

A PSYCHOSOCIAL LOOK INTO TYPES OF BULLYING VICTIMIZATION

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By

James M. Tamayose

Thesis Committee:

Michael Salzman, Chairperson

Min Liu

Ronald H. Heck

## **Abstract**

Bullying affects many adolescents in America. Although widely recognized as a problem, research has been complicated by bullying's many definitions and types. Further, findings have been mixed across types, gender, and social contexts. Although an interpersonal problem, bullying shares a compelling relationship with individuals' sense of belonging, perceived safety, and sense of self-worth. In this study, I analyzed a sample of 8,048 eight graders (4,134 females and 3,915 males) from 501 schools who participated in the 2011 Trends in Mathematics and Science Study (TIMSS). I applied latent class analysis (LCA) to identify typologies associated with physical, verbal, and relational bullying. Although I did not find these specific types of bullying, for my three-class model, gender and sense of belonging were significant predictors of latent class membership. I discuss the effect of statistical remedies such as modeling direct relationships between predictors and indicators in the study of bullying and offer recommendations.

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## CHAPTER 1. INTRODUCTION

My introduction is composed of four sections. In the opening section, I present the problem of bullying from a real world and research perspective. I then highlight challenges which have been identified by researchers who have studied bullying. Afterward, I describe the motivating factors which have inspired my study. Lastly, I outline my study's contributions to the literature.

### **Problem**

Bullying is a problem in America. According to the National Center of Educational Statistics (NCES), over 30% of middle school students in America, grades six through eight, reported being bullied during the 2011-2012 school year (Robers, Kemp, & Truman, 2013). Despite the prevalence of bullying in America's schools, the true nature of the problem is unknown due to non-reporting. In 2010, the NCES estimated that as many as two-thirds of bullied students did not report being victimized at the time of victimization (Petrosino, Guckenburg, DeVoe, & Hansen, 2010). To complicate matters, the problem of bullying is exacerbated by a wide range of assessment methods (Crothers & Levinson, 2004; Swearer, Espelage, Vaillancourt, & Hymel, 2010), stakeholders' perceptions (Vaillancourt et al, 2008) and definitions for bullying (Smith et al., 2002; Monks & Smith, 2006). Further, bullying has been demonstrated to be an antecedent, consequence, and correlate for a spectrum of negative outcomes (Bender & Losel, 2011; Hamilton, 2012; Swearer, Espelage, Vaillancourt, & Hymel, 2010). Regardless of whether bullying is an antecedent, consequence, or a correlate, bullying remains a serious dilemma (Batsche & Knoff, 1994; Robers et al., 2013; Smith, 2011).

## **Scope of Problem**

The variability of bullying as an antecedent, consequence, and correlate affords for many possibilities and challenges for the study of bullying (Bovaird, 2010; Olweus, 2010; Smith, 2011). To explore bullying, researchers have adopted a number of theoretical frameworks, some of which I present later, and utilized an array of assessment methods (Bovaird, 2010; Swearer, Espelage, Vaillancourt, & Hymel, 2010; Swearer, Siebecker, Johnsen-Frerichs, & Wang, 2010). As a result of such explorations, researchers have acknowledged several challenges in addition to the aforementioned problem of underreporting. These challenges include concerns about self-reporting (Bovaird, 2010; Furlong, Sharkey, Felix, Tanigawa, & Green, 2010), comparability of results (Swearer, Siebecker, Johnsen-Frerichs, & Wang, 2010) and measurement issues (Olweus, 2013). Despite these challenges, researchers have suggested that bullying is a complex phenomenon comprised of a network of within- and across-person variables (Swearer & Doll, 2001).

## **Purpose of My Study**

The main purpose for my study is to determine whether three commonly found types of bullying, namely physical, verbal, and relational are present in a sample of American students. For this study, bullying is defined as a form of aggression in which one or more children intend to harm or disturb another child who is perceived as being unable to defend himself or herself (Glew, Rivara, & Feudtner, 2000). A second purpose of my study is to investigate the relationship between these types of bullying, gender, and individuals' human needs. Findings pertaining to gender differences have been mixed across these three types of bullying. With respects to individuals' human needs, equally impressive arguments where human needs serve as an antecedent and are affected as a consequence of bullying have been presented and will be



covered in greater detail in the paper. The material I cover will suggest that, human needs such as perceived safety, sense of belonging, and self-worth share a relationship with bullying.

