

Electronic Thesis and Dissertation Repository

8-5-2014 12:00 AM

Multi-sector Service Use by Children in Contact with Ontario Mental Health Agencies

Christian M. Hahn, *The University of Western Ontario*

Supervisor: Dr. Graham Reid, *The University of Western Ontario*

A thesis submitted in partial fulfillment of the requirements for the Master of Science degree in
Psychology

© Christian M. Hahn 2014

Follow this and additional works at: <https://ir.lib.uwo.ca/etd>



Part of the [Child Psychology Commons](#), and the [Clinical Psychology Commons](#)

Recommended Citation

Hahn, Christian M., "Multi-sector Service Use by Children in Contact with Ontario Mental Health Agencies" (2014). *Electronic Thesis and Dissertation Repository*. 2261.

<https://ir.lib.uwo.ca/etd/2261>

This Dissertation/Thesis is brought to you for free and open access by Scholarship@Western. It has been accepted for inclusion in Electronic Thesis and Dissertation Repository by an authorized administrator of Scholarship@Western. For more information, please contact wlsadmin@uwo.ca.

MULTI-SECTOR SERVICE USE FOR CHILDREN IN CONTACT WITH ONTARIO
MENTAL HEALTH AGENCIES

(Thesis format: Monograph)

By

Christian Martin Hahn

Graduate Program in Clinical Psychology

This thesis is submitted in partial fulfillment

of the requirements for the degree of

Master of Science

The School of Graduate and Postdoctoral Studies

Western University

London, Ontario, Canada

© Christian M. Hahn 2014

Abstract

Children and youth frequently receive services for mental health issues from multiple service sectors but little is known about the rates of multi-sector involvement over time. Thus, the prevalence of multi-sector service use for children in contact with Ontario mental health agencies, and the influence of demographic, familial, and need variables on child multi-sector involvement, were examined. Secondary data analyses were performed on chart reviews of clients (N=355; 67% boys; ages 4 to 13) from six mental health agencies. Approximately two-thirds of clients had multi-sector involvement. In cross-sectional analyses, risk factors predicted increased likelihood of multi-sector involvement, whereas protective factors predicted decreased likelihood. In longitudinal analyses, increased risk/need at time 1 did not predict likelihood of multi-sector involvement at time 2. Ensuring a match between a client's degree of need and services used may prevent misallocation of mental health resources.

Keywords: Mental health services, children's mental health, multi-sector service use, Ontario

Acknowledgments

First and foremost I would like to thank my graduate supervisor, Dr. Graham Reid for his support and guidance over the past two years. I have grown greatly as a student, a researcher, and a writer as a result of his mentorship and for that am deeply thankful.

I would like to thank Dr. Evelyn Vingilis for her role on my thesis advisory committee. Her consultation and insight were of great help in the development of this project. I would like to thank my colleagues here at Western University; particularly Gesine Alders, Kyleigh Schraeder, and Kathryn Turnbull who were constant sources of aid throughout this process. I would also like to thank everyone involved in the initial Frequent Flyers project for their hard work and attention to detail. Special thanks go out to my graduate school partners in crime, Lauren Dunphy, Martin Smith, Nadia Maiolino, and Kat Rnic for always being there for me throughout this process.

Finally, I would like to thank those closest to me. To my Parents, Erik and Dorothy Hahn I am forever indebted to you for the constant example of hard work and perseverance that you set every day. To my brothers, Oliver, Isaac, and Riley, I wouldn't be where I am or who I am without you and you've always kept me grounded. Lastly I would like to thank the wonderful group of friends that I am blessed to have in my life. Both in London and in Halifax every one of you has helped me during this process and I thank you for your unwavering support throughout my pursuit of a career in Clinical Psychology.

Table of Contents

Abstract	ii
Acknowledgments	iii
Table of Contents	iv
List of Tables.....	viii
List of Figures	ix
List of Appendices	x
Introduction.....	10
Theoretical Models	3
Systems of care models.....	3
The behavioural model of health services use.	5
Resilience.....	11
Conceptual Framework for the Current Study.....	12
Patterns of Service Use	13
Predictors of multi-sector involvement	15
Predisposing factors.....	16
Enabling factors.....	18
Need.....	19
Current Study.....	20

Objective 1: Prevalence of multi-sector involvement.	20
Cross-sectional.....	20
Longitudinal.....	20
Objective 2: Predictors of multi-sector involvement.....	21
Cross-sectional.....	21
Longitudinal.....	21
Methods.....	21
Principal Study.....	21
Visit data.	22
Chart reviews.	22
Current Study.....	25
Participants.....	25
Measures.	26
Predictor variables.	26
Predisposing and enabling variables.....	26
Child and Adolescent Needs and Strengths scale (CANS).....	26
Missing data and recoding of CANS items.....	29
Covariates.....	31
Total number of visits.	31
Duration of involvement.	31

Outcome variables.....	31
Sectors of involvement.....	31
Data Analyses	32
Weighting.....	33
Objective 1: Prevalence of multi-sector involvement.	33
Cross-sectional.....	33
Longitudinal.....	34
Objective 2: Predictors of multi-sector involvement.....	34
Cross-sectional.....	34
Longitudinal.....	35
Goodness of fit.	35
Omnibus tests of logistic models.....	36
Results.....	37
Sample Characteristics	37
Cross sectional.....	37
Longitudinal	37
Objective 1: Prevalence of multi-sector involvement.....	37
Cross sectional.....	37
Longitudinal	37
Longitudinal changes in sector involvement.	41

Objective 2: Predictors of multi-sector involvement 42

 Descriptive analyses. 42

 Cross-sectional. 48

 Prediction of specific sector intake involvement. 50

 Longitudinal 54

Discussion 57

 Service Use at Intake..... 57

 Prevalence 57

 Changes in Multi-Sector Service Use 59

 Prediction of Service Use at Intake..... 60

 Prediction of Service Use from Intake to End of Involvement 63

 Implications 65

 Limitations..... 67

 Future Directions 70

References 72

Curriculum Vitae 98

List of Tables

Table 2.1. <i>Internal consistency reliability for CANS domains..</i>	29
Table 3.1. <i>Characteristics of the intake and end of involvement (EoI) samples.....</i>	38
Table 3.2. <i>Client intake involvement with different combinations of sectors.....</i>	39
Table 3.3. <i>Client involvement with different combinations of sectors at end of involvement.....</i>	40
Table 3.4. <i>Changes in total sector involvement from intake to end of involvement</i>	42
Table 3.5. <i>Changes in specific sector involvement from intake to end of involvement (EoI).....</i>	43
Table 3.6. <i>Descriptive statistics for variables used in prediction of multi-sector involvement at intake and end of involvement (EoI).....</i>	44
Table 3.7a. <i>Correlations between predictor variables for intake sample.....</i>	46
Table 3.7b. <i>Correlations between predictor variables for EoI sample.....</i>	47
Table 3.8. <i>Logistic regression analyses predicting intake multi-sector involvement...50</i>	50
Table 3.9. <i>Full logistic models of service use by sector.....</i>	54
Table 3.10. <i>Multinomial logistic regression analysis of change in multi-sector involvement.....</i>	58

List of Figures

<i>Figure 1.</i> Andersen's Behavioural Model of Health Services Use.....	7
<i>Figure 2.</i> Chart review time periods for a client without overlap and a client with overlap.....	22

List of Appendices

Appendix A: Example CANS Items.....	79
Appendix B: Full Model Regression Equations for Specific Sectors of Involvement.....	81
Appendix C: Bivariate Regression Equations for Intake Multi-sector Involvement.....	85
Appendix D: Additional Statistics for Regression Equations.....	95

Multi-sector Service Use by Children in Contact with Ontario Mental Health Agencies

An estimated 1.5 million Canadian children have need for services related to a mental health issue (Canadian Mental Health Association, 2013). Services include, but are not limited to, assessment, intervention, mental health related advice, family support. These services are provided by several different sectors including: mental health, medicine, education, justice, and child welfare (in Ontario, the Children's Aid Societies [CAS]). The mental health sector refers to agencies and clinics with the primary objective of servicing mental health needs. In Ontario, most mental health agencies/clinics are funded by the Ministry of Child and Youth Services and the majority are accredited by Children's Mental Health Ontario. Some mental health clinics are located within hospitals; these clinics are funded by the Ministry of Health and Long-term Care and accreditation is usually through the Canadian Council on Healthcare Services Accreditation. Services are often received from more than one sector at a time; this is termed *multi-sector involvement*. Multi-sector involvement is common for children with mental health issues (Burns et al., 1995; Farmer, Burns, Phillips, Angold, & Costello 2003; Farmer, Mustillo, Wagner, Burns, Kolko, Barth, & Leslie, 2010). However, little is known about how the rates of multi-sector involvement changes over time, or which factors (e.g., level of child psychopathology) influence multi-sector involvement. Understanding not only the prevalence but also the predictors of multi-sector involvement may assist service providers in identification of clients that will require services from multiple sectors. Furthermore this understanding may help prevent the misallocation of resources to clients who do not require them.

The issue of multi-sector involvement is particularly salient for child populations because multi-sector involvement occurs more frequently for children and adolescents than it does for adults (Leaf et al., 1996; Regier et al., 1993). One of the most salient points in understanding multi-sector involvement is the identification of its relationship to child need which, can be challenging. Child need, in this context, is defined as a demonstrated necessity for the receipt of services due to issues related to mental health. Recent estimates of mental health service use report that only 20% of children receive services for their mental health issue(s) (Canadian Mental Health Association, 2013; Costello, Pescosolido, Angold, & Burns, 1998). This gap between need and service use highlights the need for investigation of the underlying mechanisms that are driving it.

Research has been conducted to identify factors that influence service for a mental health issue use involving multiple sectors (Burns et al., 1995; Burns et al., 2004; Farmer et al., 2003; Farmer et al., 2010; Jud, Fallon, & Trocme, 2012). Through these prior works over the past two decades, understanding of multi-sector involvement has increased greatly. However, understanding the relationships between these factors and involvement remains a work in progress. For example, to date no studies have been conducted evaluating the influence of factors related to the child and family on changes in multi-sector involvement over time.

The first purpose of the current study is to examine the prevalence of multi-sector involvement among children and youth who have received specialized mental health services, as well as the different forms that multi-sector involvement takes (e.g., involvement with mental health and education). The second purpose of the present study is to investigate the relationships between factors related to the child and involvement

with sectors additional to mental health. This investigation will occur both cross-sectionally and longitudinally. Theoretical frameworks that have been used to conceptualize the relationships between factors related to the child and service utilization in relation to mental health issues are reviewed first. Existing research is then reviewed to identify the prevalence of- and the variables that influence- multi-sector involvement. Finally, gaps in the existing literature in this field will be identified and the objectives for the present study presented.

Theoretical Models

Understanding the ways in which children seek and receive services for mental health issues aids service providers in the development of their ability to ensure that children are receiving the help that they require. The ways in which children receive mental health services can be conceptualized within several distinct theoretical frameworks. Most of the research conducted to date involving multi-sector involvement has been framed within systems of care models (Garland, Hough, Landsverk, & Brown, 2001; Stroul & Friedman 1994). Models such as Andersen's Behavioural Model of Health Services Use and models of child resilience are also applicable to this field. These frameworks are necessarily broad in order to be applicable to mental health research involving sectors outside of mental health. An integrated understanding of service use across sectors is impossible to achieve if viewed without this breadth.

Systems of care models. The driving force behind the development of systems of care models has been the recognition that many children with mental health issues had unmet need (Stroul & Friedman, 1986). Unmet need may be the result of a lack of available services, poor collaboration between providers, or insensitivity to child-specific

needs. After this unmet need had been identified, a number of principles were developed to guide the progression of systems of care models. These include: services within a system of care should center on the child and family, service should be individualized to the needs of the child and family, and services should be integrated between sectors from the planning stages through implementation (Stroul & Friedman, 1986).

The realization that children with mental health issues receive services to meet their need from a variety of sectors has led to the restructuring of systems of care models (Garland, Hough, Landsverk, & Brown, 2001). Contemporary models now place greater emphasis on collaboration and integration of services across multiple sectors; the new goal being reduction of fragmentation and redundancy in service provision and utilization. The system of care model almost exclusively focuses on concurrent multi-sector involvement (i.e., a child receiving services from multiple sectors at a single point in time). “Wraparound” service models all fall under this mandate, as these models are based on integration of concurrent services and custom-fitting services to the individual needs of each family. Wraparound service models attempt to create an integrated system of care for children and families with complex needs. The original work by Stroul and Friedman (1986) that began the systems of care movement made the model’s application to cross-sectional research a major point of emphasis, which inhibits its applicability to certain forms of study.

Naturally, most studies of systems of care have been cross-sectional or have had very brief follow-up periods (Epstein & Quinn, 1996). This is a major limitation in the applicability of these models and there have been calls to integrate longitudinal study of multi-sector involvement and systems of care (e.g., Costello, Pescosolido, Angold, &

Burns, 1998). This would facilitate understanding of the interactive nature of involvement with different sectors. A new and dynamic conceptual framework of the organization of systems of care as outlined above may facilitate the study and understanding of the various trajectories of multi-sector involvement that is necessary to the evaluation of service provision in mental health (Garland et al., 2001).

Systems of care models are most closely related to the study of multi-sector involvement, particularly in recent years. These models maintain that, although the populations that utilize services from different sectors often overlap, the sectors are not interchangeable. As such, the reasons for involvement are expected to vary among sectors. These tenets of systems of care models facilitate the study of multi-sector involvement; however, these models are not well established in longitudinal study. Furthermore systems of care models place a great deal of emphasis on unmet need. While the concept of unmet need ties in closely with the aims of the present study, it is not being directly investigated. Therefore, systems of care models will not be employed in the present study.

The behavioural model of health services use. Commonly referred to as *Andersen's Model* (Andersen, 1968; Aday & Andersen, 1974; Andersen & Newman, 1973; Andersen, 1995), the Behavioural Model of Health Services Use was designed to conceptualize the interrelationships between factors that influence the receipt of health services. This model has been applied to all sectors of health service provision and posits that factors determining service use can be grouped into one of three dynamics: (1) predisposing (i.e., demographics, social structure, health beliefs); (2) enabling (i.e., personal/family resources, barriers, social relationships); or (3) need (i.e., perceived and

evaluated need). Although these dynamics are believed to make independent contributions to determine an individual's health practices and use of health services, they are also believed to interact with one another and have a causal ordering; specifically, that predisposing factors influence enabling resources, which are necessary but not sufficient conditions for health services use, and finally that some need must be defined in order for health service use to occur. For example the combination of male sex, family support, and a high degree of demonstrated need results in high service use (Alexandre, Dowling, Stephens, Laris, & Rely, 2008). Health practices and use of services determine an individual's perceived health status, and also form a feedback loop with the three dynamics. A second feedback loop is created from perceived health status to the three dynamics (Figure 1). These feedback loops represent the dynamic nature of service use. Services used influence future personal health practices, predisposing factors, and perceived need.

The predisposing dynamic of Andersen's Model includes variables relating to demographics, social structure, health beliefs, and genetics. Demographic variables represent a biological imperative for the likelihood of needing health services (e.g., sex, age). This dynamic also incorporates social structure variables such as occupation, which determine an individual's ability to cope with their personal need and to command resources to address this need. This dynamic also includes variables related to health beliefs. This includes an individual's knowledge of both health and health services. Andersen (1995) states that the strongest relationships may be found between health beliefs, in relation to a specific pathology, and need associated with that pathology and subsequent service use. However, it is also noted that even when studying health beliefs

with this specificity, enabling and need factors will account for the largest proportion of the variance in health services use. Finally, in a similar vein as the biological factors sex and age, genetic factors have been implicated as an area of study in understanding the biological imperatives that influence service use.

Of the three dynamics, *enabling* may have the greatest variety amongst its variables. Initially conceived as primarily encompassing the resources that must be in place in order for service use to occur (i.e., personal and community resources) this dynamic has been expanded to include potential barriers to service use (Andersen, 1995; Stein, Andersen, & Gelberg, 2007). These barriers may be conceptualized as having opposite effects of the variables originally conceptualized as enabling. For example, basic needs being met versus not met has been studied as an enabling factor (Jahangir, Irazola, & Rubinstein, 2012). A supportive family environment is believed to increase a client's likelihood of service use whereas the antithesis of this (e.g., physical/emotional neglect by the family) may act as a barrier and decrease likelihood of service use. Andersen originally developed his model to help understand health care utilization within the United States. Thus, the enabling dynamic of Andersen's Model places a great deal of emphasis on health insurance. Insurance represents the personal means to access the resources in the community. Enabling variables also include information relevant to the organization in which service use may take place such as, the type of facility (e.g., hospital, outpatient clinic) and the mix of health care personnel working within the facility. Finally, enabling resources encompass the type and quality of social relationships (e.g., parent and child sharing a home; Bass & Noelker, 1987) in an individual's life which may advance or impede service use.

The need dynamic in Andersen's Model encompasses variables of perceived and evaluated need. Evaluated need is defined as a professional's judgment of an individual's need for health services. However, even evaluated need is subject to variation due to social factors (e.g., the professional background of the evaluator). Perceived need also involves an individual's subjective evaluation of his or her need which is determined in large part by health beliefs. Perceived need is most closely related to the understanding of treatment seeking and adherence. Evaluated need is most closely related to both the type and intensity of service that is actually received.

