as part of a baseline assessment prior to treatment.

**Results:** Contrary to hypotheses, there was no association between presence of a physical illness and parent- and child-reported internalizing symptoms. However, number of physical illnesses was related to some internalizing symptoms. Children with two or more physical illnesses had more severe depressive symptoms than those with one or zero illnesses. There was no effect of number of physical illnesses on self-reported or parent-rated anxiety symptoms.

**Conclusion:** Results suggest that having multiple physical illnesses may put a child at risk for more severe psychopathology, specifically depression, even among a clinical population of children with diagnosed internalizing and/or externalizing disorders. Potential applications for clinical research and practice are discussed.

## **The Relationship Between Physical Illness and Internalizing Symptomatology in a Transdiagnostic Clinical Sample of Youth**

Prior research suggests that approximately 26.6% of children in the United States suffer from at least one physical health condition (Van Cleave, Gortmaker, & Perrin, 2010). According to Mokkink et al. (2008), chronic illness, which, for the present study, will be used interchangeably with the term “physical illness”, refers to illness that “lasts three months or more, affects a child’s normal activities, and requires frequent hospitalizations, home health care, and/or extensive medical care” (p. 1442). Furthermore, Stanton, Revenson, and Tennen (2007) state that chronic illnesses have three primary features—they are prolonged in their duration, do not resolve spontaneously, and are rarely cured completely. While many chronic illnesses common to children, such as asthma, diabetes, and skin-related conditions, have no known cure, they can typically be managed medically. To manage the physical illnesses, children and their families have to attend frequent medical appointments, maintain daily medical regimens, and accommodate various physical changes (Perrin, 1999; Van Cleave et al., 2010).

The difficulty of managing physical illnesses and the limitations on social and physical activities are two factors associated with the well-established comorbidity between physical and mental illness in children and youth. Research has shown that rates of mental illness are up to four times greater in children with physical illness than in children who are physically well (Hysing et al., 2007; Piquart & Shen, 2011). Children are at especially high risk for experiencing emotional and behavioral disturbances within the first year of diagnosis (LeBlanc, Goldsmith, & Patel, 2003).

Among the mental disorders, there is a particularly strong association between physical illness and internalizing symptomatology (Bennett, 1994; Harter, Conway, & Merikangas, 2003;

Last et al., 2008; Pao and Bosk, 2010, Piquart & Shen, 2011). Internalizing disorders, as defined by Kovacs and Devlin (1998), are conditions which centrally feature is disordered mood or emotion. Anxiety and depressive disorders are considered the two primary internalizing disorders. According to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), anxiety disorders are characterized by “excessive fear and anxiety, and related behavioral disturbances, that are excessive or persist beyond developmentally appropriate periods.” Depressive disorders are characterized by the presence of “sad, empty or irritable mood” and are often “accompanied by somatic and cognitive changes that significantly affect the individual’s capacity to function (American Psychiatric Association, 2013). These disorders are highly prevalent among youth; according to the National Institute of Mental Health (NIMH), approximately 31.9% of youth will suffer from an anxiety disorder and 12.8% will suffer from a depressive disorder at some point in their youth (NIMH, 2017). However, according to the 2013 Children’s Mental Health Report, only 3% and 2.1 % of youth have a current diagnosis of and receive treatment for anxiety and depression, respectively (Centers for Disease Control and Prevention [CDC], 2013).

Several studies have examined the relationship between physical illness and internalizing symptomatology. With regard to anxiety, several studies have found a positive correlation between physical illnesses and anxiety symptoms (Chavira, Garland, Daley & Hough, 2009; Harter et al., 2003; LeBlanc et al., 2003; Pao & Bosk, 2010). It is important to note that, although some of these studies collected data on specific anxiety disorders (e.g. Generalized Anxiety Disorder, Panic Disorder, Specific Phobia), all of them examined anxiety as a general construct. When further investigating this relationship, LeBlanc et al. (2003) found that children are at highest risk for development of anxiety within the first year of physical illness diagnosis. This is

likely because children are adjusting to a diagnosis and feel uncertain and anxious about how to best manage the condition (Drotar, 2006).

Recent studies have also examined depressive symptoms in children with chronic medical problems (Pinquart & Shen, 2011; Bennett, 1994). In a meta-analysis, Pinquart and Shen (2011) found that levels of depressive symptoms are higher in children and adolescents with chronic physical illness than in those without physical illness. They also found that the highest effect sizes were among females. Based on previous research demonstrating that female adolescents are more likely than males to respond to stressors with depressive symptoms (Piccinelli & Wilkinson, 2000), the authors hypothesized that there may be a stronger effect of chronic illness on depressive symptoms in females.