### **Statement of Research Questions**

To achieve my intended purposes, my study addresses the following research questions

1. Are the three types of bullying victimization present in this sample of American students? If so or not, what kinds of attributes are associated with the identified types of bullying victimization?
2. For the identified types of bullying victimization, are there gender differences? If so, are these gender differences consistent with those reported in the literature (e.g. males with physical aggression, females with relational aggression)?
3. For the identified types of bullying victimization, are there differences in their effects on human needs? If so, what is the magnitude of these differences across these types of victimization?

### **Significance of my Study**

In answering my research questions, my study makes three contributions. First, my study adds to a relatively small number of studies which have applied a person-centered approach, namely latent class analysis (LCA), to investigate typologies of individuals' bullying victimization experiences. Second, by applying LCA, my study offers an empirical description of attributes associated with each type of bullying victimization experience. In addition to describing each type of bullying, the inclusion of the predictors; gender and human needs which includes perceived safety, sense of belonging, and sense of self-worth offer deeper detail into the formation of the types of bullying. Specifically, my study highlights the role of human needs as

a protective factor against different kinds of bullying victimization experiences. To this end, my study makes three contributions to the study of adolescent bullying.

## **CHAPTER 2. REVIEW OF THE LITERATURE**

My review of the literature is comprised of five sections. I open by describing the process I used to collect resources for the review. In the second section, I cover the literature related to bullying. I follow my coverage of bullying by discussing three psychological factors of bullying, perceived safety, sense of belonging, and sense of self-worth. In the fourth section, I offer an overview of LCA. Finally, I end my review with a summary and a second presentation of my research questions.

### **Literature Search**

For my review I conducted searches for each of the sections. In addition to section searches, I conducted subsection-specific searches for each type of bullying, LCA, and the use of LCA for studying bullying. For all searches, I gathered resources such as journal articles from the Google Scholar database as well as textbooks. I did not have a preference for the time of publication especially with regards to the section on LCA.

With respect to bullying, I limited the scope of my literature search to adolescents. Although I limited my scope to adolescents, adolescents can be involved in bullying with other age groups depending on the context. For this reason, I included resources where adolescents were studies with other age groups, but excluded resources which did not study adolescents at all. To expand my breadth, I included relevant literature tied to aggression. Admittedly, while including the literature on aggression adds a layer of intricacy to bullying, I defend my decision to include aggression based on the inclusion of aggression in published meta-analyses (Merrell, Gueldner, Ross, & Isava, 2008; Ttofi, Farrington, & Losel, 2012) and reviews (Hong & Espelage, 2012; Swearer, Espelage, Vaillancourt, & Hymel, 2010) on bullying. After combining

resources from aggression and bullying, I did not have a preference for studies which investigated aggressors/bullies, victims, bystanders or the non-involved.

## **Bullying**

Although researchers have not yet come to a consensus regarding the definition of bullying, researchers have come to some agreement when describing bullying (Swearer, Espelage, Vaillancourt, & Hymel, 2010). Researchers have acknowledged that bullying consists of behaviors which are intentionally harmful, repetitive in nature, and indicative of an imbalance of power between the bully and the victim (Felix, Sharkey, Green, Furlong, & Tanigawa, 2011; Solberg, Olweus, & Endresen, 2007; Swearer, Espelage, Vaillancourt, & Hymel, 2010). Further, researchers have recognized that bullying behaviors can take direct and indirect forms (Espelage, Mebane, & Swearer, 2004; Jimerson, Swearer, & Espelage, 2010, Smith & Sharp, 1994). These direct and indirect forms of bullying can encompass a wide range of behaviors (Bovaird, 2010). Consequently, the breadth of behaviors which researchers could use when defining bullying has presented issues regarding the comparability of bullying across studies (Swearer, Siebecker, Johnsen-Frerichs, & Wang, 2010).