This model provides a useful framework from which to study the various predictors of simultaneous involvement in multiple sectors. A strength of Andersen's Model in the study of multi-sector involvement is its broad application to service use. Multi-sector involvement occurs broadly and therefore it's the framework with which it is studied must be similarly broad. Similar to the systems of care models, Andersen's model has most frequently been used in cross sectional research which has resulted in a call for its expansion and study using longitudinal methodologies (Mechanic, 1979). In recent years this call has been answered and Andersen's model has been applied to longitudinal research (e.g., Tyrel, 2006; Vingilis, Wade, & Seeley, 2006). Although the purpose of the present study is not to test the applicability of Andersen's Model, this model provides a useful framework for the organization of predictors of multi-sector involvement. A key limitation of the use of Andersen's Model, both in general and in relation to the present study, is its conceptualization of service use as dichotomous. This model identifies services being used or not used. Other models emphasize the importance of services sought but not received, or of informal services whereas

Andersen's Model neglects these types of help and as such has been criticized as lacking applicability to "real-world" health services use which often involve informal and indirect services (Harris, McLean, & Sheffield, 2009).

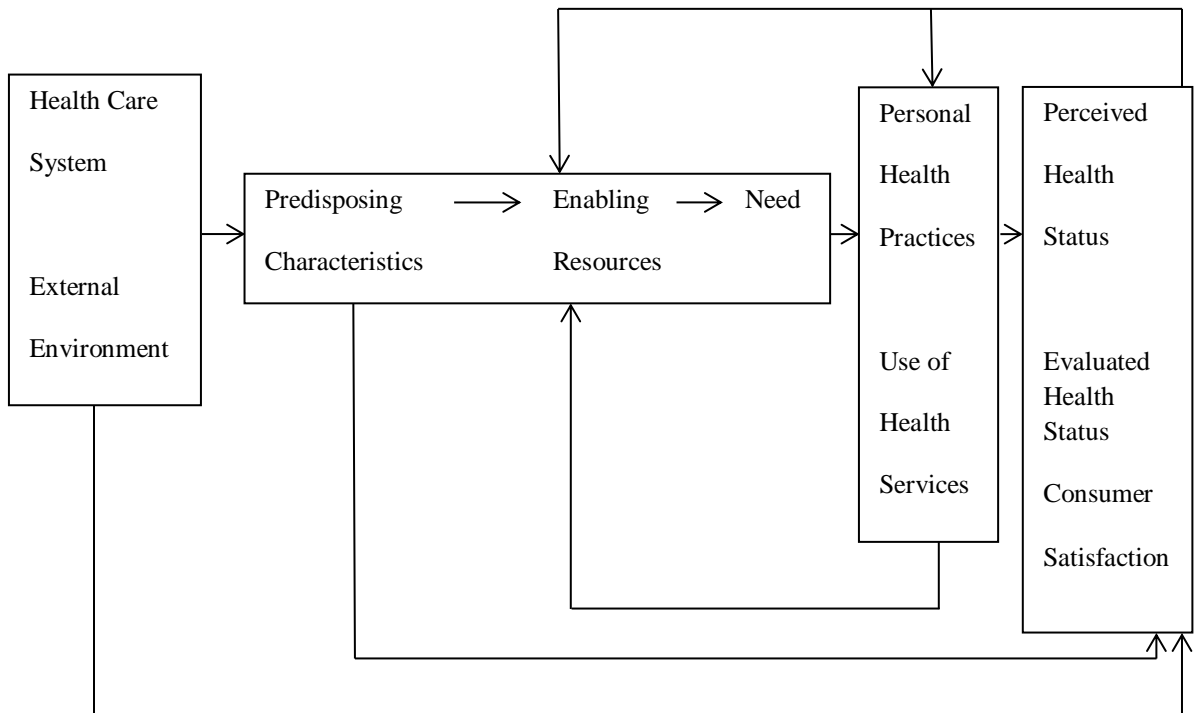


Figure 1. Andersen's Behavioural Model of Health Services Use

From Andersen (1995).

Resilience. The concept of psychological resilience was initially introduced by Garmezy in 1973 and has since been studied in great detail (e.g., Rutter, 1987; Connor & Davidson, 2003; Fletcher & Sakar, 2013). This research has yielded several definitions of the construct that, while varying in terminology, all center around the concepts of adversity and positive adaptation (Fletcher & Sarkar, 2013). When we discuss adversity in this context we are referring to circumstances that have been demonstrated to influence difficulties in adjustment. Of these definitions of resilience, perhaps the most concise is that offered by Lee and Cranford who operationalize resilience as “The capacity of individuals to cope successfully with significant change, adversity, or risk” (2008, p.213).

Resilience is not merely the absence of risk; rather, resilience is the presence of other factors that may be conceptualized as protective (Hjemdal, Friborg, Stiles, Rosenvinge, & Martinussen, 2006). Much of the study of resilience has targeted children and adolescents who have prospered despite exposure to adverse circumstances (e.g., childhood abuse or neglect; Garmezy, 1991) and has sought to identify the factors that facilitate successful adaptation (e.g., supportive family environment; DuMont, Widom, & Czaja, 2007). Within the resiliency framework, factors are conceptualized as either risk (i.e., increasing the likelihood of a particular outcome) or protective (i.e., decreasing the likelihood of a particular outcome). Resilience theory posits that individuals with multiple risk factors do not always incur adverse outcomes, and that protective factors can counter the negative influence of risk factors in the development of psychopathology (Margalit, 2004; Sameroff, & Chandler, 1975).

The pervasive influence of childhood adversity (risk) on adverse mental health outcomes throughout the course of a child’s life is well documented (Schilling, Aseltine,

& Gore, 2008; Chapman et al., 2004; Hammen, Henry, & Daley, 2000). Risks do not tend to overlap conceptually in this context; however they do tend to cluster together. In fact, cumulative models of risk have demonstrated that there is greater disturbance in the presence of a plurality of risk factors (Forehand, Wierson, Thomas, Armstead, Kempton, & Neighbors, 1991; Rutter, 1979; Sameroff, Seifer, & Bartko, 1997). The more risks a child had, the more likely they were to have a mental health issue. This cumulative risk (e.g., parent mental illness and parent employment/unemployment) influence the likelihood of a child to develop a mental health issue. Child risks also have an influence on service use, with more risks predicting increased likelihood of service use (Ungar et al., 2013). Therefore, the conceptualization of resilience lends itself to the study of the relationships between cumulative risk and protective factors, on multi-sector involvement. In the present study the notion of risk and protective factors influencing service use was used to inform the development of composite variables with the “need” dynamic of Andersen’s (1995) model. However, resilience theory itself is not being tested.

Conceptual Framework for the Current Study

Andersen’s Model (1995) provides the most applicable framework with which to conceptualize the study of multi-sector involvement. This model is well established in service use literature and provides a clear outline for the framing of factors related to service use. Although a great deal of work has been conducted in the identification of factors that influence multi-sector involvement there remains much to be done. Therefore a broad theoretical framework such as Andersen’s Model provides a good starting point for research in this domain. The conceptualization of current study was informed by

Andersen's model, but the study was not designed to be a test of his model nor were the variables tested based exclusively on his model. Andersen developed a model to understand access to healthcare for adults; as such, the variables within the model are based on the patient him/herself. In adopting the model to mental health services for children, the current study incorporates aspects of the child's family, as well as the child as the "patient". Such adaptation has been used in other studies on access and use of mental health services for children and youth (e.g., Schraeder, & Reid, in press, 2014).

The need dynamic of Andersen's Model has been studied in a variety of different ways (Babitsch, Gohl, & von Lengerke, 2012) and resilience research has demonstrated that psychological adjustment is determined by the balance between risk and protective factors (Rutter, 1987). Therefore the present study will frame the need dynamic within the structure of resilience theory. Specifically, the need that drives service use is conceptualized as being determined by a child's risk and protective factors. It is important to note that although the term "risk" is being used, this is not to imply that service use is an adverse outcome. Rather multi-sector involvement is seen as the result of needs of children with multiple risk factors.

Patterns of Service Use

Children with mental health issues have been demonstrated to frequently engage in a pattern of service involving sectors additional to mental health (i.e., medicine, education, juvenile justice, and child welfare; Burns et al., 1995; Farmer et al., 2003; Farmer et al., 2010; Silver, Duchnowski, & Kutash, 1992; Staghezza-Jaramillo, Burd, & Gould, 1995; Stroul & Friedman, 1994). Furthermore, services are frequently received from different combinations of these sectors (Burnett-Zeigler & Lyons, 2009; Farmer et

al., 2003; Farmer et al., 2010). The most common of these patterns (15-34%) is the combination of services from the mental health and education sectors (Farmer et al., 2003; Farmer et al., 2010). This suggests that the education sector plays a central role in the provision of mental health services to children.

The combination of services used from different sectors suggests that collaboration among sectors that serve the same clients is an important piece in the provision of necessary care. Understanding which combinations occur most frequently in different populations may facilitate targeted efforts for increasing inter-sector collaboration. To date only a few studies have examined the prevalence of different combinations of multi-sector involvement for a mental health issue in a mental health sector population (e.g., Reid et al., 2011).

Oftentimes children become involved in multiple sectors of service, over a period of time as short as a few months (Farmer et al., 2010). This may be due to the ability of providers from a given sector to identify case complexities that require collaborative care and subsequently facilitate the child's involvement with required sectors of service. While the aforementioned possibility seems reasonable, there is very little evidence to date that investigates whether or not these possibilities are actually the driving forces behind multi-sector involvement (Glisson & Hemmelgarn, 1998).

Different precipitating events lead children to become involved with different sectors of service. For example, when it becomes apparent to a service provider that a child has experienced abuse or neglect, in most jurisdictions the professional is required to contact child welfare. If a child develops difficulties at school (e.g., behavioural problems), the education sector becomes involved. If a provider sees a potential need for

medications to facilitate treatment, a family physician may be consulted, bringing the medical sector into the fold. Addition of sectors of involvement likely occurs over time as different events take place. The existing literature is only recently coming to identify the specific factors that influence a child's receipt of services from additional sectors. The following section reviews the literature on factors that influence multi-sector involvement in a children's mental health sample.

Predictors of multi-sector involvement

Over the last three decades there has been a surge of interest in the study of factors that influence complex patterns of mental health services for children (Knitzer, 1982; England & Cole, 1992; Stroul & Friedman, 1986; Stroul & Friedman, 1998; Farmer, Burns Phillips, Angold, & Costello, 2003; Farmer et al., 2010; Willie, Bettge, & the BELLA study group, 2008). These efforts have resulted in a greatly increased knowledge base regarding factors that predict service use for mental health issues and, specifically, multi-sector involvement. However, a great deal regarding what drives multi-sector involvement for mental health issues remains unknown (Farmer et al., 2003). Despite the recent surge in interest, research on service use across multiple sectors is quite sparse, compared to research examining mental health sector service use alone (Burchard et al., 1993; Burns, Gwaltney, & Bishop, 1995).

As mentioned above, children frequently receive mental health services outside of the mental health sector (Staghezza-Jaramillo et al., 1995; Stroul & Friedman, 1998; Farmer et al., 2003; Farmer et al., 2010). This type of service use has been identified as being dependent on characteristics of the child, his or her environment, and his or her caregiver(s) (Farmer et al., 2003; Farmer et al., 2010; Burnett-Zeigler & Lyons, 2009).

However, the majority of research in this field involves child welfare and community-based samples. This leaves a gap in the existing literature in understanding multi-sector involvement for clients principally involved in the mental health sector.

Predisposing factors. Much of the work that has been done in prediction of service utilization across sectors has examined the roles of demographic variables. Child age has commonly been included in predictive models of multi-sector service use (e.g., Farmer et al., 2003; Farmer et al., 2010; Horwitz et al., 2012). However, research regarding its precise role is, at times, conflicting. Farmer et al. (2010) identified increased age as a predictor of involvement with mental, and justice or medical sectors for problems associated with mental health. Age did not predict general multi-sector involvement (multi-sector involvement in any form) in this study. Another study found younger age to predict involvement with specialty mental health but not overall multi-sector involvement (Farmer et al., 2003). These conflicting findings highlight a need for future research using more sophisticated methodologies to increase understanding of the relationship between child age and multi-sector involvement. Several studies have examined sex as a predictor of multi-sector involvement. In a study involving children in the care of child welfare, female sex has been shown to predict decreased likelihood of involvement in any other sector for mental health issues (Farer et al., 2010). This same study also found female sex to predict reduced likelihood of involvement with the education sector. The relation between sex and multi-sector involvement has also been found to vary by age in several studies. Laitinen-Krispijn, Van der Ende, Wierdsma, and Verhulst (1999) found that, in a community-based sample, male sex predicted mental health involvement in early adolescence whereas female sex predicted involvement in

later adolescence. Horwitz et al. (2012) analyzed the relationships between sex and service use separately for different age groups and found sex to be a significant predictor for children ages 6-to-10 years old but not for other age groups (i.e., 1.5-2, 2-5, 11-15, 16-18). Other research on multi-sector involvement comes from a subset of children with documented mental health involvement taken from a nationally representative sample in the United States (Hazen, Hough, Landsverk, & Wood, 2004). Logistic models employed in this study identified female sex as a predictor of reduced probability for involvement with the education and juvenile justice sectors. Based on these studies, it is clear that sex differences in specific sector involvement exist. The nature of this relationship may be more complex than anticipated and requires further study. Thus, the current study will examine sex as a predictor multi-sector involvement.

Custody status (i.e., biological parent, foster care, adoptive parent) has also been linked to receipt of services, with those in non-relative foster care the most likely to receive services (Burns et al., 2004; Horwitz et al., 2012; Leslie et al., 2000; McMillan et al., 2004). The methodology commonly employed by these studies involves evaluating the predictive power of each type of custody through logistic models and then running an analysis of the overall influence of custody on service use. These studies demonstrate the salience of a child's social relationships in receipt of care and tie into the predisposing dynamic as representations of the social structure of the child's environment. It should be noted that custody was not directly addressed by Andersen. However, the current literature stops short of linking these variables to multi-sector involvement. Thus, the present study will examine custody status as a predictor of multi-sector involvement.

Little is known about the influence of parent marital status on child service use for mental health issues. However, the influence of marital status on parental service use is well documented. Parents who are raising a child alone for any reason (i.e., divorce, separation, widowhood, or never married) are at a greater risk for mental health issues than are parents raising a child with together (i.e., married, common-law). Single parents have been demonstrated to be more likely to use mental health services (Davies, Avison,, McAlpine, 1997; Lipman, Offord, & Boyle, 1997). This influence of parent marital status may also have similar effects on child service use (Cairney & Wade, 2002). Although single parent status is not directly identified as a predisposing factor by Andersen, it is seen in the present study to fit the predisposing dynamic of Andersen's model as it speaks to the social structure surrounding the child; specifically, a unique relationship with one parent and the absence of a relationship with the other parent. The present study will therefore investigate the influence of single parent status on child multi-sector involvement.

Enabling factors. Enabling factors in Andersen's Model refer to factors that allow the child to seek care if needed. Factors that are thought to impede access to care are included within this dynamic as well (Stein, Andersen, Ronald, Gelberg, 2007). For example, basic needs being met versus not met has been studied as an enabling factor (Jahangir, Irazola, & Rubinstein, 2012). Using data from the National Survey for Child and Adolescent Well-Being (NSCAW Research Group, 2002; a stratified sample of children who had experienced abuse and/or neglect) several enabling factors were identified as predictors of multi-sector involvement. Child experiences of caregiver neglect (i.e., physical, emotional, moral, and educational neglect) were demonstrated to

predict increased multi-sector involvement (Farmer et al., 2010). Leslie et al. (2000) found that physical abuse and neglect both predicted concurrent involvement with the mental health and child welfare sectors. In another study Leslie, Hurlburt, James, Landsverk, Slymen, and Zhang (2005) examined abuse and neglect as a single variable and found that abuse and/or neglect predicted multi-sector involvement in a child welfare sample. Thus, the present study will examine the influence of any form of abuse and/or neglect on multi-sector involvement. It is of note that this variable has not been identified as an enabling factor by Andersen. It is included in the present study due to its documented influence on multi-sector involvement. It is conceptualized as an enabling factor in the present study because it is an indication of the quality of social relationship that the child has with his or her caregiver, which Andersen notes is an enabling factor that may either facilitate or impede services use (1995).

Need. A high level of evaluated need (e.g., psychopathology) reflect a high need for service and has been associated with increased likelihood of receiving services (Burns et al., 2004; Garland et al., 1996; Leslie et al., 2000, 2004; Farmer et al., 2010). In Andersen's model, evaluated need is identified as the best predictor of services received (more so than perceived need). In the prior literature psychological need has been assessed with a variety of methods including being framed within resilience theory (Willie et al., 2008). The present study deviates from Andersen's model in the conceptualization of the need dynamic and its relationship to multi-sector service use. The present study employs the Child and Adolescent Needs and Strengths scale (CANS; Lyons, 1999), a measure of evaluated need, as a predictor of multi-sector involvement. This scale also contains a number of reverse-coded items that evaluate strength (the

opposite of need). Andersen's model does not endorse the inclusion of client strengths in the need dynamic. They are included under this dynamic due to the identification in prior literature of the interactive nature of risk and protective (needs and strengths, respectively) factors in determining both need for services (Willie et al., 2008) and service use (Ungar, Liebenberg, Dudding, Armstrong, & van de Vijver, 2013).