Many research studies examining mental health in children with chronic illness have focused on children with asthma (Alati et al., 2005; Chen, Hermann, Rodgers, Oliver-Welker, & Strunk, 2006; Letitre, Groot, Draaisma, & Brand, 2014; Wayne, 2010). Within these studies, a correlation between asthma and internalizing behaviors is well-documented. For example, Wayne (2010) found, in a study on asthma, suicide risk, and psychiatric comorbidity, that adolescents with asthma were twice as likely to meet criteria for depressive or anxiety disorders as healthy comparison subjects. One of the explanations for this pattern, according to Wayne (2010), is that asthma may interfere with normal development in youth and prevent engagement in social and physical activities which, in turn, may lower self-esteem. However, Letitre et al. (2014) found that, if a child's asthma was well-controlled and well-managed (i.e., symptoms were not affecting daily functioning), the child was less likely to suffer from anxiety, depression, and low self-esteem. This finding is important because it suggests that if a physical illness is well-managed, children may be at lower risk for suffering from internalizing symptoms.

In addition to examining the mental health outcomes of physical illness in youth, it is important to consider the effects of experiencing multiple physical illnesses on youth mental health. While there has been little research done examining this relationship specifically for internalizing symptoms, Newacheck and Stoddard (1994) performed a study examining the prevalence and impact of experiencing multiple childhood chronic illnesses. The National Health Interview Survey on Child Health surveyed roughly 17,000 children, and found that 5% of children had two or more physical illnesses, while less than 1% had three or more physical illnesses. Results showed that children with multiple chronic illnesses had significantly more emotional and behavioral problems than both children with one and zero physical illnesses. The results of this study are noteworthy because they support the previous findings that the more poorly managed a child's physical illness is, the more severe are their mental illness symptoms. Specifically, the results indicate that there may be a cumulative effect of managing multiple chronic illnesses—the more physical illnesses a child has, the more difficult it is to manage them. However, it is important to acknowledge that Newacheck and Stoddard did not report a breakdown of the “emotional and behavioral problems” being experienced (e.g. anxiety, depression, and conduct), which is necessary to fully understand which specific mental illness symptoms are most affected. Understanding this would allow researchers and clinicians to know on which areas of treatment to focus most, thus providing the most effective treatment for children.

Most of the existing literature has examined the relationship between physical and mental illness in samples of children recruited for having a physical illness. However, few have taken the opposite approach and examined medical comorbidity in samples of children with mental illnesses (Chavira, Garland, Daley & Hough, 2009; Klassen, Miller, & Fine, 2004; Sawyer,

Whaites, Rey, Graetz, & Baghurst, 2002). The study by Chavira et al. (2009) specifically examined the impact of medical comorbidity on mental and functional health outcomes among youth recruited for having at least one anxiety disorder. Approximately half of the sample also had a comorbid physical illness. It was found that allergies and asthma were the most common comorbid physical illnesses in children with anxiety, and that those with comorbid physical illnesses exhibited higher levels of emotional problems than those without physical illnesses. Klassen et al. (2004) and Sawyer et al. (2002) also examined physical health in samples of children with mental illnesses, but used Health-Related Quality of Life (HRQL) as the primary measurement. According to Sawyer et al., (2002) HRQL is defined as a “multifactorial construct that focuses on individuals’ perceptions of their physical, psychological, and social functioning” (p. 532). In their study on the HRQL of children and adolescents with mental disorders, Sawyer et al. found that there was a higher percentage of physical health problems in children with mental disorders, which included Major Depressive Disorder (MDD), Conduct Disorder (CD), and Attention-Deficit/Hyperactivity Disorder (AD/HD). The research team also found that children with MDD were the most likely to have physical health problems.

Given the limited amount of research on physical illness among children with mental illness, further investigation is needed. Existing literature shows that children who are physically ill are significantly more likely to have emotional and behavioral symptoms. However, few studies have examined whether children with diagnosed emotional and behavioral disorders are at higher risk for having comorbid physical illnesses. In addition, the lack of research on transdiagnostic samples of children with mental illness indicates the need for further study. The majority of prior studies have examined homogenous samples of children with mental illnesses. However, in a study of young adults with both internalizing and externalizing disorders, Jones et

al. (2004) found that there was a high percentage of comorbid medical conditions. Similar research in a transdiagnostic sample of children with both internalizing and externalizing disorders is needed to determine whether this finding holds true in children. This is important because the comorbidity of internalizing and externalizing disorders in children can range from 15-45% (Boylan, Vaillancourt, Boyle, & Szatmari, 2007). Lilienfeld (2003) found that this comorbidity rate can be up to twice as high in treatment-seeking individuals. Third, there is very little research on how the number of physical illnesses a child has affects their mental illness symptoms, and which symptoms in particular may be most affected by physical illness. Elucidating this relationship may allow for improved treatment refinement and matching needs to individual presentations.

The current study aims to examine the relationship between internalizing symptoms and physical illness in a transdiagnostic sample of children seeking outpatient mental health care. Based on the present research showing a strong correlation between physical illness and internalizing symptoms, as well as the aforementioned gaps in the literature, we propose the following hypotheses:

1. Children with a physical illness will have higher parent- and child-reported total internalizing symptoms, as well as specific depressive and anxiety symptoms.
2. As the number of physical illnesses increases, so will the severity of parent- and child-reported internalizing symptoms, as well as specific depressive and anxiety symptoms. Specifically, children with two or more illnesses will have more severe internalizing symptoms than those with one or zero illnesses, and those with one illness will have more severe internalizing symptoms than those with zero illnesses.