Despite the absence of a universal definition, bullying has long been recognized as a problem (Batsche & Knoff, 1994; Espelage & Swearer, 2003; Robers et al., 2013; Swearer, Espelage, Vaillancourt, & Hymel, 2010). The problem of bullying extends beyond students and researchers. In fact, studies have shown that various stakeholders such as parents (Sawyer, Mishna, Pepler, & Wiener, 2011; Stockdale, Hangaduambo, Duys, Larson, & Sarvela, 2002), teachers and school-related personnel (Boulton, 1997; Dake, Price, Telljohann, & Funk, 2004; Kochenderfer-Ladd & Pelletier, 2008; Mishna, Scarcello, Pepler, & Wiener, 2005), and policymakers (Limber & Small, 2003; Srabstein, Berkman, & Pyntikova, 2008) perceive

bullying to be a problem. Studies (e.g. Maunder, Harrop, & Tattersall, 2010; Naylor, Cowie, Cossin, Bettencourt, & Lemme, 2006; Vaillancourt et al., 2008) which have demonstrated discrepancies between students' and other stakeholders' perceptions of bullying provide insight on the difficulties researchers face when conducting research. In spite of these discrepancies across stakeholders and a lack of a universal definition from the research community, bullying is still a pervasive problem.

Bullying is such a widespread problem that researchers all over the world have given bullying attention (Cook, Williams, Guerra, & Kim, 2010; Craig et al., 2009; Smith et al., 2002). While studies (e.g. Hussein, 2010; Konishi et al, 2009; Li, 2008) have found some similarities of bullying in cross-cultural contexts, bullying behaviors have been found to be perceived differently across cultures. Researchers (Chen & Astor, 2010; Due et al., 2005; Ortega et al., 2012) have attributed these cross-cultural differences to relevant values which shape individuals' responses and cognitions. Researchers (Carlyle & Steinman, 2007; Konishi et. al, 2009; Smith et al., 2002) have suggested that discretion should be used when generalizing findings across socio-cultural contexts though bullying is a recognized as a problem around the world, variability in socio-cultural values may cause observed differences between groups to be incommensurable.

In light of the issue of incommensurability, researchers (Baker, 1998; Espelage, Bosworth, & Simon, 2000; Hong & Espelage, 2012; Lee, 2010) have acknowledged the need to understand contextual factors which affect individuals. Accordingly, researchers have examined social (Cassidy, 2009; Espelage, Holt, & Henkel, 2003; Gini, 2006a) and ecological (Bacchini, Esposito, & Affuso, 2009; Barboza, Schiamberg, Oehmke, Korzeniewski, Post, & Heraux, 2009; Green, Dunn, Johnson, & Molnar, 2011) factors of bullying. Moreover, the relationship between bullying and contextual factors has been modeled through a variety of theoretical frameworks.

Although assumptions and objectives associated with relationships between variables may generate incommensurability across studies, the need to include contextual factors reflects the complexities of bullying.

### **Social theories and models for examining bullying.**

While my list is not exhaustive, researchers have utilized concepts from Bandura's (1989) social cognitive theory, Bronfenbrenner's (1979) social ecological model, Crick and Dodge's (1994) social information processing theory, and Tajfel and Turner's (1979) social identity theory to investigate the dynamics of bullying. While researchers make different assumptions about bullying across frameworks, these frameworks offer different clues about the complex nature of bullying. As with cross-cultural studies, caution needs to be exercised when generalizing findings across socio-cultural contexts; as findings may not be comparable to justify conclusions drawn about the relationship between contexts and individuals. Aside from the cautionary note, researchers have been able to gather support for the relationship between context and bullying through using the aforementioned theories and models.