Current Study

Service use for children with mental health issues often consists of involvement in multiple sectors. This is an important issue due to the interconnectedness between service use and child need. The existing literature identifies the prevalence of certain combinations of sectors of involvement and with samples drawn from many different samples. The present study will examine the point prevalence of multi-sector service use in a children's mental health sample and involvement in different sectors of service. This study will also examine the changes in multi-sector involvement over time. Furthermore, the relationships between variables identified above and multi-sector involvement will be analyzed both cross-sectionally and longitudinally.

Objective 1: Prevalence of multi-sector involvement.

Cross-sectional. Assess the prevalence of multi-sector involvement for children in contact with Ontario mental health agencies at intake (i.e., first face-to-face visit during the study period and describe the different combinations of sectors constituting multi-sector involvement.

Longitudinal. Assess the prevalence of multi-sector involvement for children in contact with Ontario mental health agencies at end of involvement (EoI; i.e., conclusion of involvement with the agency or end of the five-year study period, whichever came

first), describe the different combinations of sectors constituting multi-sector involvement, and to document changes in multi-sector involvement from intake to EoI.

Objective 2: Predictors of multi-sector involvement.

Cross-sectional. (1) To examine the relationships between (a) predisposing (i.e., age, sex); (b) enabling (i.e., marital status, custody, abuse/neglect); and (c) need (i.e., risk factors, protective factors) and multi-sector involvement at intake.

Longitudinal. To examine the relationships between (a) predisposing (i.e., age, sex); (b) enabling (i.e., marital status, custody, abuse/neglect); and (c) need (i.e., risk factors, protective factors) and multi-sector involvement changes from intake to EoI.

Methods

Secondary data analyses from a larger study on client patterns of involvement within children's mental health agencies over extended periods of time (Reid et al., 2011) were conducted. The aims of the larger study included identifying: patterns of involvement over extended periods of time, and describing the intensity (e.g., number of sessions/year) of services associated with these patterns of involvement within children's mental health (CMH) centres. The principal study is described first, followed by details related to the current study.

Principal Study

Data were obtained from six children's mental health agencies in Ontario that: (a) provided services for children ages 4-17 years old, and (b) were accredited by Children's Mental Health Ontario or a similar body. Inclusion criteria for children were: (a) children were between the ages of four and 12 years at their first visit, (b) children's first visit

occurred between the year 2000 and 2002, and (c) children had at least one face-to-face visit. Exclusion criteria were: (a) a diagnosis of a development disorder at the child's first visit; or (b) participation in a program reserved for children with developmental disabilities. Visit data obtained included visit date and nature of contact (e.g., consultation, individual visit). Visits that were telephone contacts only, and not face-to-face visits, were excluded.

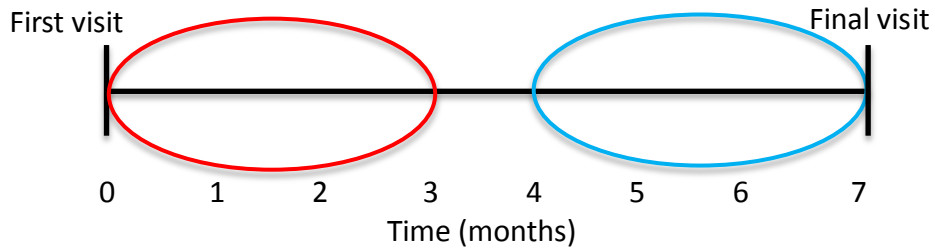
Visit data. Multi-level latent class cluster analyses (Vermunt & Magidson, 2005) of children's (N= 7,638) electronic visit data (recoded as the presence or absence of visits by month) over a 5-year period were performed. A five-cluster solution was deemed the best fit to the data. To facilitate understanding of these clusters, an episode of care was defined as three visits with a 180 day free period (Reid, Stewart, Zaric, Barwick, Carter, Neufeld, et al, 2014). The five clusters identified were: (a) Minimal care (50% of children; i.e., few sessions within 6 months following first visit); (b) Acute treatment (21% of children; i.e., multiple sessions within a year, with few sessions thereafter); (c) Intensive treatment (11% of children; i.e., multiple sessions over two years); (d) Brief episodic care (13% of children; i.e., average of 28 visits distributed in two episodes of care); and (e) On-going/intensive episodic care (6% of children; i.e., relatively continuous care over four to five years with high number of visits [M=137] and 56% of children having two or more episodes of care).

Chart reviews. Chart reviews were conducted for a subset of clients. Within each of the six agencies, 12 clients were sampled from each of the five clusters. A stratified random sample, stratified by age (4-7- and 8-11- years old) and sex, was used to ensure that the clients sampled for chart reviews were representative of clients within

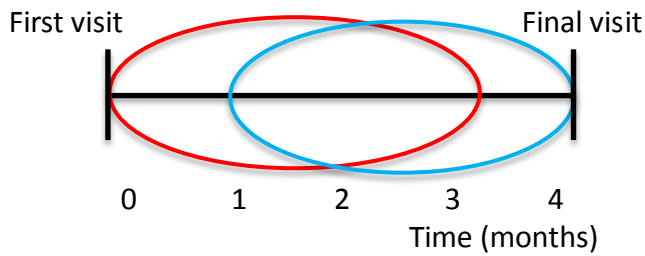
each cluster. Chart reviews were completed for two time periods: (a) intake (i.e., first face-to-face visit during the study period); and (b) end of involvement (EoI; i.e., conclusion of involvement with the agency or end of the five-year study period, whichever came first). Demographic information (e.g., age, sex), characteristics of the family (e.g., marital status, custody status), traumatic experiences (i.e., alleged abuse and/or neglect), and sectors of involvement additional to mental health (i.e., juvenile justice, education, medical, and children's aid society) were recorded. In addition, the Child and Adolescent Needs and Strengths scale (CANS; Lyons, 1999) was completed at both intake and EoI based on information in the chart.

At intake, chart review ratings were based on the first 10 visits or three months following first visit. Similarly, the EoI chart review ratings were based on the 10 visits or the three months preceding the final face-to-face visit. Some clients had very brief involvement with an agency (e.g., two visits). For these clients, the time frame for intake and EoI CANS ratings would have overlapped; thus, only one CANS rating was completed (see Figure 2).

Client without overlap



Client with overlap:





-  = Intake chart review ratings
-  = End of involvement (EoI) chart review ratings

Figure 2. Chart review time periods for a client without overlap and a client with overlap.

Chart reviews were performed by trained research staff. Training of reviewers included achieving a minimum of 70% exact agreement with another reviewer already trained by one of the co-investigators on the project (Juliana Tobon). Inter-rater reliability was assessed on an ongoing basis. Every sixth chart (60 charts in total) was coded by two raters. For each agency, inter-rater reliability was assessed and discussed after chart reviews were completed; disagreements were resolved by consensus. Inter-rater reliability was 88.2% (percent exact agreement) for all non-CANS items. CANS raters completed a standardized online training module followed by additional training by one of the co-investigators on the project (Juliana Tobon). Inter-rater reliability for the CANS items was .88 (intra-class correlation).

Current Study

Participants. Secondary analyses were conducted on the chart review data. Five clients were excluded due to problems with their data. Specifically, after chart reviews were completed, one client was found to have a diagnosis of Asperger's syndrome and four clients were outside the study age range at intake; these clients should have been excluded from all analyses. Due to logistical issues, it was not possible to return to the participating agencies to conduct chart reviews for five new clients at the time the errors were identified. The final sample included 355 children (67% boys) age 4 to 13 years at intake; the sample characteristics are presented in the results section.

Measures.***Predictor variables.***

Predisposing and enabling variables. The following variables obtained at intake were used in the present study: child age (in years), sex (0 = female, 1=male), custody status, and parent marital status. Custody status was originally coded in the chart reviews as Children's Aid Society -foster parent(s), birth parent(s), adoptive parent(s), or grandparent(s). Custody status was recoded: 0 = not birth parent (i.e., Children's Aid Society-foster parents, adoptive parents, grandparents) or 1 = birth parent(s). Marital status was originally coded in the chart reviews as: married, common-law, divorced, divorced/single parent, separated, separated/single parent, single parent, or unknown. For the current study, marital status was recoded: 0 = single parent (i.e., divorced /single parent, separated/single parent, or single parent); 1 = non single parent (i.e., married, common-law, divorced/shared custody, or separated/shared custody); or system missing = unknown. Participants with unknown marital status (n= 7) were excluded from prediction analyses. Abuse and/or neglect was originally coded in the chart reviews as: exposure to domestic violence, sexual abuse, physical abuse, neglect, or no abuse and/or neglect. Abuse and/or neglect was recoded: 0 = no abuse and/or neglect; or 1 = allegedly experienced abuse and/or neglect (i.e., exposure to domestic violence, sexual abuse, physical abuse, or neglect).

Child and Adolescent Needs and Strengths scale (CANS). The CANS (Lyons, 1999) is a multi-purpose measure used by mental health agencies to support decision making and to assess outcomes of services. When used for decision-making, the CANS is completed by intake workers at the time of the client's referral for services. The CANS

has also been used in a chart review format (Anderson et al., 2003). The CANS consists of 48 items that assess six domains of client functioning. There are five needs domains: (a) problem presentation (i.e., psychosis, attention deficit, depression/anxiety, oppositional behaviour, emotional control, antisocial behaviour, substance abuse, adjustment to trauma, attachment, anger control, situational consistency, temporal consistency); (b) risk behaviours (i.e., danger to self, danger to others, elopement, sexually abusive behaviour, social behaviour, crime/delinquency); (c) functioning (i.e., intellectual/developmental, physical/medical, sleep functioning, family, school achievement, school behaviour, school attendance, sexual development); (d) care intensity and organization (i.e., monitoring, treatment, transportation, service permanence); (e) caregiver needs and strengths (i.e., physical/behavioural health, supervision, involvement, knowledge, organization, safety, residential stability, resources); and one strengths domain; and (f) strengths functioning (i.e., family, interpersonal, relationship permanence, educational, vocational, well-being, optimism, spiritual/religious, talents/interests, inclusion).

All CANS items are rated on a 4-point scale. The CANS items in the domains of problem presentation, risk behaviours, developmental functioning, care intensity and organization, and caregiver needs and strengths, are coded as needs items. For needs items, the coding is as follows: 0 = no evidence and/or no need for action; 1 = mild degree and/or need for watchful waiting to see if action is needed; 2 = moderate degree and/or need for action; 3 = severe or profound degree and/or need for immediate or intensive action. Thus, higher scores indicate greater need. Items in the strengths functioning domain are coded as follows: 0=Significant strengths; 1 = Moderate

strengths; 2 = Mild strengths; 3 = No known strength in this area. Thus, lower scores indicate greater strength. A description of coding for a sample need and a sample strength item is presented in Appendix A. The following items have a fifth (“not applicable”) coding option: attachment, school achievement, physical/behavioural health, supervision, involvement; knowledge, organization, resources, residential stability, safety, vocational. Not applicable is coded for these items when clients within a certain age range (e.g., vocational is not applicable for children 12 years and under; attachment not applicable to children older than 6 years). In the current project, a separate code was used for situations when data needed in order to rate a CANS item were not available or were insufficient to identify items needing to be recoded for analyses. Additional recoding procedures used in the present study are described in the *Missing and recoding of CANS items* section.

Inter-reliability of the CANS was examined in one previous study and shown to be good in ratings between researchers and clinical case workers ($r = .81$), and among researchers ($r = .85$; Lyons, Rawal, Yeh, Leon, & Tracy, 2002). In terms of validity, CANS total scores have been found to be significantly correlated ($r = .63$) with Child and Adolescent Functional Assessment Scale (CAFAS; Hodges, 1996) scores (Rautkis & Hdalio, 2001).

Analyses exploring the reliability of the CANS were also conducted for the current study. Cronbach’s alpha for internal consistency was computed for each of the individual CANS domains and also for all needs items across domains. In the present study overall reliability for needs items at intake is .80 and for strengths items is .59; at

EoI the overall reliability for needs items is .83 and for strengths items is .72 (See Table 2.1).

Table 2.1.

Internal consistency reliability for CANS domains.

Domain	Intake Cronbach's α	EoI Cronbach's α
Needs Domains		
Problem presentation	.63	.69
Risk behaviours	.44	.50
Functioning	.31	.28
Care intensity and organization	.43	.50
Caregiver needs and strengths	.59	.72
All needs items	.80	.83
Strengths Domain		
All strengths items	.59	.72

Missing data and recoding of CANS items. Prior to computing total scores, patterns of missing values were analyzed. For intake CANS, in only 13 of the 48 items were some clients missing data; no items contained more than 10% unknown responses and 8.7% of clients were missing data for one or more intake CANS items. Across all intake CANS items and all clients, only 177 (1.0%) items were missing. For EoI CANS, in only 7 of the 48 items were some clients missing data; no item contained more than 10% unknown responses and only 11.2% of clients were missing data for one or more

EoI CANS items. Across all EoI CANS items and all clients, 284 (1.8%) items were missing.

For clients missing CANS items, missing data were imputed using the SPSS Multiple Imputation procedure (IBM Corp, 2013). Client age, sex, and all other CANS items were used as predictors to impute values for missing CANS items.

A total risk factor score was computed at both intake and EoI from the CANS needs-related domains: problem presentation, risk behaviours, developmental functioning, care intensity and organization, caregiver needs and strengths. CANS needs items were recoded as follows: 0 = the absence of a risk factor (0 = no evidence and/or no need for action, 1 = mild degree and/or need for watchful waiting to see if action is needed); or 1 = presence of a need or “risk factor” (2 = moderate degree and/or need for action, 3 = severe or profound degree and/or need for immediate or intensive action). The 38 need items were then summed to form a total risk factor score; higher scores reflect a greater number of client risk factors. The method of employing a cumulative resilience score has been used in several prior studies (e.g., Forehand, Wierson, Thomas, Armstead, Kempton, & Neighbors, 1991; Rutter, 1979; Sameroff, Seifer, & Bartko, 1997). A drawback to the use of dichotomous coding is that much of the variance in CANS item responses is lost. However, this issue is less salient with ordinal variables (e.g., CANS items) than it is with continuous variables (Cohen, 1983).

A total protective factor score was computed from the CANS strengths items: strengths of family, relationships, education, well-being, optimism, spirituality, talents/interests, inclusion, resiliency, and resourcefulness. These items were recoded as follows: 0 = the absence of a protective factor (2=Mild strengths. 3 =No known strength

in this area); 1 = the presence of a strength or “protective factor” (0=Significant strength. 1=Moderate strengths). The 10 protective items were then summed to form a total protective factors score; higher scores reflect a greater number of client protective factors.

Covariates.

Total number of visits. Visit data were taken from the electronic administrative records. Visits included any face-to-face contact between agency personnel, and the child or his or her guardian. Visits varied by type (e.g., assessment, crisis intervention, day treatment) and location (e.g., at the agency, at the child’s home, in the child’s school). The total number of visits across the five year study period, regardless of the type of visit or location, was computed.

Duration of involvement. The dates of the client’s first and last face-to-face visit were obtained from the electronic administrative records. The total length of involvement (reported in months) from intake to EoI was calculated as the difference between these two dates.

Outcome variables.

Sectors of involvement. Client involvement in other sectors was recorded only when involvement was related to a mental health issue. For example, if a client used services from the medical sector involvement for treatment of the flu, this was not be recorded in the chart review as medical involvement. The client’s involvement in each of the juvenile justice, education, medical, and child welfare sectors was coded, at both intake and EoI, as: 0 = no contact; or 1= some contact. Multi-sector involvement was operationally defined as the involvement of a child in one or more sectors *in addition* to the mental health sector (i.e., Ontario mental health agency in which the client received

services). Services received varied from one sector to another. In the medical sector any services (e.g., treatment, referral) received from a physician relating to a mental health issue was coded as medical sector involvement. Services constituting justice sector involvement included referrals, court counselling, and other services provided by court counsellors, probation officers, and police officers. Services constituting education sector involvement included individual education plans, placement in a special classroom, assistance in a standard classroom, referral, and counselling. Services constituting CAS involvement included placement in crown ward custody or foster care, and provision of mental health services when parents are unable or unwilling to provide them.

A multi-sector involvement score at intake computed as: 0 = not involved with additional sectors; 1 = involved with one or more additional sectors. Multi-sector involvement at EoI was coded into four categories to describe change in involvement between intake and EoI: 0 = no multi-sector involvement at intake and at EoI; 1 = multi-sector involvement at intake and at EoI; 2 = multi-sector involvement at intake but not at EoI; 3 = no multi-sector involvement at intake but involvement at EoI. Sequential entry was used in order to test the effects of specified blocks of covariates on the outcome variables *multi-sector involvement at intake* and *multi-sector involvement at EoI*.

Andersen's Model (Andersen, 1995) holds that a causal ordering occurs in which the variables age and sex represent a biological imperative for service use, that the enabling resources are necessary but not sufficient for service use, and finally that need must be identified in order for service use to take place.