## Method

### Participants

Participants were referred by clinicians at one of four community mental health clinics in Connecticut. Out of 683 participants referred, 262 children and adolescents completed the baseline assessment (38.36%; see Figure 1). The sample was 48.47% female ( $n=127$ ). Children ranged between the ages of 7 and 15,  $M = 10.79$ ,  $SD = 2.48$ . The racial/ethnic distribution was as follows: 32.06% Non-Hispanic White, 26.72% Black, 25.57% Latino/Hispanic, 0.76% Asian, 13.74% Multi-racial, and 1.15% other. In the sample, 36.80% of families earned a combined income of less than \$20,000 per year, 30.40% earned between \$20,000-\$39,000 per year, 13.60% earned between \$40,000-\$59,000 per year, and 19.20% earned more than \$60,000 per year. Primary caregiver marital status distribution was as follows: 33.08% married, 16.92% divorced, 3.85% separated, 2.31% widowed, 38.85% never married, and 5% living with a partner. Secondary caregiver (for those with more than one caregiver) marital status distribution was as follows: 52.53% married, 15.82% divorced, 2.53% separated, 23.42% never married, and 5.96% living with a partner.

Inclusion criteria were: (1) endorsement during phone screens by caregiver of the child having problems related to anxiety, depression, conduct, or posttraumatic stress and (2) borderline ( $T\text{-score} \geq 65$ ) or clinical elevations ( $T\text{-score} \geq 68$ ) on the Internalizing and/or Externalizing subscales of the Child Behavior Check List (CBCL) and/or the Youth Self Report (YSR) at the baseline assessment. Exclusion criteria were: (1) court-ordered clinical services, (2) a diagnosis of intellectual disability, schizophrenia, Autism Spectrum Disorder, or psychotic symptoms, (3) hospitalization in past year for suicide attempt or intent, or (4) absence from Connecticut for more than six weeks for the six months following baseline assessment.

## **Procedure**

The current study is a secondary analysis of the baseline data from an ongoing large, randomized controlled trial examining the effects of the Modular Approach to Therapy for Children with Anxiety, Depression, Trauma, or Conduct Problems (MATCH-ADTC; Chorpita & Weisz, 2009) treatment combined with expert consultation compared to MATCH-ADTC treatment with training only in the state of Connecticut.

Clinicians at the participating clinics were asked to refer any child between ages 7 and 15 seeking treatment at their site. After a clinician referral, potential families were contacted to complete a phone screen, if eligible, and schedule a baseline assessment. Phone screens and baseline assessments were administered by full-time Bachelor's and Master's level research assistants.

Caregivers and participants completed their respective portions separately, but with the same administrator. The caregiver portion included a demographic questionnaire and the CBCL while the child portion only included the YSR. After completion of the baseline assessment, participants and their caregivers were compensated for their time. The study was approved by the Internal Review Board (IRB) of Harvard University as well as the IRB of the Department of Children and Families for the state of Connecticut.

## **Planned Analyses**

Prior to analysis, continuous variables were examined for normality. All continuous variables were found to be normal, indicated by skewness and kurtosis values of less than an absolute value of two. Descriptive analyses were used for demographic data as well as the demographic profiles of different illnesses. Independent sample t-tests were used for comparing CBCL and YSR scales between children with and without a physical illness. Analysis of

Variance (ANOVA) and Tukey HSD/Dunnett's C post-hoc tests were used to examine the relationship between number of illnesses and CBCL and YSR subscale scores.

## **Measures**

**Demographic characteristics and protocol assignment.** During the baseline assessment, research assistants obtained demographic information about youth participants, including medical history, from the primary caregiver via interview. Primary caregivers were asked to provide information on youth's age, sex, and racial/ethnic background. Caregivers were also asked to report whether or not their child had any physical illness (i.e. "Does your child have any significant physical illnesses/medical problems? If yes, please list them here."). For analytic purposes, participants were classified as having or not having asthma based on whether caregivers included asthma in the list of physical illnesses/medical problems in response to the above question. Participants were classified as having zero physical illnesses if caregivers denied their child had a physical illness/medical problem. If caregivers reported their child had a physical illness/medical problem, the number of illnesses listed was used to classify participants into groups of youth with one and youth with two or more physical illnesses. Three children that had three illnesses listed, and they were grouped with those that had two for analytic purposes. Finally, information about the MATCH-ADTC protocol each child was assigned to at the start of treatment was obtained from study assessment records.

**Child Behavior Checklist (CBCL/6-18;** Achenbach & Rescorla, 2001). The CBCL is a 112-item, caregiver-report questionnaire that assesses behavioral and emotional problems in the participants. The response format ranges from 0 ("not true") to 2 ("very true"), with open-ended follow-up responses for select questions. The present study used the T-scores of the following subscales of the survey: Total problem behavior, Internalizing problems, Affective problems, and

Anxiety problems. The T-scores are adjusted to account for sex and age. This questionnaire was administered to all caregivers at baseline. Internal consistency for the CBCL is typically between 0.75 and 0.84, as measured by Cronbach's alpha (Nakamura, Ebesutani, Bernstein & Chorpita, 2009). Internal consistency was very high for the current overall sample, Cronbach's  $\alpha = 0.99$ . Internal consistency was also high for the individual subscales used in analyses: Cronbach's  $\alpha = 0.96$  for the Internalizing problems subscale, Cronbach's  $\alpha = 0.97$  for the Affective problems subscale, and Cronbach's  $\alpha = 0.93$  for the Anxiety problems subscale.