In the context of bullying, Bandura's social cognitive theory posits that a part of an individuals' knowledge about bullying is acquired by observing others and direct experience (Anderson & Bushman, 2002; Bandura, Ross, & Ross, 1963; Espelage et al., 2000). Individuals can acquire knowledge about bullying from observing aggressive acts portrayed in the media (Huesmann, Moise-Titus, Podolski, & Eron, 2003) and multimedia such as video games (Anderson et al., 2010; Sherry, 2001) as well as by experiencing corporal punishment (Muller, Hunter, & Stollak, 1995; Patterson, DeBaryshe, & Ramsey, 1990). Although individuals can gain knowledge from observing others and direct experience, the decision to act on knowledge is determined in part by consequences, vicarious reinforcement, and self-reinforcement (Bandura,

1977). Roughly translated, cognitions about the efficacy of bullying is comprised of thoughts pertaining to consequences associated with bullying as well as its level of self and social acceptance. These cognitions are characterized by symbols which represent events, operations, and relationships (Bandura, 1977).

Researchers applying Bronfenbrenner's social ecological model view the context as a hierarchical structure comprised of several interrelated systems. To investigate the hierarchical structure in the context of bullying, researchers have applied multilevel modeling techniques to the study the relationship between individuals and countries (Due et al., 2009), communities (Chaux, Molan, Podlesky, 2009), schools (Ma, 2001; Mehta, Cornell, Fan, & Gregory; 2013), classrooms (Sentse, Scholte, Salmivalli, & Voeten, 2007), and groups of individuals including peers (Espelage et al., 2003) and families (Khoury-Kassabri, Benbenishty, Astor, & Zeira, 2004). Collectively, findings from these studies indicate that individuals' perceptions and bullying-related experiences can be influenced by various interrelated systems. Hence, individuals' interactions with these systems allow individuals to acquire knowledge about various bullying contexts and experiences.

Individuals' learned knowledge involves processing of cues (Crick & Dodge, 1994). In their Social Information Processing model, Crick and Dodge (1994) proposed that individuals' situational responses are the result of encoding and interpreting informational cues and clarifying goals. Further, these situational responses are manifests of the real-time effects of cognition (Li, Fraser, & Wike, 2013). Real-time effects of processing do not tap latent cognitive structures which contain beliefs and values unless actively accessed (Crick & Dodge, 1994; Fontaine, 2008). As responses to social situations are formed, individuals consider the content and efficacy of their immediate responses as well as likely outcomes but do not necessarily involve

comprehensive information processing (Crick & Dodge, 1994). In studies with adolescents, researchers (Calvete & Orue, 2012; Crick & Werner, 1998; Werner and Nixon, 2005) have found positive relationships between attitudes towards, engagement in, and justification for the use of bullying behaviors. To elaborate, when individuals perceive bullying as acceptable, they are likely to engage in it under the premise that it is an effective and quick mechanism for solving problems.

While the theoretical frameworks I have presented indicate that individuals can learn and process information about bullying from a variety of sources, the specific content of that information is not explicitly discussed. Tajfel and Turner's (1979) social identity theory when applied to the context of bullying can address this issue. Social identity theory posits that individuals' social identity is derived from membership in groups which are characterized by a set of prescribed behaviors (Brown, 2000; Ojala & Nesdale, 2004). Further, the meaning that individuals pull from their membership in groups is linked to their self-esteem (Brown, 2000; Cassidy, 2009). This link guides the nature of individuals' responses as they evaluate threats to aspects of the self across social contexts (Ellemers, Spears, & Doojse, 2002). These threats emerge as a product of in- and out-group comparisons and dynamics (Tajfel & Turner, 1979). Empirical investigations have demonstrated support for social identity theory in bullying contexts such as in-group favoritism and out-group discrimination (Gini, 2006b; Ojala & Nesdale, 2004), sense of connectedness to friends (Cassidy, 2009; Holt & Espelage, 2007), as well as specific groups such as classrooms (Scholte, Sentse, & Granic, 2010) and student cliques (Killeya-Jones, Costanzo, Malone, Quinlan, & Miller-Johnson, 2007). To sum, as posited by Tajfel and Turner (1979), the valence of individuals' social identity is determined by these evaluations of in- and out-group comparisons.