Data Analyses

Weighting. An equal number of charts were sampled (using stratified random sampling) and reviewed within each cluster at each agency. However, the percent of cases within each cluster varied (e.g., 49.9% of clients were in the minimal care cluster, 12.6% were in the brief episodic cluster). Thus, weighting procedures were applied so that the contribution of each client within the cluster was proportional to total population of clients within each agency.

Standard weighting protocols are appropriate for stratified samples, such as the one used in the present study (de Leeuw, Hox, & Dillman, 2008). Charts were weighted based on the probability of a chart being sampled. Weights were applied based on the client's age (4-7 years old, 8-11 years old), sex (male, female), and cluster (minimal care, acute treatment, intensive treatment, brief episodic care, and on-going/intensive episodic care). All results presented are based on weighted analyses. Although 5 clients were excluded for reasons stated above, weighting was based on the original sampling procedures. Thus, the total weighted N = 360 (6 agencies x 5 clusters within each agency x 12 charts/cluster). However, depending on the analyses the observed N varies slightly and thus, at times the sum of n's for subgroups may not total to 360.

Objective 1: Prevalence of multi-sector involvement.

Cross-sectional. The prevalence of multi-sector involvement at intake is reported as a percentage along with the 95% confidence interval (CI). For descriptive purposes, the prevalence (%; 95% CI) of involvement in each sector in addition to mental health, and the patterns of sectors related to multi-sector involvement are also reported.

Longitudinal. For the longitudinal analyses, data from a subset of cases were used. Similar to the cross-sectional analyses, the prevalence (%; 95% CI) of multi-sector involvement at EoI is reported. The prevalence (%; 95% CI) of involvement in each sector in addition to mental health is reported. Changes in multi-sector involvement from intake to EoI are reported. Changes in the number of sectors of involvement from intake to discharge were analyzed using paired samples t-tests. The number of clients with increased, decreased, or no change in multi-sector involvement from intake to EoI is also reported.

Objective 2: Predictors of multi-sector involvement. Descriptive statistics for all predictor and outcome variables at intake and EoI were computed. For continuous predictor variables, means (M), and standard deviations (SD) are presented. For categorical predictors and for the outcome variables, frequency counts and percentages are presented.

Cross-sectional. (1) To examine the relationships between the predictor variables and multi-sector involvement at intake, a sequential binomial logistic regression predicting multi-sector involvement was conducted (Sanford, 2005). The obtained statistic of interest for each predictor variable is an odds ratio (OR) that indicates the change in likelihood of multi-sector involvement for every one unit increase in the predictor. Predictor variables were grouped as follows, based on Andersen's Behavioural Model of Health Care Service Use (Andersen, 1998): (a) predisposing (i.e., age, sex); (b) enabling (i.e., marital status, custody, abuse/neglect); and (c) need (i.e., CANS risk factor total, protective factor total). The inclusion of abuse and/or neglect as a predictor may severely bias the models, as nearly all clients with reported abuse and/or neglect had CAS

involvement, and therefore also had multi-sector involvement. Hence the regression equations were repeated with abuse and/or neglect excluded as a predictor. The regression equations are presented as three models with each block of predictors added sequentially.

(2) Exploratory analyses were also conducted examining the relationships between predictor variables and specific sector involvement. A series of binomial logistic regressions were conducted predicting involvement for each of the four sectors: CAS, justice, education, and medical. All hypothesised predictor variables were entered simultaneously. Abuse/neglect was not entered as a predictor for CAS, for reasons stated above. Only final models of these equations are presented in the results section; the full equations showing the sequential addition of the each of the three blocks of variables are presented in Appendix B.

Longitudinal. To examine the relationships between the predictor variables and multi-sector involvement changes from intake to EoI, a multinomial logistic regression was conducted with change in multi-sector involvement as the outcome (Greene, 1993). Age, intake CANS risk factors, intake CANS protective factors, EoI CANS risk factors, EoI CANS protective factors, sex, marital status, and total visits were entered as predictors.

Goodness of fit. All equations were subjected to the Hosmer and Lemeshow test for goodness of fit (Hosmer & Lemeshow, 2000). This test is used for logistic regression models to assess whether the observed event rates match anticipated event rates in calculated subgroups of the population of interest. Specifically, this test generates decile

subgroups of fitted risk values. If the observed event rates do not differ significantly from the anticipated event rates, using the chi-square test statistic, then the model is deemed to have goodness of fit. If a significant difference is found, then the model does not fit the data; as such, results are not interpreted (Hosmer & Lemeshow, 2000).

Omnibus tests of logistic models. Significance of regression models in the present study were evaluated using a chi-square test against the null model (i.e., 50% sample membership in group 0 and 50% sample membership in group 1). Significance of the full model in this equation indicates the probability of obtaining the chi square statistic if there is no collective effect of the predictor variables on the outcome variable. If the full model is significant, then this indicates that the probability of obtaining the reported chi-square statistic is due to chance alone.

Results

Sample Characteristics

Cross sectional. Characteristics of the intake sample used in all cross sectional analyses are presented in Table 3.1. The weighted intake sample is $N = 360$ (66.9% male). The average age at intake of this sample is 8.15 ($SD = 2.1$); 24.7% of clients were from single parent families and 92.5% of clients lived with their birthparent(s).

Longitudinal. Charts with overlap in the time periods used in conducting the intake and EoI rating were excluded from longitudinal analyses. A total of 79 (21.9%) clients were excluded from longitudinal analyses, resulting in a final weighted n of 281 (68.7% male). Characteristics of the EoI sample are presented in Table 3.1.

Objective 1: Prevalence of multi-sector involvement

Cross sectional. Multi-sector involvement occurred for 67.6% of clients (95% CI = 63% - 73%). The most common multi-sector involvement pattern was with the mental health and medical sectors (12.2%). Involvement with any two sectors is 32.8% and any three, 23.1%; few clients were involved with four, (4.4%) or all five (2.8%) sectors. Table 3.2 shows the all patterns of multi-sector involvement.

Longitudinal. Multi-sector involvement occurred for 63.0% of clients (95% CI = 57% -68%) at the EoI with the agency. The most common multi-sector involvement pattern was with the mental health and CAS (13.2%). Involvement with any two sectors was most common (38.7%), followed by any three (15.6%); as with intake, few clients were involved with four (6.9%), or all five (1.7%) sectors. Table 3.3 shows of all patterns of multi-sector involvement.

Table 3.1.

Characteristics of the intake and end of involvement (EoI) samples.

	Intake sample	EoI sample
	(n = 360)	(n = 281)
	<i>n</i> (%) or <i>M</i> (<i>SD</i>)	<i>n</i> (%) or <i>M</i> (<i>SD</i>)
First contact age (years)	8.15 (2.1)	8.19 (2.01)
Sex		
Female	119 (33.1%)	88 (31.3%)
Male	241 (66.9%)	193 (68.7%)
Marital status		
Both parents present	261 (72.5%)	190 (67.7%)
Married	158 (45.2%)	118 (41.9%)
Common-law	11 (3.8%)	9 (3.2%)
Divorced	19 (5.3%)	17 (5.9%)
Separated	73 (20.3%)	47 (16.8%)
Single parent present	96 (26.8%)	91 (25.9%)
Divorced, single parent	5 (1.5%)	5 (1.9%)
Separated, single parent	31 (8.6%)	29 (10.3%)
Single parent	53 (14.7%)	48 (16.9%)
Unknown	7 (1.9%)	9 (3.1%)
Custody status		
Birth parent(s)	333 (92.5%)	262 (93.2%)
Non-birthparent	25 (6.6%)	17 (5.8%)
CAS-foster parent(s)	12 (3.3%)	8 (2.7%)
Adoptive parent(s)	6 (1.5%)	6 (2.0%)
Grandparent(s)	7 (1.8%)	3 (1.1%)

Note: CAS = Children's Aid Society

Table 3.2.

Client intake involvement with different combinations of sectors.

Number of sectors	Sector					<i>n</i>	% of total sample
	Mental health	CAS	Justice	Education	Medical		
One	✓					117	32.4
Two	✓	✓				32	9.0
	✓		✓			6	1.8
	✓			✓		35	9.8
	✓				✓	54	15.0
Three	✓	✓	✓			9	2.5
	✓	✓		✓		12	3.3
	✓	✓			✓	15	4.3
	✓		✓	✓		3	0.8
	✓		✓		✓	5	1.3
	✓			✓	✓	39	10.9
Four	✓	✓	✓	✓		3	1.0
	✓	✓	✓		✓	11	0.5
	✓	✓		✓	✓	2	3.0
	✓		✓	✓	✓	3	0.9
All five sectors	✓	✓	✓	✓	✓	10	2.8
<i>Total (column % or N)</i>	100.0%	26.2%	11.6%	32.4%	35.9%	356	100.0%

Note: Each check mark indicates involvement with the sector indicated in its column heading. The n of each row is the number of clients with involvement in only the sectors with checkmarks.

CAS = Children's Aid Society

Table 3.3.

Client involvement with different combinations of sectors at end of involvement.

Number of sectors	Sector					<i>n</i>	% of total sample
	Mental health	CAS	Justice	Education	Medical		
One	✓					104	35.9
Two	✓	✓				37	13.2
	✓		✓			15	5.5
	✓			✓		24	8.7
	✓				✓	32	11.3
Three	✓	✓	✓			7	2.6
	✓	✓		✓		4	1.4
	✓	✓			✓	6	2.2
	✓		✓	✓		6	2.0
	✓		✓		✓	2	0.6
	✓			✓	✓	19	6.8
Four	✓	✓	✓	✓		3	1.1
	✓	✓	✓		✓	2	0.9
	✓	✓		✓	✓	10	3.7
	✓		✓	✓	✓	3	1.1
All five sectors	✓	✓	✓	✓	✓	5	1.7
<i>Total (column % or N)</i>	100.0%	24.6%	11.7%	30.3%	36.5%	281	100.0%

Note: each check mark indicates involvement with the sector indicated in its column heading.
The *n* of each row is the number of clients with involvement in only the sectors with checkmarks.

Longitudinal changes in sector involvement. Table 3.4 shows the changes in the number of sectors of involvement from intake to EoI; data are from the EoI sub-sample (i.e., excluding clients with very short periods of involvement with the agency). Paired-sample t-test indicated a significant decrease in total number of sectors children were involved with at intake ($M= 2.30$ $SD = 1.31$) versus EoI ($M= 2.12$ $SD = 1.17$); $t_{(280)} = 2.33$, $p = .021$. Although the average number of sectors of involvement changed from intake to EoI, not all children varied in the number of sectors they were involved with. Specifically, (1) the number of sectors of involvement increased from intake to EoI for 54 clients (22.1%); (2) the number of sectors of involvement decreased from intake to EoI for 92 clients (33.4%); (3) the number of sectors of involvement did not change from intake to EoI for 128 clients (44.5%). Half of the clients maintained multi-sector involvement from intake to discharge (50.4%). A similar proportion of clients moved from no multi-sector involvement to multi-sector involvement (13.7%) as moved from multi-sector involvement to no multi-sector involvement (13.3%).

Analyses of change were also conducted for each specific sector (see Table 3.5). Maintenance of involvement from intake to EoI was most common in the medical sector (16.1%) and least common in the justice sector (6.6%). Change from no involvement at intake to involvement at EoI was most common in CAS (10.6%) and least common in the medical sector (7.8%). Change from involvement at intake to no involvement at EoI was most common in the medical sector (20.4%) and least common in the justice sector (5.2%). Finally, no involvement at intake or EoI was most common in the CAS sector (62.6%) and least common in the medical sector (55.7%).

Objective 2: Predictors of multi-sector involvement

Descriptive analyses. The samples used for analyses of data at intake versus EoI are different. Table 3.6 shows the descriptive statistics for all variables used in regression analyses separately for the intake and EoI samples. Descriptive statistics are also provided for the 79 clients who were excluded from longitudinal analyses. Table 3.7 shows the correlations between predictors used for both the intake and EoI samples.

Table 3.4.

Changes in total sector involvement from intake to end of involvement.

		End of Involvement					
		(Number of sectors of involvement)					
Intake (Number of sectors of involvement)		1	2	3	4	5	
		<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	row %
1	64	26	5	5	1	36.4%	
2	20	39	9	1	2	25.4%	
3	14	26	17	1	0	20.7%	
4	3	4	8	6	4	8.9%	
5	1	3	7	6	2	7.6%	
column %		36.3%	34.9%	16.4%	6.8%	3.2%	

Note: The bolded diagonal reflects clients with no change in multi-sector involvement between intake in end of involvement at the agency (45.5%). Upper diagonal indicates increase in sectors of involvement; lower diagonal indicates decrease in sectors of involvement.

Only one sector at intake or end of involvement reflects only involvement in the mental health sector; involvement in two or more sectors reflects multi-sector involvement.

Table 3.5.

Changes in specific sector involvement from intake to end of involvement (EoI).

Sector	<i>Multi-sector involvement</i>			
	<i>No involvement</i>	<i>EoI only</i>	<i>Intake only</i>	<i>Intake and EoI</i>
	<i>n (%)</i>	<i>n (%)</i>	<i>n (%)</i>	<i>n (%)</i>
CAS	176 (62.6%)	36 (10.6%)	30 (12.7%)	39 (14.0%)
Justice	223 (62.1%)	25 (8.9%)	15 (5.2%)	18 (6.6%)
Medical	157 (55.7%)	22 (7.8%)	45 (20.4%)	57 (16.1%)
Education	173 (61.4%)	24 (8.4%)	34 (12.2%)	51 (18.1%)
Multi-sector involvement	64 (22.7%)	39 (13.7%)	37 (13.3%)	142 (50.4%)

Note: CAS = Children's Aid Society.

End of involvement sample used ($n = 281$)

Table 3.6.

Descriptive statistics for variables used in prediction of multi-sector involvement at intake and end of involvement (EoI).

Variable ¹	Predictor variables		
	Intake sample (n = 360)	EoI sample (n = 281)	Overlap sample ¹ (n = 79)
	<i>n</i> (%) or <i>M</i> (<i>SD</i>)	<i>n</i> (%) or <i>M</i> (<i>SD</i>)	<i>n</i> (%) or <i>M</i> (<i>SD</i>)
Predisposing factors			
Age (years)	8.15 (2.1)	8.19 (2.0)	8.00 (2.3)
Sex (female)	119 (33.1%)	88 (31.3%)	30 (38.7%)
Non-birthparent custody	13 (3.5%)	9 (3.1%)	3 (4.4%)
Single parent	89 (24.7%)	82 (22.8%)	7 (9.1%)
Enabling factors			
Abuse and/or neglect	72 (20.0%)	53 (18.9%)	60 (76.2%)
Need factors			
Intake risk factors (out of 38)	4.72 (3.6)	5.05 (3.7)	3.54 (3.1)
Intake protective factors (out of 10)	4.10 (1.8)	4.08 (1.7)	4.16 (2.1)
EoI risk factors (out of 38)		5.07 (4.4)	
EoI protective factors (out of 10)		5.26 (2.0)	
Control variables			
Total Visits	17.95 (28.0)	22.2 (30.4)	2.8 (2.9)
Duration of Involvement	18.7 (20.2)	23.3 (20.4)	2.4 (6.6)

Note: SD = standard deviation.

¹Overlap sample consists of the clients that were excluded from longitudinal analyses due to overlapping periods of data collection.

¹ All predictor data were obtained at intake

Table 3.7a.

Correlations between predictor variables for intake sample.

	Sex	Age	Marital status	Custody	Abuse and/or neglect	Intake risk factors
Age	-.05					
Marital status	-.01	.03				
Custody	.02	.18**	-.10			
Abuse and/or neglect	.01	-.03	-.09	-.12		
Intake risk factors	.12*	.01	-.20**	-.06	.19**	
Intake protective factors	-.01	.08	-.01	.16**	-.15**	-.38**

Note: Correlation coefficients calculated using Pearson's r (two-tailed);

Sex: 0 = female; 1 = male

* = $p < .05$

** = $p < .01$

Table 3.7b.

Correlations between predictor variables for End of Involvement (EoI) sample.

	Sex	Age	Marital status	Custody	Abuse and/or neglect	Intake risk factors	Intake protective factors	EoI risk factors	EoI protective factors	Total Visits
Age	-.03									
Marital status	.03	.12								
Custody	-.07	.14*	-.10							
Abuse and/or neglect	.04	-.06	-.12	-.03						
Intake risk factors	.12*	.02	-.19**	-.03	.22**					
Intake protective factors	-.04	.12*	-.05	.05	-.13	-.39**				
EoI risk factors	.05	.09	-.09	.12*	.08	.16**	.01			
EoI protective factors	-.14*	-.05	-.03	-.06	-.01	-.09	.01	-.56**		
Total visits	.08	-.01	-.09	.01	.09	.26**	-.13*	.07	-.08	
Duration (months)	.03	-.10	.02	-.03	.01	.16**	-.23**	.06	-.06	.46**

Note: Correlation coefficients calculated using Pearson’s r (two-tailed); Sex: 0 = female; 1 = male

* = $p < .05$ ** = $p < .01$

Cross-sectional. Table 3.8 shows the results of the sequential entry binomial logistic regression analysis predicting multi-sector involvement at intake. Significance of the full model improved with the addition of each set of predictor variables. Model 3a is significantly different from the null model; thus, the theoretical model improves the prediction of multi-sector involvement beyond chance. The confidence interval for abuse/neglect was excessively large, suggesting problems of model specification. Almost all clients (96%) with a history of abuse/neglect also had multi-sector involvement. Thus, Model 3b was calculated with abuse/neglect excluded. This is the preferred model. Age, sex, custody, and marital status were not significant predictors. The CANS risk factors predicted a 30% increase in likelihood of multi-sector involvement for every additional risk factor. CANS protective factors predicted a 17% decrease in likelihood of multi-sector involvement for every additional protective factor. The Hosmer and Lemeshow test was non-significant; indicating that the model fit is acceptable. Model 3b correctly classified 48% of clients that have no multi-sector involvement, 86% of clients that have multi-sector involvement, and correctly classified 74% of clients overall. The bivariate relationships between predictor variables and intake multi-sector involvement are presented in Appendix C. Appendix D presents the full results of the final model (Model 3) of the regressions, including the regression coefficients and Wald statistics

Table 3.8.