**Youth Self-Report (YSR; Achenbach & Rescorla, 2001).** The YSR is a 112-item, self-reported questionnaire based on and with the same response format as the CBCL. The scales used for this study were the same as those used for the CBCL. The YSR was administered to all participants in the study at baseline. Question #96 ("I think about sex too much") was deemed inappropriate for participants under the age of 11 and thus was removed in those cases. The present study used the T-scores of the following scales of the survey: Total problem behavior, Internalizing problems, Affective problems, and Anxiety problems. Internal consistency was very high for this sample, overall, Cronbach's  $\alpha = 0.99$ . Internal consistency was also high for the individual subscales used in analyses: Cronbach's  $\alpha = 0.98$  for the Internalizing problems subscale, Cronbach's  $\alpha = 0.99$  for the Affective problems subscale, Cronbach's  $\alpha = 0.99$  for the Anxiety problems subscale.

## **Results**

### **Sample Characteristics**

Sample characteristics and descriptive statistics are presented in Tables 1 and 2. Mean CBCL Total problems, Internalizing symptoms, Affective symptoms, and Anxiety symptoms T-scores were above the clinically borderline cutoff T-score of 65 or elevated and near the cutoff.

Mean YSR Total, Internalizing, Affective, and Anxiety T-scores were all below the clinically borderline cut-off of 65.

Primary problem areas (Anxiety, Depression, Trauma, or Conduct), according to the MATCH-ADTC protocol assigned after baseline assessment, as well as physical illness presence as measured via parent report, are presented in Table 3. The Depression (40.0%) and Conduct (38.1%) protocols were the most common primary problem areas, followed by Anxiety (19.5%) and Trauma (2.4%). However, it is important to acknowledge that many, if not most, of the sample likely had comorbid diagnoses.

### **Physical Illness Presence and Internalizing Symptoms**

Our first hypothesis predicted that children with a physical illness would have higher parent-reported internalizing symptoms, as measured by the Internalizing problems, Affective problems, and Anxiety problems subscales of the CBCL. Means and standard deviations for these variables can be found in Table 4. An independent samples *t*-test revealed no significant difference in the mean CBCL Internalizing subscale T-scores between children who had a physical illness and those who did not,  $t(101.55) = -0.23, p = .83$ . There were also no significant differences in the CBCL Affective,  $t(255) = -1.48, p = .14$ , or Anxiety subscale *t*-scores,  $t(255) = -0.18, p = .86$ , between children who did and did not have a physical illness. When examining only asthma and internalizing symptoms, there were no significant differences in the CBCL Internalizing,  $t(255) = -0.051, p = .96$ , Affective,  $t(255) = -1.03, p = .230$ , or Anxiety,  $t(255) = -0.38, p = .71$  subscales between children who did and did not have asthma.

We also hypothesized that children with a physical illness would have higher mean child-rated internalizing symptoms compared to children without a physical illness. Means and standard deviations for child-rated measures can be found in Table 4. An independent samples *t*-

test revealed no significant difference in the YSR Internalizing subscale t-scores between children who did and did not have a physical illness,  $t(241) = 1.47, p = .14$ . Furthermore, no significant differences were found between children with and without physical illnesses on the YSR Affective,  $t(241) = 0.89, p = .37$ , and Anxiety subscales,  $t(241) = 1.73, p = .08$ . When examining only asthma and internalizing symptoms, there were no significant differences in the YSR Internalizing,  $t(241) = 2.07, p = .07$ , Affective,  $t(258) = -0.36, p = .72$ , or Anxiety,  $t(241) = 1.24, p = .22$ , subscales between children who did and did not have asthma.

### **Number of Illnesses and Internalizing Symptoms**

The second hypothesis examined more specifically the relationship between number of physical illnesses (0, 1, or 2+) and parent- and child-reported internalizing symptoms. Means and standard deviations can be found in Table 4. A one-way ANOVA showed that the number of physical illnesses a child had was not significantly associated with CBCL Internalizing subscale t-scores,  $F(2, 256) = 2.580, p = .078$ , or the CBCL Anxiety subscale t-scores,  $F(2, 256) = 0.527, p = .591$ . There was, however, a significant mean difference between groups on CBCL Affective subscale t-scores,  $F(2, 256) = 5.098, p = .007, \eta^2 = 0.038$ . Levene's test revealed a lack of homogeneity of variances for the CBCL Affective T-scores, so Dunnett's C post hoc analysis was used. Post hoc analyses indicated that children with two or more illnesses ( $M = 72.83, SD = 5.98$ ) had significantly higher CBCL Affective T-scores than both children with one physical illness ( $M = 65.00, SD = 9.71$ ) and children with no physical illnesses ( $M = 64.49, SD = 8.70$ ),  $p < .05$ . There was no significant difference between children with one physical illness and children with no illness,  $p > .05$ .