To recap this section, bullying is a complex social problem that can be explored through a range of social theoretical frameworks. Although I reviewed just four theoretical frameworks, I have shed some light on the intricate nature of the bullying problem. The intricacies of bullying suggest that it is a multilevel problem, one that involves the acquisition and processing of information. Information which is generated through interactions with various systems is used to form self and social identities. These identities reflect the ways individuals respond in bullying situations. Finally, while findings and inferences about the relationships between individuals and systems need to be made with caution, I conclude that theoretical frameworks which consider social phenomena such as observational learning (Bandura, 1989), environmental (Bronfenbrenner, 1979) and situational (Crick & Dodge, 1994) enhances understanding of bullying.

### **Types of bullying.**

In this section I review the literature on three types of bullying, physical, verbal, and relational. As part of my review, I have committed a subsection to each type of bullying with each subsection containing a description and examples of behaviors. Additionally, I introduce several outcomes associated with that subsection's type of bullying. I follow this by presenting a discussion on gender and continue with a short overview of the social context for that bullying type. I close each subsection with a short summary. After the final subsection, I end my review with a summary of the three types of bullying.

### ***Physical bullying.***

*Physical bullying* refers to action-oriented bullying characterized by overt violence directed at individuals (Jacobsen & Bauman, 2007; Rose, Monda-Amaya, & Espelage, 2011; Smokowski & Kopasz; 2005). Examples of physical bullying include hitting, kicking, punching,

shoving, biting, taking personal belongings and throwing things (Kim & Leventhal, 2008; Raskaukas & Stoltz, 2007; Veenstra, Lindenberg, Oldehinkel, DeWinter, & Ormel, 2005). Since these behaviors are observable, physical bullying is the easiest type of bullying to identify (Smokowski & Kopasz, 2005). Additionally, physical bullying has been found to be perceived as the most serious type of bullying by parents (Sawyer et al., 2011), school staff (Bauman & Del Rio, 2006; Hazler, Miller, Carney, & Green, 2001), and students (Maunder et al., 2010). Despite the seriousness of physical bullying, the relationship between physical bullying and other phenomena suggests that physical bullying is more complex than the violence people observe.

Aside from the immediate harm of cuts, bruises, and damaged property, physical bullying has been linked to outcomes such as substance abuse (Tharp-Taylor, Haviland, & D'Amico, 2009), suicide ideation and attempt (Klomek, Marrocco, Kleinman, Schonfeld, & Gould, 2008), depression (Klomek et al., 2009), and higher social anxiety (Yen et al., 2013) for victims and bullies. In fact, physical bullying may also lead to future physical bullying in the short- (Glover, Gough, Johnson, & Cartwright, 2000; Unnever, 2005) and long-term (Bender & Losel, 2011; Pepler, Jiang, Craig, & Connolly, 2008). Some individuals may engage in weapon carrying (Dukes, Stein, & Zane, 2010; Webster, Gainer, & Champion, 1993), and adopt avoidant coping strategies (Batsche & Knoff, 1994) to protect themselves against physical bullying. Finally, physical bullying may lead into other types of bullying as social contexts change and new needs emerge (Pellegrini & Long, 2002; Pepler, Craig, Connolly, Yulie, McMaster, & Jiang, 2006).

With the regards to gender and physical bullying, research has suggested that males are more likely than females to be involved as bullies (Wang, Iannotti, & Nansel, 2009; Williams & Guerra, 2007), victims (Tharp-Taylor, 2009; Wang et al., 2009), and bully-victims (Craig et al., 2009). Further, males and females adopt different types of coping mechanisms to deal with

physical bullying (Kepenekci & Cinkir, 2006; Kristensen & Smith, 2003). Differences in preferences of coping mechanisms across genders may be due to differences in the way genders perceive the morality of physical bullying (Ahmed, 2005; Athanasiades & Deliyanni-Kouimtzis, 2010; Gini, 2006b). For example, perceived differences in the importance of size and strength in physical bullying contexts may affect involvement in physical bullying (Kaukiainen et al., 1999, Olweus, 1997, Rigby & Slee, 1991).