Logistic regression analyses predicting intake multi-sector involvement.

Predictor Variables	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3a</i>	<i>Model 3b</i>
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Predisposing				
Age (years)	.97 (.87, 1.09)	.99 (.89, 1.10)	.98 (.87, 1.11)	.97 (.86, 1.10)
Sex (female)	.58 (.36, .92)*	.55 (.34, .91)*	.69 (.39, 1.18)	.64 (.38, 1.06)
Custody (non- birthparent) ⁱ	2.11 (.36, 12.22)	2.13 (.37, 12.22)	1.31 (.20, 8.68)	1.76 (.31, 10.11)
Single parent ⁱⁱ	1.58 (.89, 2.79)	1.58 (.88, 2.81)	1.42 (.76, 2.67)	.73 (.40, 1.33)
Enabling				
Abuse and/or neglect		18.64 (4.84, 71.80)***	17.01 (4.30, 67.25)***	---
Need				
Risk factors			1.30 (1.18, 1.44)***	1.30 (1.18, 1.43)***
Protective factors			.84 (.72, .96)*	.83 (.72, .96)*
<i>Goodness of fit</i> ⁱⁱⁱ	$\chi^2_{(8)} = 8.12$	$\chi^2_{(8)} = 6.15$	$\chi^2_{(8)} = 11.56$	$\chi^2_{(8)} = 11.77$
<i>Full model</i> χ^2	$\chi^2_{(2)} = 5.68$	$\chi^2_{(4)} = 53.07$ ***	$\chi^2_{(6)} = 98.03$ ***	$\chi^2_{(6)} = 64.92$ ***
<i>Delta</i> χ^2	-----	$\chi^2_{(2)} = 47.39$ ***	$\chi^2_{(4)} = 44.96$ ***	11.85*

ⁱ Birthparent custody is the reference category

ⁱⁱ Married parent is the reference category

ⁱⁱⁱ Hosmer and Lemeshow test

* = $p < .05$

** = $p < .01$

*** = $p < .001$

Prediction of specific sector intake involvement. Table 3.9 shows results of binomial logistic regression analyses predicting involvement in each of the four sectors of care separately. For the model predicting involvement with the CAS, the full model chi-square is significantly different from the null model; thus, the theoretical model improves the prediction of multi-sectorial involvement beyond chance. The CANS risk factors predicted a 13% increase in likelihood of CAS involvement for every additional risk factor. CANS protective factors predicted a 22% decrease in likelihood of CAS involvement for every additional protective factor. Age, sex, custody, marital status, and abuse/neglect were not significant. The Hosmer and Lemeshow test was non-significant indicating that the model fit is acceptable.

For the model predicting involvement with the justice sector, custody had no distribution across the outcome variable categories and therefore yielded an odds ratio of 0 (the CI ranged from 0 to infinity). This suggests the custody variable is influencing the poor model fit. The equation was repeated without custody entered as a predictor. The full model chi-square for this regression is significantly different from the null model; thus, the theoretical model improves the prediction of multi-sector involvement beyond chance. Every year of increased age predicted a 39% increase (OR = 1.39) in likelihood of justice involvement. Abuse/neglect predicted a 189% increase in likelihood of justice involvement (OR = 2.89). The CANS risk factors predicted a 12% increase in likelihood of justice involvement for every additional risk factor that a client has (OR = 1.12). Marital status and CANS protective factors were not significant. The Hosmer and Lemeshow test was non-significant indicating that the model fit is acceptable.

For the model predicting involvement with the education sector, the full model chi-square is significantly different from the null model; thus, the theoretical model improves the prediction of multi-sectorial involvement beyond chance. Every year of increased age predicted

a 27% increase in likelihood of education involvement (OR = 1.27). The CANS risk factors predicted a 35% increase in likelihood of education involvement for every additional risk factor that a client has (OR = 1.35). CANS protective factors predicted a 15% decrease in likelihood of education involvement for every additional protective factor that a client has (OR = .85). Sex, custody, and marital status were not significant. The Hosmer and Lemeshow test was non-significant indicating that the model fit is acceptable.

For the model predicting involvement with the medical sector, the full model chi-square is significantly different from the null model; thus, the theoretical model improves the prediction of multi-sectorial involvement beyond chance. The CANS risk factors predicted a 24% increase in likelihood of education involvement for every additional risk factor that a client has (OR = 1.24). Age, sex, custody, marital status, abuse/neglect, and CANS protective factors were not significant. The Hosmer and Lemeshow test was non-significant indicating that the model fit is acceptable. Appendix D presents the full results of these regressions, including the regression coefficients and Wald statistics.

Table 3.9.

Full logistic models of service use by sector.

Variables	<i>Children's Aid Society</i>	<i>Justice</i>	<i>Education</i>	<i>Medical</i>
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Predisposing				
Age (years)	.95 (.84, 1.08)	1.39 (1.15, 1.69)**	1.27 (1.11, 1.46)**	1.01 (.89, 1.13)
Sex (female)	.88 (.50, 1.55)	1.63 (.80, 3.34)	.78 (.44, 1.38)	.79 (.47, 1.32)
Custody (non- birthparent) ⁱ	2.96 (.83, 10.53)	---	2.50 (.61, 10.33)	.97 (.26, 3.61)
Single parent	1.37 (.76, 2.45)	.80 (.20, 3.17)	1.15 (.62, 2.11)	1.30 (.75, 2.26)
Enabling				
Abuse/neglect	---	2.89 (1.36, 6.12)**	.55 (.26, 1.14)	.60 (.31, 1.15)
Need				
Risk factors	1.13 (1.06, 1.22)**	1.12 (1.02, 1.18)*	1.35 (1.24, 1.48)***	1.24 (1.15, 1.34)***
Protective factors	.78 (.66, .93)**	.93 (.76, 1.15)	.85 (.72, .99)*	.90 (.78, 1.05)
<i>Goodness of fit</i> ⁱⁱⁱ	$\chi^2_{(8)} = 9.59$	$\chi^2_{(8)} = 35.73$	$\chi^2_{(8)} = 15.42$	$\chi^2_{(8)} = 14.86$
<i>Full model</i> χ^2	$\chi^2_{(4)} = 45.73$ ***	$\chi^2_{(7)} = 33.45$ ***	$\chi^2_{(7)} = 96.34$ ***	$\chi^2_{(7)} = 54.50$ ***

* = $p < .05$

** = $p < .01$

*** = $p < .001$

--- = variable not included

ⁱ Birthparent custody is the reference category

ⁱⁱ Married parent is the reference category

ⁱⁱⁱ Hosmer and Lemeshow test

Longitudinal. Table 3.10 shows results of the multinomial logistic regression predicting changes in multi-sector involvement. The reference category for all analyses is no involvement at intake or EoI. Abuse/neglect was excluded as a predictor, because history of abuse or neglect was almost perfectly associated with multi-sector involvement in the cross-sectional analyses. Custody is excluded because there was insufficient distribution of custody categories across the categories of the outcome variable. The full model chi-square is significantly different from the null model; thus, the theoretical model improves the prediction of multi-sector involvement beyond chance. Predictors for changes in multi-sector involvement were as follows: (a) Intake CANS risk factors predicted an 18% increase in likelihood of intake multi-sector involvement only for every additional risk factor that a client has (OR = 1.18). EoI CANS risks also predicted a 29% increase in likelihood of EoI multi-sector involvement only for every additional risk factor that a client has (OR = 1.29). Age predicted a 23% decrease in likelihood of intake multi-sector involvement for every additional year of age (OR = .77). Sex, marital status, intake protective factors, discharge protective factors, and total visits were not significant; (b) EoI CANS risks also predicted a 26% increase in likelihood of intake multi-sector involvement only for every additional risk factor that a client has (OR = 1.26). Age, sex, marital status, intake risk factors, intake protective factors, discharge protective factors, and total visits were not significant; (c) Intake CANS risk factors predicted a 27% increase in likelihood of involvement at intake and EoI for every additional risk factor that a client has (OR = 1.35). Intake CANS protective factors predicted a 24% decrease in likelihood of intake and EoI involvement for every additional protective factor that a client has (OR = .76). EoI CANS risk factors predicted a 27% increase in likelihood of multi-sector involvement for every additional risk factor (OR = 1.27). Age, sex, marital status, and total visits did not predict involvement at intake and EoI. The Hosmer and

Lemeshow test was non-significant indicating that the model fit is acceptable. Appendix D presents the full results of these regressions, including the regression coefficients and Wald statistics.

Table 3.10.

Multinomial logistic regression analysis of change in multi-sector involvement.

Predictors	Outcome		
	Intake involvement only	EoI involvement only	Intake and EoI involvement
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Predisposing			
Age (years)	.77 (.62, .97)*	1.03 (.83, 1.29)	.93 (.78, 1.11)
Sex (female)	.72 (.26, 1.95)	1.41 (.57, 3.49)	.77 (.36, 1.66)
Single parent	.62 (.21, 1.79)	.41 (.13, 1.30)	1.44 (.66, 3.17)
Need			
Intake CANS risk factors	1.18 (1.07, 1.48)**	.93 (.78, 1.11)	1.27(1.10, 1.47)**
Intake CANS protective factors	.84 (.62, 1.13)	.79 (.58, 1.04)	.76 (.60, .96)*
EoI CANS risk factors	1.29 (1.10, 1.52)**	1.26 (1.01, 1.48)**	1.27 (1.10, 1.47)**
EoI CANS protective factors	.95 (.73, 1.23)	.98 (.76, 1.27)	.96 (78, 1.19)
Control variables			
Total visits	1.01 (.99, 1.03)	1.02 (.99, 1.04)	1.01 (.99, 1.03)
Duration (months)	1.02 (.99, 1.05)	.99 (.97, 1.03)	1.01 (.99, 1.03)
<i>Goodness of fit</i> ⁱⁱ	$\chi^2_{(945)} = 851.14$		
<i>Full model chi-square</i>	$\chi^2_{(15)} = 80.78^{***}$		

Note: reference category = no multi-sector involvement at intake or EoI

* = $p < .05$

** = $p < .01$

*** = $p < .001$

Discussion

Multi-sector involvement as analyzed in the present study was similar at both intake (67%) and EoI (63%). The medical and education sectors were found to play a central role in the provision of services for mental health issues. Client resilience (i.e., risk and protective factors) was found to influence these rates of multi-sector involvement both cross-sectionally and longitudinally. The employment of Andersen's model to frame the variables in predictive equations suited the data appropriately as was expected given the existing literature. The following discussion seeks to compare and contrast these findings, with those in the prior literature as well as to discuss the implications, limitations, and future directions of results obtained in the present study.

Service Use at Intake

Prevalence. In the present study more than two thirds (67.6%) of clients had some form of multi-sector involvement at intake. Using a representative population-based sample, Farmer et al. (2003) found 45% of their sample to have multi-sector involvement for a mental health issue(s). In a child welfare sample, Farmer et al. (2010) found 33% of their sample to have multi-sector involvement. The differences between our rates and others are likely due to differences in the populations from which samples were drawn. A sample from a mental health clinic would be expected to have a greater degree of multi-sector involvement than would a community sample or a child welfare sample. This is primarily because all clients in our sample had a mental health issue whereas participants in other samples may or may not have mental health issues. Furthermore, help seeking for mental health issues takes a variety of forms and contact with mental health agencies is often preceded by involvement with other sectors (Reid et al., 2011). This makes it even more likely that our sample of children in contact with mental

health agencies would have multi-sector involvement. Using a sample of children in contact with a mental health agency, Reid et al. (2010) found multi-sector involvement to occur for over 90% of clients. However, the sample characteristics in this study were different from those in the present study. One important difference is that 51% of the Reid et al. (2010) sample was in the clinical range for functional impairment. Functional impairment data are not available in the present study; however it is possible that having a higher proportion of clients with functional impairment would explain the difference in prevalence of multi-sector involvement between the two studies. It is likely that the higher the functional impairment, the more services required. Results of the present study and that by Reid et al. (2010) allow us to conclude that children in contact with a mental health agency are very likely to receive services for a mental health issue from additional sectors, more so than are children in the general population (Farmer et al., 2003) or children with mental health issues in contact with child welfare (Farmer et al., 2010).

Multi-sector involvement in the present study most commonly (36%) involved the mental health and medical sectors. Reid et al. (2010) found that in a sample of families from Ontario seeking mental health services for their children found that 64% of their sample had medical sector involvement. The medical sector plays such a crucial role in mental health services that it has been termed the “de facto mental health care system” (Reiger, Goldberg, & Taube, 1978). Therefore, when examining its role in the provision of mental health services it is reasonable to expect our rates to be quite high, but not as high as those found in other studies using a less exclusive definition of medical sector involvement. For many children mental health service use does not stop at a mental health agency, additional services from the medical sector are also used in response to a mental health issue. This implies that collaboration between these two sectors

may be of particular importance in the provision of services to children with mental health issues.

The education sector was found to be the second most common (32%) additional sector of involvement in the present study. Many studies report education involvement as either the most- or second most- common sector of involvement additional to mental health (Farmer et al., 2003; Farmer et al., 2010). These studies have found that American children with experiences of maltreatment (e.g., physical abuse, emotional abuse, sexual abuse, physical neglect) are also receiving specialized services within the education sector related to their mental health issues. Some rates of education involvement in prior literature (21.7%; Farmer et al. 2010) are lower than those found in the present study. This discrepancy is attributed to the fact that the Farmer et al. sample was of children who had reported experiences of maltreatment whereas the present study simply examined education involvement for children in contact with mental health agencies. However, these findings support the overall agreement in the literature that education plays a central role in the provision of mental health services (Staghezza-Jaramillo et al., 1995; Burns et al., 1996; Farmer et al., 1999). Similar to the medical sector, these results imply that collaboration between the education and mental health sectors is of particular importance as clients frequently are involved with the two.

Changes in Multi-Sector Service Use

In the present study overall rates of multi-sector involvement at EoI (63%) were found to be very similar to those at intake (67%). However, a change in multi-sector involvement from intake to EoI was found for 10% of clients. This drop off was found to be approximately equal across additional sectors (e.g., just as many clients with intake mental health and education involvement had EoI mental health involvement only as clients with intake mental health and

justice). If this is due to a reduction in client need for services then we may conclude that the system is appropriately matching services with need.

Nearly half (45%) of clients did not alter the number of sectors that they were involved with from intake to EoI. This high percentage of clients maintaining their degree of involvement for the duration of the study period highlights a need to understand the variables that influence this. When examined descriptively it is unclear whether this lack of change is due to maintained need or other factors such as a hesitancy to relinquish services obtained (Reid et al., 2010). For example when a degree of comfort, familiarity, and trust is established with a given practitioner, a family may continue to go to that practitioner long after their need has concluded and be hesitant to relinquish that involvement.

An increase in multi-sector involvement from intake to EoI was found for 22% of clients. This may be due to identification by a professional of changing client needs. For example if a client is seen first in the mental health sector reports abuse then CAS will be brought into the network of care. It may also be that the parents who seek services for these children begin contacting many different sectors at the outset of treatment seeking but do not receive services promptly due to logistic issues. Therefore it is possible that these parents have sought out multiple services at the same time but receipt of services from these sectors took varying amounts of time. Involvement had been achieved with some sectors at intake but involvement with others took longer and did not show up until EoI.

Prediction of Service Use at Intake

Cross-sectional analyses in the present study identify only risk and protective factors as significant predictors of multi-sector involvement. The greater the client's risk (i.e., need), the

more likely he or she is to have multi-sector involvement and the more protective factors the less likely he or she is to have multi-sector involvement. This finding supports prior works on the role of resilience in mental health service use (Chapman et al., 2004; Hammen, Henry, & Daley, 2000; Schilling, Aseltine, & Gore, 2008; Ungar et al., 2013). Burns et al. (1995) found that the degree of child need assessed with the CBCL influenced their likelihood of service use across multiple sectors; specifically, the higher the CBCL score, the more likely multi-sector involvement. Therefore it is apparent that child needs are not only being evaluated appropriately but also that service use aligns closely with this need. This is a very positive notion for practitioners in mental health. Keeping the amount of services provided congruent with the amount of need a given child has may prevent unnecessary provision of services.