A one-way ANOVA revealed a significant effect of number of physical illnesses a child had (0, 1, or 2+) on YSR Internalizing subscales T-scores,  $F(2, 242) = 3.044, p = .049, \eta^2 =$

0.025. Means and standard deviations for each of the groups were the following: no illness ( $M = 57.32$ ,  $SD = 11.65$ ); one illness ( $M = 53.61$ ,  $SD = 12.30$ ); two or more illnesses ( $M = 61.50$ ,  $SD = 8.44$ ). However, post hoc analyses failed to detect any significant differences between the three groups ( $p$ -values ranged from .089 to .43). A significant effect of number of illnesses was also found on YSR Affective subscale t-scores,  $F(2, 242) = 6.46$ ,  $p = .002$ ,  $\eta^2 = 0.051$ . A Tukey HSD post hoc test revealed that children with two or more physical illnesses ( $M = 66.50$ ,  $SD = 6.79$ ) had higher YSR Affective t-scores than children with one physical illness ( $M = 56.59$ ,  $SD = 8.18$ ) and children with no physical illnesses ( $M = 59.62$ ,  $SD = 9.29$ ),  $p < .05$ . There was no significant difference between children with one physical illness and children with no illness,  $p = .077$ . An ANOVA showed that the number of physical illnesses a child had was not significantly associated with YSR Anxiety subscale t-scores,  $F(2, 242) = 1.381$ ,  $p = .253$ .

### **Number of Illnesses and Total Problems**

Exploratory analyses were conducted to examine if the number of physical illnesses a child had (0, 1, or 2+) was related to the Total Problems subscales of the CBCL and YSR. These analyses were conducted to investigate the relationship between number of physical illnesses and both externalizing and internalizing symptoms in a transdiagnostic sample. Descriptive statistics can be found in Table 5. A one-way ANOVA revealed that there was no significant effect of number of physical illnesses on CBCL Total Problems T-scores,  $F(2, 256) = 1.916$ ,  $p = .149$ . However, an ANOVA showed that number of illnesses had an effect of YSR Total Problems T-scores,  $F(2, 242) = 3.401$ ,  $p = .035$ . Post hoc analyses using the Tukey HSD criterion indicated a significant difference in YSR Total Problems T-scores between youth with two or more physical illnesses ( $M = 62.58$ ,  $SD = 7.62$ ) and youth with one physical illness ( $M = 54.26$ ,  $SD = 10.64$ ),  $p = .045$ . No significant differences were revealed between children who had one illness and

children who had no illnesses,  $p = .157$ , as well as between children who had two or more illnesses and children who had no illnesses,  $p = .245$ .

### **Discussion**

This study was conducted to examine the relationship between physical illness and internalizing disorders among a transdiagnostic sample of treatment-referred children ages 7-15. We hypothesized that children with a physical illness would report higher internalizing symptoms than children without a physical illness. Furthermore, we hypothesized that children with a greater number of physical illnesses would report more severe internalizing symptoms. Our hypotheses were partially supported. The overall presence of a physical illness was not associated with higher self- and parent-rated internalizing symptoms. However, the number of physical illnesses was associated with both the CBCL and YSR Affective subscale scores. Specifically, children with two or more physical illnesses reported significantly more affective symptoms than those with one physical illness and those with no physical illnesses. There was no significant difference between the affective symptoms of children with one physical illness and those with no physical illnesses, suggesting that having two or more physical illnesses represents a potential cut-off for increased risk for more severe affective symptoms. This relationship, however, was not found for the Total Internalizing subscales and the Anxiety subscales.

The lack of a significant relationship between the presence of child physical illness and overall internalizing symptoms is contrary to most findings in the research literature, as prior research has found that children with physical illnesses are more likely than children without physical illnesses to have various emotional and behavioral difficulties (Harter et al., 2003; Last et al., 2006; Pao & Bosk, 2010; Piquart & Shen, 2011). We believe there are several possibilities for the discrepant findings from our sample. First, our sample was clinic-referred

youth who were recruited for treatment of emotional and behavioral disorders, not physical illness. As a result, there was no exclusion criteria based on presence of or type of physical illness, which led to a wide variety of physical illnesses. In previous research, the variety of physical illnesses in the sample has been controlled for or limited to one illness (Pao & Bosk, 2010; Piquart & Shen, 2011)

Second, the lack of an overall relationship could be due to the generally low severity of the physical illnesses that were present. The demographic questionnaire administered to parents that gathered data on physical illnesses was open-ended and did not ask parents to rate the severity of the illness. Furthermore, many of the children in the sample (n=52) were reported to have asthma, which is often minor and well-managed. This is further supported by the non-significant findings when only comparing children who did and did not have asthma. Thus, it is possible that the relatively low overall severity of physical illnesses may have limited the ability to detect an effect on internalizing symptoms.