Research in the area of physical aggression has stressed the importance of considering the social context of physical bullying. Individuals who experience familial adversity and are situated in hostile households marked by physical aggression are likely to engage in physical aggression (Bevan & Higgins, 2002; Haapasalo & Tremblay, 1994; Schwartz, Dodge, Pettit, & Bates, 1997). Moreover, individuals adopting physically aggressive behaviors may actually be imitating the behaviors of their role models (Bandura et al., 1963; Smokowski & Kopasz, 2005; Piotrowski & Hoot, 2008). Given their experiences, individuals may construe physical aggression as a suitable means to an end (Smokowski & Kopasz, 2005). Support for this comes from the notion that the mind processes aggression in an efficient manner (Anderson & Huesmann, 2003; Berkowitz, 1990; Markovits, 2013). Taken together, individuals may perceive physical aggression as desirable because it converges with the behaviors of role models and requires less time and cognitive processing of information. Finally, the social context plays an important role in physical bullying because the information that is processed by individuals varies from situation to situation.

To summarize, physical bullying is an action-oriented form of bullying which encompasses a wide of range of behaviors. The effects of physical bullying have been linked to a variety of immediate and long-term outcomes. While gender differences pertaining to physical

bullying have been found and were presented earlier, physical bullying is a complex problem that extends from the individual and into the social context. Lastly, irrespective of the intricacies of physical bullying, physical bullying is perceived to be a serious problem by students, parents, and teachers.

### ***Verbal bullying.***

*Verbal bullying* involves the use of words to hurt individuals' self-concept (Bauman & Del Rio, 2006; Infante, 1995; Smokowski & Kopasz, 2005; Wang et al., 2009). Verbal bullying encompasses behaviors ranging from teasing (Bauman & Del Rio, 2006), name calling (Rivers & Smith, 1994), making prejudiced remarks (Kristensen & Smith, 2003) and verbal threats (Jacobsen & Bauman, 2007). Although episodes of verbal bullying can be observed, the short duration of these episodes makes it hard for individuals to detect and intervene (Smokowski & Kopasz, 2005). To complicate matters, individuals may not perceive verbal bullying as being as serious as physical bullying; even though verbal bullying is experienced by just as many if not more individuals (e.g. Craig et al., 2009; Kepenkci & Cinkir, 2006; Wang et al., 2009). While most episodes of verbal bullying are short and may not be seen as serious, the effects of verbal bullying can remain with individuals for a long time (Glover et al., 2000; Infante, 1995; Smokowski & Kopasz, 2005).

Since the effects of verbal bullying can manifest long after verbal bullying has ended, researchers (Bjorkqvist 1994; Infante, Riddle, Horvanth, & Tumlin, 1992; Jacobsen & Bauman, 2007) have suggested that verbal bullying is more sophisticated than physical bullying. To elaborate, in order for verbal bullying to be effective, individuals must know that their behaviors will negatively influence another individual's self-concept (Hamilton, 2012; Infante & Wigley, 1986; Sutton, Smith, & Swettenham, 1999). Verbal bullying has been shown to have a

deleterious impact to individuals' self-concept when attacks are directed at individuals' physical appearance (Jankauskiene, Kardelis, Sukys, & Kardeliene, 2008; Janssen, Craig, Boyce, & Pickett, 2004), personality and behavioral mannerisms (Horowitz et al., 2004), and status (Grandey, Kern, & Frone, 2007; Keltner, Young, Heerey, Oemig, & Monarch, 1998). Individuals whose self-concept has been verbally attacked may experience feelings of embarrassment, inadequacy, hopelessness, anger, shame, and hostility (Hamilton, 2012; Infante et al., 1992; Rodriguez Mosquera, Fischer, Manstead, Zaalberg, 2008; Tangney, Wagner, Fletcher, & Gramzow, 1992). To combat these feelings, individuals may respond by engaging in verbal and physical bullying, withdrawing from situations, and in some cases attempting suicide (Borowsky, Taliaferro, & McMorris, 2013; Hamilton, 2012; Rodriguez Mosquera et al., 2008).