In the present study age was not a significant predictor of overall multi-sector involvement. Prior research utilizing child welfare samples often identified higher age as a predictor of multi-sector involvement (Farmer et al., 2003; Farmer et al, 2010). Other research has posited that the relationship between age and service use may be moderated by the effects of child need. Therefore, this discrepancy may be due to age predicting clinical need rather than predicting service use per se (Burns et al., 2004). If this is the case then the non-significant age result can be expected. However, in the present study age and risk factor total were not significantly correlated. Another possible explanation is that differences in type of psychopathology as a function of age may be contributing to the non-significant effects of age alone. Different disorders often require different services. For example, the services used by a client with oppositional defiant disorder (ODD) would likely involve the education sector as difficulties in school are associated with this disorder. However, that service use would not be expected to be maintained over many years, as ODD typically has a relatively brief course

(Biederman, Petty, Dolan, Hughes, & Mick, 2008). Conversely, a diagnosis of bipolar disorder would likely involve the medical sector (e.g., to receive pharmaceuticals) and possibly the justice and education sectors as well. Bipolar disorder typically has a much longer course than does ODD and therefore it would be expected that these clients would have maintained multi-sector involvement over time (Carlson & Meyer, 2006).

In the present study intake multi-sector involvement involving the mental health and justice sectors was predicted by age, abuse/neglect, and risk factors. Farmer et al. (2010) found that this pattern of multi-sector involvement was predicted by age but not any type of maltreatment (e.g., sexual abuse, physical neglect) but did not use a comparable measure of need. Increased age predicted increased likelihood of multi-sector involvement in both the present study and in that of Farmer et al. (2010). The discrepancy in abuse-related findings can be explained by the differences in the way that the variable was operationalized. A dichotomous coding for all types of abuse or neglect was used in the present study whereas Farmer et al. analyzed each type of abuse or neglect as a separate variable. In the present study no single form of abuse or neglect predicts this pattern of multi-sector involvement. Only when the combined variable “abuse and/or neglect” is used is there significance. Our findings demonstrate that the justice sector has some unique qualities not found in other sectors. It stands to reason that abuse/neglect would bring this sector into the fold, as there are often legal issues associated with abuse/neglect. This is not the case for other sectors. Significance of the age variable may be explained by the increased likelihood of engagement in crime/delinquency found in older children and adolescents (Gottfredson, 1983; Hansen, 2003). In the present study the average age and its standard deviation for clients with justice involvement were compared to that of those without justice involvement in order to draw an apt conclusion. It was found that clients with

justice involvement were, on average, older than those without. This finding supports the prior literature and highlights a need for increased vigilance on the part of service providers for clients as they age.

A higher number of protective factors predicted a reduction in likelihood of involvement with CAS and education. This is the first time such a variable has been used in the prediction of involvement in different sectors of service use for mental health issues. This finding demonstrates that there is a balance between client risk and resilience that plays a major role in the determination of involvement in CAS and education. This finding demonstrates that involvement in these sectors for mental health issues is not wholly determined by risk. The presence of protective factors increases the resilience of clients, which decreases their involvement, and likely their need of involvement, with these sectors. It is likely that service providers in these two sectors form closer relationships with clients than do providers in other sectors. For example, many children remain in the same school from kindergarten through the sixth grade. This allows for education sector stability lasting seven years. Protective factors are often more difficult to identify than risks and therefore a closer and more stable relationship likely facilitates the identification of these protective factors. In order to provide empirical support for this theory, data are needed on length of involvement in the different sectors and this length compared to the number of protective factors identified. Unfortunately, such data were unavailable in the present study.

Prediction of Service Use from Intake to End of Involvement

Longitudinal analyses revealed a close link between risk and multi-sector involvement. Results suggest that multi-sector involvement at a given point in time is predicted by risk at that same time point. Therefore it seems that risk factors are not useful predictors of future

involvement but rather that risk should be assessed continuously throughout a client's involvement in a given sector. Furthermore, this indicates that there is a match between the amount of risk that a given client has and the amount of services that they receive; with more risk predicting more services. Prior research assessing need has found this same relationship between client's need and service use (Villagrana, 2009). The only exception, in the present study, to this rule is that *intake only* multi-sector involvement is predicted by both intake and EoI risk factors. When exploring why this was the case it was found that, for clients with this pattern of involvement, there was no significant difference between intake and EoI total risk scores. For all other patterns of longitudinal multi-sector involvement a significant difference was found between intake and EoI. This finding shows that for clients with intake only multi-sector involvement, service use is changing but risk is not. It is unclear why this is the case. Differences in combinations of multi-sector involvement at intake have been ruled out as have between subjects differences in total risks at both intake and EoI. Therefore we must conclude that the undocumented effects of another variable are responsible for the inconsistent finding in prediction of intake only multi-sector involvement.

The finding that risk is generally well-matched with service use is likely attributable to service providers identifying client risk and facilitating their involvement with sectors that may best address this risk. It is also plausible that increased risk has a motivating effect on the client and his or her family. Help-seeking research has identified characteristics of the family, similar to those coded as risks in the present study, to be associated with higher motivation for help-seeking (Freyer, Tonigan, Scott, Keller, Rump, John, et al., 2005). Although one or many of the aforementioned possibilities may be driving this finding, we may conclude nonetheless that the needs of the client (e.g., risks) and their sectors of involvement are dynamic in nature because a

risk at one point in time does not predict involvement at another. It is a positive notion that services are being provided in accordance to present rather than past client risks.

The influence of age on multi-sector involvement has been studied in detail in the existing literature (Burns et al., 2004; Farmer et al., 2003; Farmer et al., 2010). In the present study increased age predicted a decreased likelihood of a pattern of service use that included multi-sector involvement at intake but not at EoI. Therefore we conclude that older clients are less likely to have this short-term multi-sector involvement. This may be due the result of older clients being less likely to withdraw from service use as increased likelihood to drop out of treatment has been associated with younger age (Burgess, Pirkis, Slade, Johnston, & Meadows, 2009; Wang, 2007). This would explain why increased age predicts multi-sector involvement that is not maintained over time. However, some research has found no effect of age on withdrawal (Olfson et al., 2009). Given this conflict in the literature we cannot safely conclude that younger children are simply dropping out of sectors additional to mental health although it remains a possibility.

Implications

Descriptive analyses in our study confirm that sectors outside of mental health play a major role in the provision of services for children and youth with mental health issues. This role is largely filled by the education and medical sectors; this finding reinforces the need for collaborative efforts between sectors in creating an organized plan for the provision of care (Kaas, Lee, & Peitzman, 2003).

A majority of clients (67.6%) involved with mental health agencies receive services from additional sectors for their mental health issue(s). This high rate is influenced by a client's

resilience, namely the number of risk and protective factors that they have. The relationship between resilience and multi-sector involvement demonstrates what can be seen as a match between services required and services used. In this sense the overall system of service for mental health issues seems to be aligned with client needs and services are being rendered appropriately.

Multivariate analyses revealed very few significant relationships between predisposing and enabling variables, and overall multi-sector involvement or specific sector involvement. The significant predictors that were found may aid service providers in understanding the full scope of care that their clients may need by encouraging providers to pay particular attention to information gathered at intake (e.g., risk and protective factors). This information may be used to plan the course of service provision in terms of being prepared for the event that the client will or will not have involvement with additional sectors. Identification of which clients will require multi-sector involvement may facilitate early stage communication between professionals in different sectors.

The majority of the prior literature in this field utilizes a solely cross-sectional approach. The inclusion of longitudinal analyses sheds a new light on the ways in which involvement in multiple sectors changes over time. These results suggest that understanding of the services provided by other sectors is important for service providers because so many clients will receive these services for an extended period of time. Understanding the services provided by other sectors may facilitate inter-professional collaboration. Improving inter-professional collaboration may have positive effects on client as well as the well-being of clinical staff (Martinuseen et al 2012).

The match between risk and multi-sector involvement over time indicates that assessment of client need is closely aligned with client service use. This is a strength of the current system that should be recognized and encouraged. Ensuring that there is alignment between a client's degree of need and the extent of services used may prevent the misallocation of mental health resources.

The education sector plays a major role in the provision of services for children with mental health issues. This finding has been well documented in the prior literature (e.g., Farmer et al., 2010) and replicated in the present study. Increased mental health resources should be provided to schools. The school has several advantages over other sectors that provide mental health services including that it is the most easily accessible by the child and that it is often the most stable sector of involvement. Even so, additional services such as support teams involving the teacher as well as mental health professionals should be made available to these children. Research suggests that schools with these services are able to accommodate the vast majority of children who seek these services (Catron & Weiss, 1994).

Limitations

The CANS was completed based on chart reviews rather than via an interaction with the client. Therefore CANS strength items (protective factors) may be underestimated, as the clinicians who saw the clients may be less likely to make note of client strengths. This is because strengths items require a great deal more information to code as being present than do needs items, and in the absence of confirmatory information the items are coded as no strength present. In person coding would allow for the filling of missing information that may indicate

the presence of a strength. An inaccurate assessment of protective factors would alter the results of all multivariate analyses.

Another limitation is related to the low alpha values obtained for the CANS. These values for internal consistency were likely low due to the way that the CANS is structured. Internal consistency assesses the relatedness between items in a measure or subscale of a measure. The CANS is used to assess various areas of need and strength; however, the items within each domain are not necessarily closely related and thus may not be highly correlated. For example, the *problem presentation* domain of the CANS addresses psychopathology but items within this domain do not address the same type of psychopathology. The first item addresses psychosis while the second item addresses attention deficits. Psychosis and attention deficits are both aspects of psychopathology and thus are conceptually similar; however, it is unlikely that many children have both psychosis and attention deficits. Therefore, the low internal consistency within each domain is not unexpected, as the items within each subscale were not designed to be highly correlated (Lyons, 1999).

The study was limited by the data available. Specifically, socioeconomic information on clients was missing. Socioeconomic status (SES), a key enabling factor (Bonomi et al. 2008), has been well documented as a predictor of other- and multi- sector involvement for mental health issues (Farmer et al., 2003; Farmer et al., 2010; Tello, Jones, Bonizzato, Mazzi, Amaddeo et al., 2005). Therefore it is possible that results may have been influenced by the undocumented effect of SES. Specifically, it may be that clients with lower SES have greater likelihood of multi-sector involvement.

Multi-sector involvement was based on information available in the client charts. Involvement with other sectors was recorded by professionals at the agency that the client was receiving services from. In some cases data were based on communications received directly from other sectors, in other cases data were based on parent report. In some cases the reason for the contact with a sector may not have been specific to the child's mental health problem. In other cases, there may have been contacts with a sector that was not recorded in the client's chart. Therefore in some cases the extent and type of involvement with additional sectors may be inaccurate.

While all clients were involved with the mental health sector, we do not know if all clients began services in the mental health sector (i.e., Ontario mental health agencies). The data compiled simply state which sectors the client is involved with at intake and does not contain information relating to the order in which involvement these across sectors occurred. Therefore we are unable to draw any conclusions regarding the influence of involvement in one sector on involvement in another. The influence of initial sector of involvement has been identified as a significant predictor in other studies (e.g., Farmer et al., 2003). A similar problem was encountered with longitudinal analyses. While we are able to document changes in multi-sector involvement from intake to EoI, we are unable to draw conclusions regarding the of influence point of entry. As noted above it is possible that multi-sector involvement may be influenced by point of entry (Alimohamed-Janmohamed, Charvat, Gheyntanhi, Beutler, & Breckenridge, 2010) which we are unable to document. It may be that the inclusion of initial sector of involvement in our equations would alter the significance of our variables. If initial sector of involvement is a significant predictor of multi-sector involvement then it is likely that other variables used in the present study (e.g., intake CANS risk factors) would no longer be significant. If this is the case

then the focus on understanding multi-sector involvement would shift away from the needs dynamic of Andersen's Model and toward the predisposing dynamic.

Finally, the present study did not examine client outcomes. Research related to the outcomes of clients in this population is crucial to the determination of service recommendation. Providers must know whether or not clients who are involved with more sectors have better outcomes than those involved with a single sector. If more sectors of involvement leads to better outcomes then policy changes must be implicated to accommodate this demand. If however, outcomes are better for clients with a single sector of involvement, then efforts must be made to consolidate services and narrow the scope of care over time and prevent the unnecessary addition of additional sectors to the circle of care.

Future Directions

As noted above, the study of additional variables, such as SES, that may influence multi-sector involvement is needed in order to aid service providers in understanding which clients will require services from sectors of service additional to mental health. As it stands several variables have been identified as predictors both in the present study and in prior research. However, further efforts are still required in order to give service providers the full scope of what determines multi-sector involvement. Expanded versions of Andersen's Model include variables related to health service use practices of the family. Inclusion of variables that increase the understanding of the child's environment would facilitate understanding multi-sector involvement.

Understanding of longitudinal patterns of multi-sector service use is critical to effective treatment planning. Additional analyses of these changes would establish a fuller understanding

of the ways children move in and out of multi-sector involvement. Longitudinal multivariate analyses used in the present study applied to each specific sector of involvement would highlight any differences between the influences of various factors on involvement with that specific sector. Understanding these differences will facilitate a targeted approach to policy changes designed to improve the provision of services for mental health issues.

Lastly, the study of the relationship between psychopathology and multi-sector involvement would facilitate applicability of service use research such as this to mental health professionals. It is likely that the types of services required and used vary between different psychopathologies. Just as understanding the relationship between need and service use may facilitate treatment planning, understanding the role played by psychopathology may also aid providers in treatment planning.

References

- Achenbach, T. M. (1991). Integrative guide for the 1991 CBCL/4-18, YSR and TRF profiles.
- Burlington: Department of Psychiatry, University of Vermont.
- Aday, L., & Andersen, R. (1974). A framework for the study of access to medical care. *Health Services Research*, 9, 208-220.
- Alimohamed-Janmohamed, Shabia; Charvat, Mylea; Gheyntanchi, Anahita; Beutler, Larry E.;
- Breckenridge, James Psychological Services, Vol 7(1), Feb 2010, 44-56. doi: [10.1037/a0017783](https://doi.org/10.1037/a0017783)
- Andersen, R. (1968). *Behavioural Model of Families' Use of Health Services*. Research Series No. 25. Chicago, IL; Center for Health Administration Studies, University of Chicago.
- Andersen, R., & Odin, W. (1973). Societal and individual determinants of medical care utilization in the united states. *Milbank Memorial Fund Quarterly Journal*, 51, 95-124.
- Andersen, R. (1995). Revisiting the behavioural model and access to medical care: does it matter? *Journal of Health and Social Behaviour*, 36, 1-10.
- Babitsch, B., Gohl, D., & von Lengerke, T. (2012). Re-revisiting Andersen's behavioral model of health services use: A systematic review of studies from 1998–2011. *GMS Psycho-Social-Medicine*, 9.
- Biederman, J., Petty, C. R., Dolan, C., Hughes, S., Mick, E., Monuteaux, M. C., & Faraone, S. V. (2008). The long-term longitudinal course of oppositional defiant disorder and conduct disorder in ADHD

- boys: Findings from a controlled 10-year prospective longitudinal follow-up study. *Psychological Medicine*, 38(7), 1027-1036. doi:<http://dx.doi.org/10.1017/S0033291707002668>
- Bonomi, A. E., Anderson, M. L., Rivara, F. P., Cannon, E. A., Fishman, P. A., Carrell, D., . . . Thompson, R. S. (2008). Health care utilization and costs associated with childhood abuse. *Journal of General Internal Medicine*, 23(3), 294-299. doi:<http://dx.doi.org/10.1007/s11606-008-0516-1>
- Burgess, P. M., Pirkis, J. E., Slade, T. N., Johnston, A. K., Meadows, G. N., & Gunn, J. M. (2009). Service use for mental health issues: Findings from the 2007 national survey of mental health and wellbeing. *Australian and New Zealand Journal of Psychiatry*, 43(7), 615-623. Retrieved from <http://search.proquest.com/docview/755202636?accountid=15115>
- Burnett-Zeigler, I., & Lyons, J. (2010). Caregiver Factors Predicting Service Utilization Among Youth Participating in a School-based Mental Health Intervention. *Journal of Child and Family Studies*, 19, 572-578.
- Burns, B., Costello, E., Angold, A., Tweed, D., Stangl, D., Farmer, E., & Erkanli, A. (1995). Children's mental health service use across service sectors. *Health Affairs*, 14, no.3 (1995):147-159. doi: 10.1377/hlthaff.14.3.147
- Burns, B. J., Phillips, S. D., Wagner, H. R., Barth, R. P., Kolko, D. J., Campbell, Y., & Landsverk, J. (2004). Mental health need and access to mental health services by youths involved with child welfare: A national survey. *Journal of the American Academy of Child & Adolescent Psychiatry*, 43(8), 960-970. doi:<http://dx.doi.org/10.1097/01.chi.0000127590.95585.65>
- Canadian Mental Health Association (2013). CMHA 2012-2013 Annual Report.
- Cairney, J., & Wade, T. J. (2002). Single parent mothers and mental health care service use. *Social*

- Psychiatry and Psychiatric Epidemiology*, 37(5), 236-242. doi:<http://dx.doi.org/10.1007/s00127-002-0539-6>
- Carlson, G., Meyer, S. (2006). Diagnosis of bipolar disorder across the lifespan: complexities and developmental issues. *Developmental Psychopathology*, 18, 939–969
- Chapman, D., Whitfield, C., Felitti, V., Dube, S., Edwards, V., & Anda, R. (2004). Adverse childhood experiences and the risk of depressive disorders in adulthood. *Journal of Affective Disorders*, 82, 261-272.
- Cohen J (1983) The costs of dichotomization. *Applied Psychological Measurement* 7: 249–253.
- Connor, K. M., & Davidson, J. R. T. (2003). Development of a new resilience scale: The Connor-Davidson Resilience Scale (CD-RISC). *Depression and Anxiety*, 18(2), 76-82.
doi:<http://dx.doi.org/10.1002/da.10113>
- Costello EJ, Pescosolido BA, Angold A, Burns BJ (1998). A family network-based model of access to child mental health services. *Research in Community and Mental Health: Social Networks and Mental Illness*, 9, 165–190.
- Davies, L., Avison, W., & McAlpine, D. (1997). Significant life experiences and depression among single and married mothers. *Journal of Marriage & the Family*, 59, 294–308.
- de Leeuw, E., Hox, J., & Dillman, D. (2008). The cornerstones of survey research, In E. D. de Leeuw, J. J. Hox, & D. A. Dillman (Eds.). *International handbook of survey methodology* (pp. 1-17). New York: Lawrence Erlbaum.