When considering number of illnesses, we examined what the Affective Problems scale captured that the Anxiety and Internalizing scales did not. Items on the Affective Problems subscale included statements such as “There is very little he/she enjoys”, “Cries a lot”, and “Feels worthless or inferior.” According to *The Manual for the ASEBA School-Age Forms and Profiles*, the Affective Problems subscale of both the CBCL and YSR is meant to represent the Diagnostic and Statistical Manual of Mental Disorders, 5<sup>th</sup> edition (DSM-5) diagnoses of Persistent Depressive Disorder (PDD) and Major Depressive Disorders (MDD) (Achenbach & Rescorla, 2001). Therefore, we can speculate that, among children with emotional and behavioral disorders, those with two or more physical illnesses are likely to report higher depressive symptoms than children with one or no physical illnesses. This conclusion is in line with the

existing literature, such as the study done by Newacheck and Stoddard (1994) on the prevalence and impact of multiple childhood chronic illnesses. Similar to our findings, the authors found that children with multiple chronic conditions had more emotional and behavioral problems than other children (Newacheck & Stoddard, 1994).

As both the parent and child reports indicated, children with two or more illnesses had significantly more severe depressive symptoms than those with one or no physical illnesses. We believe that this is the case because of the difficulty that comes with managing multiple physical illnesses. Managing multiple chronic illnesses typically entails taking multiple medications and frequent doctors' visits, both of which can be burdens for children and families. Furthermore, when children have more than one physical illness, they are often limited in what activities they can engage in, both socially and physically, which creates a sense of social withdrawal (Bennett, 1994). This, in turn, often leads to feelings of depression (Kovacs & Devlin, 1998). In addition, children with severe, chronic physical illnesses often feel a loss of control, which can lead to feeling hopeless with regards to their future (Shaw & McCabe, 2007). This feeling, according to the DSM-5, is one of the primary symptoms of both PDD and MDD.

One interesting finding is that children with only one physical illness did not report higher symptoms than those without any physical illness. We believe this was primarily due to the fact that in the present sample, the majority of the children with one physical illness had asthma. In general, asthma is a well-managed illness (Letitre et al., 2014). This is why we believe that, in the present study, children with one physical illness did not report more severe depression than children with no physical illnesses, as many of them had manageable, often mild asthma, which likely did not lead to the functional impairment and limitations that multiple chronic illnesses would produce.

While we can understand why children with more than one physical illness may be prone to more severe depression symptoms, we understand less why there was no relationship between number of illnesses and anxiety symptoms. One possible hypothesis is that many of these children have been living with their physical illnesses for years and thus feel less anxious, but more hopeless. While we do not have data on age of onset of physical illness, we speculate that this may hold especially true among children who have more than one illness, since many of the illnesses were genetic or autoimmune disorders with early ages of onset. According to LeBlanc et al. (2003), children are at very high risk for development of behavioral and emotional problems as they adjust to a physical illness diagnosis. Specifically, children with chronic illnesses are most likely to develop anxiety within the first year of diagnosis (LeBlanc et al., 2003, p. 862.) Therefore, it is possible that children in the present study had more anxiety at the onset of the physical illness, but have since gained a better understanding, have fewer unknowns, and therefore feel less anxious.

Based on the findings of no relationship between number of illnesses and anxiety symptoms, we can also understand why the Internalizing subscale did not reveal a significant relationship. On both the YSR and CBCL, the Total Internalizing subscale includes all items from the Somatic Complaints, Anxiety, and Affective subscales (Nakamura, Ebesutani, Bernstein, & Chorpita, 2009). Therefore, the results were likely skewed by the lack of significance for anxiety symptoms. This speculation is further supported by the fact that the CBCL Total Internalizing scale was trending towards significance and the YSR Total Internalizing scale was just below the alpha level of .05, but with no significant post-hoc analyses. In other words, the significant difference in number of illnesses for Affective symptoms was drawing the Total Internalizing towards significance, but it was also skewed by

the non-significant Anxiety subscale. In addition, it is important to note that 40.0% of the sample had a primary problem area of depression. Anxiety was only the primary problem area of 19.5% of the sample. Therefore, because there were twice as many children with depression as anxiety, there was not a significant relationship between number of illnesses and total internalizing symptoms, which includes depression and anxiety.

As indicated in the results section, further exploratory analyses were conducted to examine the relationship between number of physical illnesses and overall problems, according to the CBCL and YSR Total Problems scales. Since a relationship was found between number of illnesses and affective symptoms, we intended to examine if this relationship also existed in the Total Problems scale. The analyses indicated that, for CBCL Total problems, there was no relationship between number of physical illnesses and total problems. However, for the YSR, it was found that children who had two or more illnesses had higher Total Problems T-scores than children with one physical illness. Unexpectedly, the post-hoc analyses did not reveal a relationship between having two illness and no illnesses. Conceptually, we do not understand this, and attribute it to the variance and non-linearity of the data. This is partly because the sample sizes for the various groups were drastically different. In addition, the Total Problems scale includes externalizing symptoms, which are not as strongly related to physical illness as internalizing symptoms (Last et al., 2006).