Unlike physical bullying where gender differences are evident, gender differences in verbal bullying are less pronounced as findings with respect to gender have been inconsistent across studies (Archer, 2004; Card, Stucky, Sawalani, & Little, 2008; Knight, Guthrie, Page, & Fabes, 2002, Salmivalli, Kaukiainen, & Lagerspetz, 2000). Meta-analyses conducted by Archer (2004), Bettencourt and Miller (1996), Card et al., (2008), Eagly and Steffen (1986), and Hyde (1984) suggest that when gender differences were present, males were more likely than females to be involved in verbal bullying. However, the meaningfulness of gender differences may be difficult to interpret when generalizing findings from research contexts to real world contexts (Card et al., 2008; Hyde, 1984). Consequently, researchers have advocated for further investigation into the dynamics of the bully and victim relationship as well as other contextual factors which have an association with verbal bullying (Card et al., 2008; Bjorkqvist, 1994).

The dynamics and context of the bully and victim relationship determine whether verbal bullying is an antecedent or consequence (Hamilton, 2012). To elaborate, verbal bullying can be

reactive and proactive (Crick & Dodge, 1996; Hubbard, McAuliffe, Morrow, & Romano, 2010). Reactive verbal bullying manifests as a hostile defensive response to social thwarting; whereas proactive verbal bullying occurs when an outcome is anticipated (Little, Jones, Henrich, & Hawley, 2003). Further, meanings associated with the outcome determine whether the verbal bullying is hostile or instrumental (Bushman & Anderson, 2001; Coie, Dodge, Terry, & Wright, 1991; Ramirez, 2009). To clarify, when a bully's intent ends at hurting an individual, verbal bullying is hostile in nature. When a bully's intent is to use verbal bullying to achieve some other end, such as to maintain control, then verbal bullying is considered instrumental. In sum, the nature of verbal bullying is determined by the purpose, outcome, context and dynamics between the bully and victim.

In sum, verbal bullying describes a type of bullying where individuals use words to attack the self-concept of others. While the duration of verbal bullying is generally short, the effects can remain with individuals for an extended period of time. Individuals who have experienced attacks to their self-concept may experience distress in the form of shame, anger, embarrassment, and hopelessness. Although individuals have several options for coping with verbal bullying, such as retaliation and withdrawal; inconsistent findings such as those pertaining to gender have led some researchers to explore the social context of verbal bullying. To this end, I conclude that understanding the problem of verbal bullying requires an understanding of the relationship and nature of interactions between the bully and victim.

### ***Relational bullying.***

*Relational bullying* describes a type of bullying that is characterized by covert acts of aggression which are used to manipulate relationships between individuals (Crick & Grotpeter, 1995; Espelage et al., 2004; Smokowski & Kopasz, 2005). Covert acts which fall under

relational bullying include intentionally excluding individuals from activities, making threats to withdraw from an existing relationship, using others, and spreading rumors (Archer & Coyne, 2005; Little et al., 2003; Prinstein, Boergers, & Vernberg, 2001). The covert nature of these acts makes relational bullying difficult for individuals to identify, assess, and intervene (Bjorkqvist, 1994; Merrell, Buchanan, & Tran, 2006; Young, Boye, & Nelson, 2006). As a result, relational bullying is seen as a sophisticated type of bullying that deserves more attention (Olweus, 2010; Underwood, Galen, & Paquette, 2001; Yoon, Barton, & Taianol, 2004).

Aside from the immediate consequences of covert acts, relational bullying has been associated with other phenomenon such as weapon carrying (Dukes et al., 2010, Goldstein, Young, & Boyd, 2008) and bodily injury (Dukes et al., 2010) as well as internalization of problems such as depression, anxiety, and loneliness (Card et al., 2008; Merrell et al., 2006; Prinstein et al., 2001). Additionally, relational bullying has been linked with attitudes toward school climate (Dukes, Stein, & Zane, 2009). As a corollary, peer maladjustment caused by relational bullying during adolescence can lead to increased likelihood of school dropout (Ehrenreich, Reeves, Corley, & Orpinas, 2012; Parker & Asher, 1987). In light of these consequences, researchers (Card et al., 2008; Olweus, 2010; Underwood et al., 2001; Yoon et al., 2004) have called for increased understanding of the developmental, situational, and contextual factors of relational bullying.