- Epstein, M. H., & Quinn, K. P. (1996). A case study approach to analyzing the relationship between children and services in a system of care. *Journal of Emotional and Behavioral Disorders, 4*, 21–29.
- Farmer, E., Stangl, D., Burns, B., et al. (1999). Use, persistence, and intensity: patterns of care for children's mental health across one year. *Community Mental Health Journal 35*, 31–46.
- Farmer, E., Burns, B., Phillips, S., Angold, A., & Costello, E. (2003). Pathways into and through mental health services for children and adolescents. *Psychiatric Services 54*, (1): 60-66, <https://www.lib.uwo.ca/cgi-bin/ezpauthn.cgi/docview/620067198?accountid=15115>
- Farmer, E., Mustillo, S., Wagner, H., Burns, B., Kolko, D., Barth, R., & Leslie, L. (2010). Service use and multi-sector use for mental health issues by youth in contact with child welfare. *Children and Youth Services Review 32*, (6): 815-821, <https://www.lib.uwo.ca/cgi-bin/ezpauthn.cgi/docview/622275076?accountid=15115>
- Fletcher, D., & Sarkar, M. (2013). Psychological resilience: A review and critique of definitions, concepts and theory. *European Psychologist, 18*, 12-23.
- Forehand, R., Wierson, M., Thomas, A., Armstead, L., Kempton, T., & Neighbors, B. (1991). The role of family stressors and parent relationships on adolescent functioning. *Journal*

of the American Academy of Child & Adolescent Psychiatry, 30, 316-320.

Garland, A., Hough, R., Landsverk, J., & Brown, S. (2001). Multi-sector complexity of systems of care for youth with mental health needs. *Children's Services: Social Policy, Research, and Practice, 4, 123-140.*

Garmezy, N. (1973). Competence and adaptation in adult schizophrenic patients and children at risk, pp. 163–204 in Dean, S. R. (Ed.), *Schizophrenia: The first ten Dean Award Lectures*. NY: MSS Information Corp.

Glisson, C. & Hemmelgarn, A. (1998). The effects of organizational climate and interorganizational coordination on the quality and outcomes of children's service systems. *Child abuse & neglect 22, (5): 401-421*, <https://www.lib.uwo.ca/cgi-bin/ezpauthn.cgi/docview/619319884?accountid=15115>

Greene, William H., *Econometric Analysis*, fifth edition, Prentice Hall, 1993: 720-723.

Gorman-Smith, D., Tolan, P., & Henry, D. (2005). Promoting resilience in the inner city: Families as a venue for protection, support, and opportunity. In R. D. Peters, B. Leadbeater, & R. J. McMahon (Eds.), *Resilience in children, families, and communities: Linking context to practice and policy* (pp. 137–155). New York, NY: Kluwer

Haapasalo, J. (2000). Young offenders' experiences of child protection services. *Journal of Youth and Adolescence, 29, 355–371.*

- Hammen, C., Henry, R., & Daley, S. (2000). Depression and sensitization to stressors among young women as a function of childhood adversity. *Journal of Consulting and Clinical Psychology, 68*, 782-787.
- Hansen, K. (2003). Education and the crime-age profile. *British Journal of Criminology, 43*(1), 141-168. doi:<http://dx.doi.org/10.1093/bjc/43.1.141>
- Harris, K. M., McLean, J. P., & Sheffield, J. (2009). Examining suicide-risk individuals who go online for suicide-related purposes. *Archives of Suicide Research, 13*(3), 264-276. doi: 10.1080/13811110903044419
- Hazen, A., Hough, R., Landsverk, J., & Wood, P. (2004). Use of mental health services by youths in public sectors of care. *Mental Health Services Research, 6*, 213-226.
- Hjemdal, O., Friborg, O., Stiles, C. O., Martinussen, M., & Rosenvinge, J. H. (2006). A new rating scale for adolescent resilience: Grasping the central protective resources behind healthy development. *Measurement and Evaluation in Counseling and Development, 39*, 84-96.
- Hodges, K., & Wong, M. M. (1996). Psychometric characteristics of a multidimensional measure to assess impairment: The Child and Adolescent Functional Assessment Scale. *Journal of Child and Family Studies, 5*, 445-467.
- Horwitz, S. M., Hurlburt, M. S., Goldhaber-Fiebert, J., Heneghan, A. M., Zhang, J., Rolls-Reutz,

- J., . . . Stein, R. E. K. (2012). Mental health services use by children investigated by child welfare agencies. *Pediatrics*, *130*(5), 861-869

doi:<http://dx.doi.org/10.1542/peds.2012-1330>
- Hosmer, D., Hosmer, T., Cessie, S., Lemeshow, S. (1997). Comparison of goodness-of-fit tests for the logistic regression model. *Statistics in Medicine*, *16*, 965-980.
- Hosmer, David W.; Lemeshow, Stanley (2000). Applied Logistic Regression. New York: Wiley. [ISBN 0-471-61553-6](#).
- Hurlburt, M., Leslie, L., Landsverk, J., Barth, R., Burns, B., Gibbons, R., et al (2004). Contextual predictors of mental health service use among children open to child welfare. *Archives of General Psychiatry*, *61*, 1217-1224.
- IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.
- Jahangir, E., Irazola, V., & Rubinstein, A. (2012). Need, Predisposing, and Behavioural Determinants of access to preventative care in Argentina: analysis of the national survey of risk factors. *PLoS ONE*, *7*, e45053. doi:10.1371/journal.pone.0045053
- Jud, A., Fallon, B., & Trocme, N. (2012). Who gets services and who does not? Multi-level approach to the decision for ongoing child welfare or referral to specialized services. *Children and Youth Services Review*, *34*, 983-988.

DOI: 10.1016/j.childyouth.2012.01.030
- Kataoka, S. H., Zhang, L., & Wells, K. B. (2002). Unmet need for mental health care among

- U.S. children: variation by ethnicity and insurance status. *American Journal of Psychiatry*, 159, 1548-1555.
- Kroll, L., Rothwell, J., Bradley, D., Shah, P., Bailey, S., & Harrington, R. C. (2002). Mental health needs of boys in secure care for serious or persistent offending: A prospective, longitudinal study. *The Lancet*, 359, 1975–1979
- Laitinen-Krispijn S, Van der Ende J, Wierdsma A, Verhulst F (1999), Predicting adolescent mental health service use in a prospective record-linkage study. *Journal of American Academic Child Adolescent Psychiatry*, 38,1073–1080
- Leaf, P. J., Alegria, M., Cohen, P., Goodman, S. H., Horwitz, S. M., Hoven, C. W., . . . Regier, D. A. (1996). Mental health service use in the community and schools: Results from the four-community MECA study. *Journal of the American Academy of Child & Adolescent Psychiatry*, 35(7), 889-897.
- Lee, H. H., & Cranford, J. A. (2008). Does resilience moderate the associations between parental problem drinking and adolescents' internalizing and externalizing behaviors? A study of korean adolescents. *Drug and Alcohol Dependence*,96(3), 213-221.
doi:<http://dx.doi.org/10.1016/j.drugalcdep.2008.03.007>
- Leslie, L., Landsverk, J., Ezzet-Lofstrom, R., Tschann, J., Slyman, D., Garland, A. (2000). Children in foster care: Factors influencing outpatient mental health service use. *Child*

Abuse & Neglect, 24, 465–476.

Lipman, E. L., McMillan, H. L. & Boyle, M. H. (2011) Childhood abuse and psychiatric disorders among single and married mothers. *American Journal of Psychiatry*, 158, 73–77.

Lyons, J.S. (1999). *The Child and Adolescent Needs and Strengths for children with mental health challenges and their families*. Chicago, IL: Northwestern University.

Lyons, J.S., Rawal, P., Yeh, I., Leon, S., & Tracy, P. (2002) Use of measurement audit in outcomes management. *Journal of Behavioral Health Services & Research*, 29, (1),75-80.

MacMillan, H. L., Wathen, C. N., Jamieson, E., Boyle, M., McNutt, L.-A., Worster, A., et al. (2006). Approaches to screening for intimate partner violence in health care settings. *Journal of the American Medical Association*, 296, 530-536

Margalit, M. (2004). Second-generation research on resilience: Social-emotional aspects of children with learning disabilities. *Learning Disabilities Research & Practice* 19, (1): 45-48.

Martinussen, M., Adolfsen, F., Lauritzen, C., and Richardsen, A. M. Improving interprofessional collaboration in a community setting: relationships with burnout, engagement and service quality. *J Interprof.Care* 26(3), 219-225. 2012.

Mendenhall A. N. (2011). Predictors of service utilization among youth diagnosed with mood

disorders. *Journal of Child and Family Studies*, 21, 603-611. doi:10.1007/s10826-011-9512-x.

Mitchell, J. M., & Gaskin, D. J. (2005). Factors affecting plan choice and unmet need among supplemental security income eligible children with disabilities. *Health Services Research*, 40, 1379-1399.

Nelson, C. H., & Park, J. (2006). The nature and correlates of unmet health care needs in Ontario, Canada. *Social Science & Medicine*, 62(9), 2291-300.
doi:10.1016/j.socscimed.2005.10.014

NSCAW Research Group (2002). Methodological lessons from the National Survey of Child and Adolescent Well-Being: The first three years of the USA's first national probability study of children and families investigated for abuse and neglect. *Child Youth Services Review*, 24, 513-541.

Olfson, M., Mojtabai, R., Sampson, N. A., Hwang, I., Druss, B., Wang, P. S., . . . Kessler, R. C. (2009). Dropout from outpatient mental health care in the united states. *Psychiatric Services*, 60(7), 898-907.
doi:http://dx.doi.org/10.1176/appi.ps.60.7.898

Rautkis, M. B., & Hdalio, J. (2001). The validity of the Child and Adolescent Needs and Strengths. Presented to the Louis del Parte Florida Mental Health Institute Annual Convention.

Regier, D. A., Narrow, W. E., Rae, D. S., Regier, D. A., Narrow, W. E., Rae, D. S., et al (1993). The de facto US mental and addictive disorders service The de facto US mental and

addictive disorders service system. Epidemiologic catchment area prospective 1 year prevalence rates of disorders and services. year prevalence rates of disorders and services. *Archives of General Psychiatry*, 50, 85-94.

Reid, G., Stewart, S., Barwick, B., Cunningham, C., Carter, J., Evans, B., ... Zaric, G. (2011).

Exploring patterns of service utilization within children's mental health agencies.

The Provincial Centre of Excellence for Child and Youth Mental Health at CHEO Final Report.

Reid, G.J., Cunningham, C.E., Tobon, J.I., Evans, B., Stewart, M., Brown, J.B., Lent, B.,

Neufeld, R.W.J., Vingilis, E., Zaric, G.S., & Shanley, D.C. (2011) Help-seeking for children with mental health issues: Parents' efforts and experiences. *Administration and Policy in Mental Health and Mental Health Services Research*, 38, 384-397.

Rutter, M., Maughan, B., Mortimore, P., Ouston, J., & Smith, A. (1979). *Fifteen thousand hours.*

Cambridge, MA: Harvard University.

Rutter, M. (1987). "Psychosocial resilience and protective mechanisms". *American Journal of*

Orthopsychiatry, 57, 316–331. [doi:10.1111/j.1939-0025.1987.tb03541](https://doi.org/10.1111/j.1939-0025.1987.tb03541)

Rutter, M. (2000). Resilience reconsidered: Conceptual considerations, empirical findings, and

policy implications. In J. P. Shonkoff & S. J. Meisels (Eds.), *Handbook of early childhood intervention* (2nd ed., pp. 651–682). New York: Cambridge University Press.

Sanford Weisberg (2005). "Binomial Regression". *Applied Linear Regression*. Wiley-IEEE.

pp. 253–254. [ISBN 0-471-66379-4](#).

Sameroff, A. J., & Chandler, M. J. Reproductive risk and the continuum of caretaking casualty.

In F. D. Horowitz, M. Hetherington, S. Scarr-Salapatek, & G. Siegel (Eds.), Review of child development research (Vol. 4). Chicago: University of Chicago Press, 1975.

Sameroff, A. J., Seifer, R., & Bartko, W. T. (1997). Environmental perspectives on adaptation during childhood and adolescence. In S. S. Luthar, J. A. Burack, D. Cicchetti, & J. R. Weisz (Eds.), *Developmental psychopathology: Perspectives on adjustment, risk, and disorder* (pp. 507-526). Cambridge: Cambridge University Press.

Schilling, E., Aseltine, R., & Gore, S. (2008). The impact of cumulative childhood adversity on young adult mental health: Measures, models, and interpretations. *Social Science and Medicine*, 66, 1140-1151.

Schraeder, K. & Reid, G.J. (in press, 2014). Why wait? The effect of wait-times on subsequent help-seeking among families looking for children's mental health services. *Journal of Abnormal Child Psychology*.

Shanley, D. C., Reid, G.J., Evans, B. (2008) How parents seek help for children with mental health issues. *Administration in Policy and Mental Health and Mental Health Services Research*, 35, 135-146.

Shin, Sunny Hyucksun. 2005. Need for and actual use of mental health service by adolescents in the child welfare system. *Children and Youth Services Review*, 27, 1071-1083.

Silver, S. E., Duchnowski, A. J., Kutash, K., Friedman, R. M., Eisen, M., Prange, M. E., et al.

- (1992). A comparison of children with serious emotional disturbance served in residential and school settings. *Journal of Child and Family Studies*, 1, 43-59.
- Staghezza-Jaramillo, B., Bird, H. R., Gould, M. S., & Canino, G. (1995). Mental health service utilization among puerto rican children ages 4 through 16. *Journal of Child and Family Studies*, 4(4), 399-418.
- Stein, J., Andersen, R., & Gelberg, L. (2007). Applying the Gelberg-Andersen behavioral model for vulnerable populations to health services utilization in homeless women. *Journal of health psychology*, 12, 791-804.
- Stroul, B. A., & Friedman, R. M. (1986). *A system of care for children and youth with severe emotional disturbances*. Washington, DC: Georgetown University Child Development Center, Child and Adolescent Service System Program (CASSP) Technical Assistance Center.
- Stroul, B. A. & Friedman, R. M. (1994). *A system of care for children and youth with severe emotional disturbances*. (Revised edition). Washington, D.C.: Georgetown University Child Development Center, CASSP Technical Assistance Center.
- Tobon, J., Reid, G.J., & Neufeld, R. (2007). Investigating patterns of help-seeking and service utilization in children's mental health. *Canadian Psychology*, 48, 230.
- Ungar, M., Liebenberg, L., Dudding, P., Armstrong, M., & Van, d. V. (2013). Patterns of service

use, individual and contextual risk factors, and resilience among adolescents using multiple psychosocial services. *Child Abuse & Neglect*, 37(2-3), 150-159.

doi:<http://dx.doi.org/10.1016/j.chiabu.2012.05.007>

Wang, J. (2007). Mental health treatment dropout and its correlates in a general population sample. *Medical Care*, 45(3), 224-229.

doi:<http://dx.doi.org/10.1097/01.mlr.0000244506.86885.a5>

Widom, C. S., DuMont, K. A., & Czaja, S. J. (2007). A prospective investigation of major depressive disorder and comorbidity in abused and neglected children grown up. *Archives of General Psychiatry*, 64(1), 49-56.

Willie, N., Bettge, S., Raven-Sieberer, U. & the BELLA study Group (2008). Risk and protective factors for children's and adolescents' mental health: results of the BELLA study.

European Child and Adolescent Psychiatry, 17, 133-147.

Zwaanswijk, M., Van, d. E., Verhaak, P. F. M., Bensing, J. M., & Verhulst, F. C. (2003). Factors associated with adolescent mental health service need and utilization. *Journal of the*

American Academy of Child & Adolescent Psychiatry, 42(6), 692-700.

doi:<http://dx.doi.org/10.1097/01.CHI.0000046862.56865.B7>

APPENDICES

APPENDIX A: Example CANS Items (Lyons, 1999)

Need Item:

OPPOSITIONAL BEHAVIOR (COMPLIANCE WITH AUTHORITY)

This rating is intended to capture how the child relates to authority. Oppositional behavior is different from conduct disorder in that the emphasis of the behavior is on non-compliance to authority rather than on seriously breaking social rules, norms and laws.