One clinical implication of these findings is the importance of screening for depression in youth who have physical illnesses. This holds especially true in children who are suffering from more than one physical illness. In hospitals or other health settings, children often have significant attention paid towards their physical illness or illnesses but little towards their mental health (Wissow, van Ginneken, Chandna, & Rahman, 2016). Physical illnesses are often seen as

more imminent, thus neglecting children's mental health. Coping with these types of chronic illnesses is difficult, and thus screenings and preventative measures would be useful (Foy, Kelleher, & Laraque, 2010).

In addition, mental health providers in community outpatient youth mental health clinics, such as the ones used in this study, should continue to take time to understand the background and medical history of a child. This includes inquiring about physical health at intake assessments and throughout treatment, and assessing how children are managing their chronic conditions throughout the course of treatment, if applicable. For children with comorbid physical illnesses, clinicians must consider how traditional treatment may need to be altered to be most appropriate and effective. For example, if a child is attending many medical appointments, the frequency with which they attend mental health treatment may need to be altered from the traditional protocol.

Another option could entail incorporating mental and physical health treatment into one protocol, to help children and families better manage having multiple illnesses. This type of treatment could be implemented in primary care settings, both during children's yearly visits and visits for chronic illnesses. For example, psycho-educational group intervention for children with chronic illnesses, such as the one created by Last et al. (2007), could be implemented in primary care clinics. In their study, the research team used components of Cognitive-Behavioral Therapy (CBT) such as relaxation, cognitive restructuring, and general psycho-education for children with chronic illnesses in hospital settings. They found that their intervention greatly reduced internalizing symptoms and improved quality of life. In addition, Weersing, Gonzalez, Campo, and Lucas (2008) showed that implementing brief behavioral therapy in primary care settings for youth with anxiety and/or depression was very effective. Named the Integrated Brief Behavioral

Therapy for Anxiety and Depression (IBBT) this 8-session treatment focused on active engagement in life activities and use of relaxation and problem-solving skills to manage stress (Weersing et al., 2008, p. 128). An intervention similar to this could be very useful not only in helping youth manage their physical illnesses but also in reducing their depressive (and anxious, if applicable) symptoms. A more holistic understanding of all the pertinent factors would likely lead to more efficient treatment of mental health issues, especially depression, in children who have comorbid physical illnesses.

### **Limitations**

It is important to acknowledge the limitations of the present study. As previously stated, this study was a secondary cross-sectional analysis, using baseline assessment data from a large-scale community treatment study. Therefore, the primary study was not designed specifically for the present study. A major limitation was the way in which the data on physical illnesses were collected on the demographic questionnaire used in the original study. Parents were first asked if their child had any physical illnesses (without a definition of “physical illness” provided), and were given space to list three. This did not allow parents the opportunity to list if their child had more than three illnesses or any descriptions of the listed illnesses. The reason for this design of the demographic questionnaire was that physical illness was not a primary concern of the original study. In addition, the physical illnesses were parent-reported, which is less reliable than physician reports.

In addition, the heterogeneity of the population, in both mental and physical illness, likely interfered with the analyses. This was a limitation because it prevented us from understanding which specific illnesses were leading to the different relationships in the data. The age range of the children was also fairly wide, which prevented us from knowing if the trends found were just

present for the younger half, older half, or all of the children. We did not have a large enough sample size to look at age as a moderator. Notably, there were places where the data were absent. The amount of data missing was less than 1.5% of the total data for each subscale analyzed. This typically occurred when children were not able to or chose not to complete the assessment, even though their parents had. The YSR scores of the children with missing data were excluded from the analyses. Last, while some of the findings were statistically significant, the effect sizes were small, suggesting caution in interpreting and generalizing the findings.

Finally, the limiting sample characteristics must be acknowledged. First, there was a large imbalance in the number of children who had and did not have physical illnesses. While the data followed a normal distribution, the imbalance affected the analyses and limited the generalizability of the results. This led to a lack of linearity and large amount of variance in some of the CBCL and YSR scales, especially the Anxiety subscales. Furthermore, over 75% of the participants in this study were middle- or lower-class families (household income of 0-59,000 dollars per year). While this demographic is unique from most of the existing research, and thus a strength, it also signifies a lack of socioeconomic diversity in the sample population. Regardless of the overall low socioeconomic status of the families, they were still able to receive mental health services through insurance, which is unfortunately not available to all children who may need such services.

### **Conclusion and Future Directions**

Physical illness is a risk factor for emotional and behavioral issues in children. The present study suggests specifically that having more than one physical illness may be a further risk factor for internalizing problems, especially depression, in a treatment-seeking transdiagnostic sample.

Given these conclusions and the aforementioned limitations, future research is warranted in this area. Research examining the nature of physical illnesses children have would help us better understand some of the unexpected results of the present study. To do so, a more comprehensive questionnaire that clearly defines physical illnesses would be needed. Gathering information on age of onset and severity of physical illness, as well as a complete list of physical illnesses would allow researchers to better understand any mediating factors. It would also be important to gather information on what treatments children are receiving for their physical illness, how many and what specialty (if any) of physicians children are seeing, and whether a child has received previous mental health treatment. Analyses of this information, in tandem with socioeconomic status data, may seek to understand how access to treatment affects mental health outcomes.

Furthermore, research examining age and race/ethnicity as moderators of the relationship between physical illness and internalizing symptoms is warranted. This would also allow researchers to understand how developmental stage affects coping with mental and physical illnesses. In addition, further research examining the various mediators of the relationship between physical illness and affective symptoms is warranted. Potential mediators to test are reduction in quality of life and emotion dysregulation. Last, a longitudinal study design is warranted to better test and understand the directionality of the association between mental and physical health, and how comorbid physical illness may affect treatment outcomes.

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Table 1

*Demographic Characteristics of Sample*

Characteristic	% of Subjects	N
Sex		
Male	51.23	135
Female	48.47	127
Race/Ethnicity		
Non-Hispanic White	32.06	84
Black	26.72	70
Latino/Hispanic	25.57	67
Asian	0.76	2
Multi-racial	13.74	336
Other	1.15	3

Table 2

*Sample Characteristics: Age and Overall Symptom Measures*

Characteristic	Mean	SD
Child Age	10.79	2.48
CBCL T-scores		
Total Problems	65.48	7.95
Internalizing	64.21	9.59
Affective	64.96	8.96
Anxiety	62.54	8.58
YSR T-scores		
Total Problems	56.94	10.98
Internalizing	56.61	11.79
Affective	59.29	9.16
Anxiety	58.11	7.86

Table 3

*Diagnostic Information*

Characteristic	% of Subjects	N
Physical Illness		
Yes	27.0	71
No	73.0	191
Primary Problem Area		
Anxiety	19.5	41
Depression	40.0	84
Trauma	2.4	5
Conduct	38.1	80

*Note:* Not all primary problem area assignment information was available at time of study.

Table 4

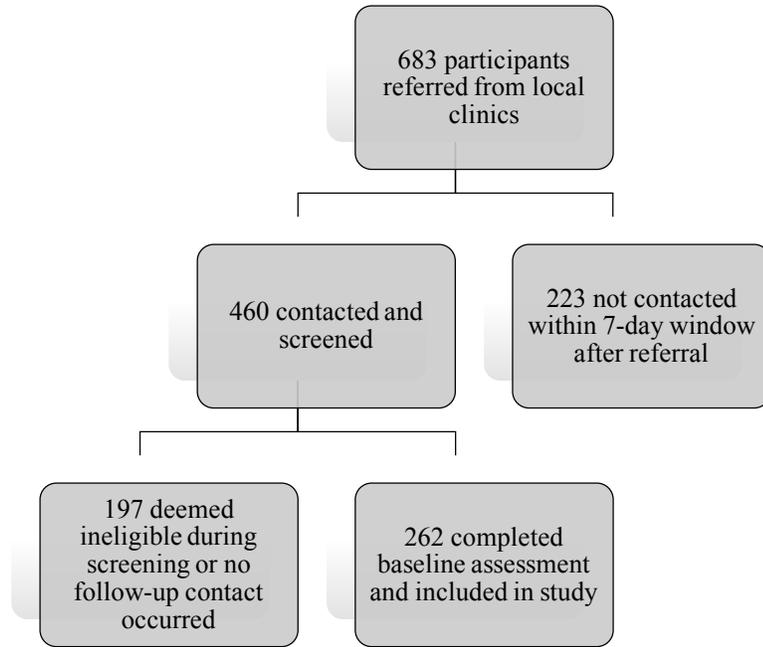
*Internalizing Symptoms Means and Standard Deviations*

Characteristic	CBCL Internalizing Problems		CBCL Affective Problems		CBCL Anxiety Problems	
	Mean	SD	Mean	SD	Mean	SD
Physical Illness						
Yes	64.43	11.24	66.36	9.62	62.74	8.67
No	64.12	8.98	64.49	8.70	62.53	8.57
Number of Illnesses						
0	64.12	8.98	64.49	8.70	62.53	8.57
1	63.25	11.85	65.00	9.71	62.26	8.89
2+	70.08	4.85	72.83	5.98	65.00	7.44
	YSR Internalizing Problems		YSR Affective Problems		YSR Anxiety Problems	
	Mean	SD	Mean	SD	Mean	SD
Physical Illness						
Yes	54.86	12.12	58.45	9.02	56.72	7.34
No	57.32	11.65	59.62	9.24	58.66	8.04
Number of Illnesses						
0	57.32	11.65	59.62	9.29	58.58	8.01
1	53.61	12.30	56.59	8.18	56.56	7.29
2+	61.50	8.44	66.50	6.79	58.00	7.85

Table 5

*Total Problems and Number of Illnesses*

	CBCL Total Problems		YSR Total Problems	
	Mean	SD	Mean	SD
Number of Illnesses				
0	65.33	7.74	57.37	11.11
1	65.09	8.79	54.26	10.64
2+	65.48	7.95	62.58	7.62



*Figure 1.* Recruitment process of study, from referral to baseline.