0 This rating indicates that the child is generally compliant.

1 This rating indicates that the child has mild problems with compliance to some rules or adult instructions.

2 This rating indicates that the child has moderate problems with compliance to rules or adult instructions. A child who meets the criteria for Oppositional Defiant Disorder in DSM-IV would be rated here.

3 This rating indicates that the child has severe problems with compliance to rules and adult instructions. A child rated at this level would be a severe case of Oppositional Defiant Disorder. They would be virtually always disobedient.

Strength Item:**RESOURCEFULNESS**

This rating should be based on the child's ability to identify and use external/environmental strengths in managing their lives.

- 0 Child is quite skilled at finding the necessary resources required to aid him/her in his/her managing challenges.
- 1 Child is some skills at finding necessary resources required to aid him/her in a healthy lifestyle but sometimes requires assistance at identifying or accessing these resources.
- 2 Child has limited skills at finding necessary resources required to aid in achieving a healthy lifestyle and requires temporary assistance both with identifying and accessing these resources.
- 3 Child has no skills at finding the necessary resources to aid in achieving a healthy lifestyle and requires ongoing assistance with both identifying and accessing these resources.

APPENDIX B: Full Model Regression Equations for Specific Sectors of Involvement

Table B1.

Children's Aid Society.

Predictor Variables	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3a</i>
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Predisposing			
Age (years)	.92 (.87, 1.03)	.95 (.85, 1.07)	.95 (.84, 1.08)
Sex (female)	.82 (.49, .1.39)	.80 (.47, 1.37)*	.88 (.39, 1.18)
Custody (non-birthparent) ⁱ		4.74 (1.41, 15.96)*	2.96 (.83, 10.53)
Single parent ⁱⁱ		1.69 (.99, 2.88)	1.37 (.76, 2.45)
Need			
Risk factors			1.13 (1.05, 1.22)***
Protective factors			.78 (.65, .92)**
<i>Goodness of fit</i> ⁱⁱⁱ	$\chi^2_{(8)} = 9.26$	$\chi^2_{(8)} = 12.9$	$\chi^2_{(8)} = 9.59$
<i>Full model</i> χ^2	$\chi^2_{(2)} = 2.56$	$\chi^2_{(4)} = 11.50^*$	$\chi^2_{(6)} = 45.73^{***}$
<i>Delta</i> χ^2	-----	$\chi^2_{(2)} = 8.94^*$	$\chi^2_{(4)} = 34.23^{***}$

* = $p < .05$ ** = $p < .01$ *** = $p < .001$ ⁱ Birthparent custody is the reference categoryⁱⁱ Married parent is the reference categoryⁱⁱⁱ Hosmer and Lemeshow test

Table B2.

Justice

Predictor Variables	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3a</i>
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Predisposing			
Age (years)	1.35 (1.12, 1.63)**	1.01 (.91, 1.13)	1.39 (1.15, 1.69)**
Sex (female)	1.45 (.74, .2.87)	.68 (.42, 1.10)	1.63 (.80, 3.34)
Custody (non-birthparent) ⁱ			---
Single parent ⁱⁱ		1.67 (1.01, 2.75)*	.80 (.20, 3.17)
Enabling			
Abuse and/or neglect		.97 (.55, 1.70)	2.89 (1.36, 6.12)**
Need			
Risk factors			1.12 (1.02, 1.18)*
Protective factors			.93 (.76, 1.15)
<i>Goodness of fit</i> ⁱⁱⁱ	$\chi^2_{(8)} = 13.05$	$\chi^2_{(8)} = 12.62$	$\chi^2_{(8)} = 35.73$
<i>Full model</i> χ^2	$\chi^2_{(2)} = 12.79^{**}$	$\chi^2_{(4)} = 6.47$	$\chi^2_{(7)} = 33.45^{***}$
<i>Delta</i> χ^2	-----	$\chi^2_{(2)} = 6.32$	$\chi^2_{(4)} = 34.23^{***}$

* = $p < .05$ ** = $p < .01$ *** = $p < .001$ ⁱ Birthparent custody is the reference categoryⁱⁱ Married parent is the reference categoryⁱⁱⁱ Hosmer and Lemeshow test

Table B3.

Education

Predictor Variables	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3a</i>
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Predisposing			
Age (years)	1.18 (1.05, 1.33)**	1.21 (1.08, 1.37)**	1.27 (1.11, 1.46)**
Sex (female)	.65 (.39, 1.08)	.64 (.39, 1.07)	.78 (.44, 1.38)
Custody (non-birthparent) ⁱ	3.06 (.89, 10.67)	3.09 (.90, 10.62)	2.50 (.61, 10.33)
Single parent ⁱⁱ	1.55 (.95, 2.69)	1.58 (.94, 2.67)	1.15 (.62, 2.11)
Enabling			
Abuse and/or neglect		1.12 (.63, 1.99)	.55 (.26, 1.14)
Need			
Risk factors			1.35 (1.24, 1.48)***
Protective factors			.85 (.72, .99)*
<i>Goodness of fit</i> ⁱⁱⁱ	$\chi^2_{(8)} = 3.69$	$\chi^2_{(8)} = 10.30$	$\chi^2_{(8)} = 15.42$
<i>Full model</i> χ^2	$\chi^2_{(2)} = 10.82^{**}$	$\chi^2_{(4)} = 16.66^{**}$	$\chi^2_{(7)} = 96.34^{***}$
<i>Delta</i> χ^2	-----	$\chi^2_{(2)} = 5.84$	$\chi^2_{(4)} = 79.78^{***}$

* = $p < .05$ ** = $p < .01$ *** = $p < .001$ ⁱ Birthparent custody is the reference categoryⁱⁱ Married parent is the reference categoryⁱⁱⁱ Hosmer and Lemeshow test

Table B4.

Medical

Predictor Variables	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3a</i>
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Predisposing			
Age (years)	1.05 (.90, 1.12)	1.01 (.91, 1.13)	1.01 (.89, 1.13)
Sex (female)	.69 (.42, 1.11)	.68 (.42, 1.10)	.79 (.47, 1.32)
Custody (non-birthparent) ⁱ	1.40 (.40, 4.65)	1.36 (.40, 4.64)	.97 (.26, 3.61)
Single parent ⁱⁱ	1.68 (1.01, 2.73)*	1.67 (1.01, 2.75)*	1.30 (.75, 2.26)
Enabling			
Abuse and/or neglect		.97 (.55, 1.70)	.60 (.31, 1.15)
Need			
Risk factors			1.24 (1.15, 1.34)***
Protective factors			.90 (.78, 1.05)
<i>Goodness of fit</i> ⁱⁱⁱ	$\chi^2_{(8)} = 16.13^*$	$\chi^2_{(8)} = 12.62$	$\chi^2_{(8)} = 14.86$
<i>Full model</i> χ^2	$\chi^2_{(2)} = 2.43$	$\chi^2_{(4)} = 6.47$	$\chi^2_{(7)} = 54.50^{***}$
<i>Delta</i> χ^2	-----	$\chi^2_{(2)} = 4.04$	$\chi^2_{(4)} = 48.03^{***}$

* = $p < .05$ ** = $p < .01$ *** = $p < .001$ ⁱ Birthparent custody is the reference categoryⁱⁱ Married parent is the reference categoryⁱⁱⁱ Hosmer and Lemeshow test

APPENDIX C: Bivariate Regression Equations for Intake Multi-sector Involvement

Table C1.

Bivariate logistic relationships between predictor variables and intake multi-sector involvement.

	Intake Multi-sector Involvement	Significance
	OR (95% CI)	$\chi^2_{(1)}$
Predisposing		
Age (years)	1.65 (.96, 2.84)	3.47
Sex (female)	.61 (.39, .97)*	4.37*
Single parent	1.65 (.96, 2.84)	3.47
Custody (non-birthparent)	3.05 (.59, 15.71)	2.25
Need		
Intake CANS risk factors	1.34 (1.22, 1.47)***	54.13***
Intake CANS protective factors	.74 (.65, .84)***	23.14***

* = $p < .05$

** = $p < .01$

*** = $p < .001$

ⁱ Birthparent custody is the reference category

ⁱⁱ Married parent is the reference category

ⁱⁱⁱ Hosmer and Lemeshow test

Appendix D: Additional Statistics for Regression Equations

Table D1.

Multi-sector involvement at intake

Predictor	OR (95% CI)	β	<i>SE</i> β	Wald's χ^2
Constant		1.20	.99	1.48
Predisposing				
Age	.97 (.86, 1.10)	-.03	.06	.27
Sex	.64 (.38, 1.06)	-.38	.26	2.11
Custody	1.76 (.31, 10.11)	.48	.89	.29
Single parent	.73 (.40, 1.33)	-.40	.72	.31
Need				
Risk Factors	1.30 (1.18, 1.43)***	.26	.05	28.26
Protective factors	.83 (.72, .96)*	-.18	.08	5.52

Table D2.

Multi-sector involvement (mental health and CAS) at intake

Predictor	OR (95% CI)	β	<i>SE</i> β	Wald's χ^2
Constant		-1.03	.99	1.07
Predisposing				
Age	.95 (.84, 1.08)	-.06	.06	.88
Sex	.88 (.50, 1.55)	.06	.28	.04
Custody	2.96 (.83, 10.53)	.93	.64	2.10
Single parent	1.37 (.76, 2.45)	.76	.69	1.22
Need				
Risk Factors	1.13 (1.06, 1.22)**	.13	.04	11.48
Protective factors	.78 (.66, .93)**	-.245	.09	8.05

Table D3.

Multi-sector involvement (mental health and Justice) at intake

Predictor	OR (95% CI)	β	SE β	Wald's χ^2
Constant		-5.24	1.36	14.84
Predisposing				
Age	1.39 (1.15, 1.69)**	.30	.10	9.13
Sex	1.63 (.80, 3.34)	.51	.37	1.95
Single parent	.80(.20, 3.17)	-.21	.71	.09
Enabling				
Abuse and/or neglect	2.89(1.36, 6.12)**	1.08	.38	7.85
Need				
Risk Factors	1.12 (1.02, 1.18)*	.11	.05	4.91
Protective factors	.93 (.76, 1.15)	-.06	.11	.29

Table D4.

Multi-sector involvement (mental health and Medical) at intake

Predictor	OR (95% CI)	β	SE β	Wald's χ^2
Constant		-.76	.88	.74
Predisposing				
Age	1.01 (.89, 1.13)	-.01	.06	.01
Sex	.79 (.47, 1.32)	-.20	.27	.55
Custody	.97 (.26, 3.61)	-.11	.66	.03
Single parent	1.30 (.75, 2.26)	-.31	.56	.31
Enabling				
Abuse and/or neglect	.60 (.31, 1.15)	-.55	.33	2.82
Need				
Risk Factors	1.24 (1.15, 1.34)***	.22	.04	31.48
Protective factors	.90 (.78, 1.05)	-.10	.07	1.90

Table D5.

Multi-sector involvement (mental health and Education) at intake

Predictor	OR (95% CI)	β	SE β	Wald's χ^2
Constant		-2.70	.99	7.39
Predisposing				
Age	1.27 (1.11, 1.46)**	.22	.07	9.81
Sex	.78 (.44, 1.38)	-.26	.29	.76
Custody	2.50 (.61, 10.33)	.81	.71	1.30
Single parent	1.15 (.62, 2.11)	-.44	.60	.53
Enabling				
Abuse and/or neglect	.55 (.26, 1.14)	-.67	.37	3.33
Need				
Risk Factors	1.35 (1.24, 1.48)***	.28	.04	42.51
Protective factors	.85 (.72, .99)*	-.16	.07	5.99

Table D5.

Longitudinal multi-sector involvement

Predictor	Intake only				EoI only				Intake and EoI			
	OR (95%CI)	β	SE β	Wald's x^2	OR (95%CI)	β	SE β	Wald's x^2	OR (95%CI)	β	SE β	Wald's x^2
Intercept		.29	1.47	.04		-.36	1.48	.06		.29	1.18	.06
Predisposing												
Age	.77 (.62, .97)*	-.24	.12	4.50	1.03 (.83,1.29)	.03	.11	.06	.93 (.78, 1.11)	-.07	.09	.58
Sex	.72 (.26, 1.95)	-.37	.51	.52	1.41 (.57, 3.49)	.35	.46	.58	.77 (.36, 1.66)	-.28	.39	.50
Single parent	.62 (.21, 1.79)	-.44	.55	.64	.41 (.13,1.30)	-.93	.59	2.42	1.44 (.66, 3.17)	.39	.40	.92
Need												
Intake risk factors	1.18 (1.07,1.48)**	.18	.08	4.43	.93 (.78, 1.11)	-.07	.09	.71	1.27 (1.10,1.47)**	.24	.07	12.17
Intake protective factors	.84 (.62, 1.13)	-.14	.16	.78	.79 (.58, 1.04)	-.24	.15	2.58	.76 (.60, .96)*	-.26	.12	4.51
EoI risk factors	1.29 (1.10,1.52)**	.25	.08	9.02	1.26 (1.01,1.48)**	.24	.08	8.34	1.27 (1.10,1.47)**	.24	.07	10.77
EoI protective factors	.95 (.73, 1.23)	-.06	.14	.17	.98 (.76, 1.27)	-.02	.13	.01	.96 (.78, 1.19)	-.03	.11	.10

Covariates

Total visits	1.01 (.99, 1.03)	.01	.01	.43	1.02 (.99, 1.04)	.02	.01	1.8	.01	.01	.48
Duration (months)	1.02 (.99, 1.05)	.02	.01	2.5	.99 (.97, 1.03)	-.01	.01	.01	.01	.01	.46

Note: all degrees of freedom = 1

Curriculum Vitae

Christian Hahn

Education

- 2012- present M.Sc. Candidate, Clinical Psychology, The University of Western
Ontario, London, Ontario
- 2008- 2012 Bachelor of Arts (honours Psychology), Saint Mary's University, Halifax,
Nova Scotia

Honours and Awards

- 2012-2014 Western Graduate Research Scholarship
- 2013- 2014 Ontario Graduate Scholarships Master's Scholarship
- 2012-2013 Joseph-Armand Bombardier Canada Graduate Scholarships Program Master's
Scholarship
- 2011-2012 Coy Family Scholarship
- 2011-2012 Clinical Psychology Award
- 2009-2012 Saint Mary's University Dean's List
- 2009- 2012 Saint Mary's University Academic Achievement Scholarship

Academic Work Experience

- 2014- present Research Assistant, London Health Sciences Centre
- 2012- present Graduate Teaching Assistant, Psych 2800, Psych 2810, Psych 2310, The
University of Western Ontario
- 2013 Research Assistant, The University of Western Ontario
- 2011-2012 Research Assistant, Saint Mary's University

2011-2012 Research Assistant, Capitol District Health Authority

2010-2012 Undergraduate Teaching Assistant, Psych 1260, Psych 2340, Psych 3317,
Saint Mary's University

Poster Presentations

Reid G, Brown J, **Hahn C**, (June, 2013). Caring for Children and Youth with Ongoing Mental Health issues: Perspectives of Providers in Primary Health Care. Poster presented at the Trillium Primary Health Care Research Day, Canada, Ontario, Toronto

Konopasky R, Lariviere K, **Hahn C**, (January, 2013). Bullying: Should Psychology Change the Public Discourse from “Bullying” to “Assault Causing Injury”? Poster presented at the National Institute for the Teaching of Psychology, 35th Annual Conference, United States, Florida, St. Pete's Beach

Hahn C, Fowler D, (June, 2012). Moderating Variables in Treatment Decisions for GAD and MDD. Poster presented at the 73rd Annual Convention of the Canadian Psychological Association, Canada, Nova Scotia, Halifax

Konopasky B, **Hahn C**, (June 2012). Punishing Bullying: Young Bullies are Given a Pass Even for Bloodying and Bruising, but the Feet of Older Bullies are Held to the Flames. Poster presented at the 73rd Annual Convention of the Canadian Psychological Association, Canada, Nova Scotia, Halifax

Konopasky B, MacKinlay J, **Hahn C**, (January, 2012). Information Not Tested is Information Not Learned: What Student Researcher Participants didn't Know, Wouldn't Learn, or Wouldn't Take Seriously. Poster presented at the National Institute for the Teaching of Psychology, 34th Annual Conference, United States, Florida, St. Pete's Beach

Hahn C, Kocum L, MacDonald K, (June, 2011). Impacts of Self-esteem and Feedback on

Perceived Fairness of an Evaluator Target. Poster presented at the 72nd Annual Convention of the Canadian Psychological Association, Canada, Ontario, Toronto

Kocum L, MacDonal K, Talley A, **Hahn C**, (June, 2011). When Our Basic Psychological Needs are Threatened (and met): Experimental Evidence of Same- and Opposite-sex Sexism. Poster presented at the 72nd Annual Convention of the Canadian Psychological Association, Canada, Ontario, Toronto

Hahn C, Harris B, Franc J, Verge L, (March, 2011). Layperson Familiarity with Psychotherapeutic Orientations. Poster presented at the 26th Annual Saint Mary's University Undergraduate Psychology Conference, Canada, Nova Scotia, Halifax