Although relational bullying increases from childhood to adolescence (Bjorkqvist, 1994; Merrell et al., 2006; Ojanen & Kiefer, 2013; Yoon et al., 2004), there appears to be two major views regarding gender and relational bullying in adolescence (Smith, Rose, & Schwartz-Mette, 2010). With the first view, females are more likely than males to be involved in relational bullying (Bjorkqvist, 1994; Crick & Grotpeter, 1995). Under the second, gender differences are

negligible (Archer, 2004; Card et al., 2008). Contexts where findings pertaining to gender have been mixed include sibling-parent relationships (Updegraff, Thayer, Whiteman, Denning, & McHale, 2005; Yu & Gamble, 2006), romantic relationships (Goldstein & Tisak, 2004; Leadbeater, Banister, Ellis, & Yeung, 2008), and social status among peers (Rose, Swenson, & Waller, 2004; Salmivalli et al., 2000; Zimmer-Gembeck, Pronk, Goodwin, Mastro, & Crick, 2013). Amidst the support for both views, researchers have expressed agreement that understanding relational bullying requires recognition of the self-construal of the bully as well as the victim in their shared context (Crick & Dodge, 1994; Cross & Madson, 1997; Ostrov & Godleski, 2010; Underwood et al., 2001). As a consequence, there is no definitive answer to whether gender differences in relational bullying exist (Espelage et al., 2004; Olweus, 2010).

Despite the absence of a definitive answer for gender differences, relational bullying appears to be strongly tied to social status. Relational bullying serves as a mechanism for image and social status enhancement which comes with the benefit of avoiding the stigma attached with other forms of bullying (Cillessen & Mayeux, 2004; Puckett, Aikins, & Cillessen, 2008, Walcott, Upton, Bolen, & Brown, 2008). In light of the benefits of relational bullying, individuals who engage in relational bullying may also experience more relational victimization (Leadbeater, Boone, Sangster, & Mathieson, 2006) and maybe disliked more than non-relationally aggressive individuals (Vaillancourt & Hymel, 2006). Further, individuals rated as less popular are more likely than individuals rated as more popular to internalize problems (Rose & Swenson, 2009). Taken together, these findings suggest that the nature of the effects from relational bullying are tied to perceptions of self and social identity.

To encapsulate, relational bullying involves the use of covert acts to manipulate relationships. These covert acts have deleterious consequences on individuals. In coping with



relational bullying, individuals may carry weapons, internalize problems, and even quit school. Although gender differences in relational bullying have been found, there is an equally impressive number of contrasting findings. Finally, relational bullying appears to have an association with social status as evinced by individuals who are perceived less favorably being at greater risk than individuals who are perceived more favorably of experiencing the effects of relational bullying.

### ***Summary on types of bullying.***

In this subsection on types of bullying, I reviewed the literature on physical, verbal, and relational bullying. Although each type of bullying has distinct characteristics, the one characteristic they share is that they are all associated with some form of harm. Regardless of whether individuals experience physical, emotional, or psychological harm, the bottom line is that bullying is a problem which is linked to many negative outcomes. While negative outcomes are problematic, antecedents associated with each type of bullying reveal another layer of the problem. Despite the inconsistency of gender differences both across and within types of bullying, researchers have acknowledged the importance of context. Finally, although these types are categorical in nature, individuals may experience more than one type of bullying.

### **Concluding remarks on bullying.**

Bullying is a problem which affects individuals in a multitude of ways. Individuals can be affected through physical, verbal, or relational manifestations, many of which evoke short- and long-term harm. Since bullying requires a bully and a victim, there is reason and empirical support to view bullying as a social problem. When bullying is viewed as a social problem, researchers have encountered a number of difficulties, perhaps the most important being a lack

of agreement for the definition of bullying. Notwithstanding the lack of consensus, bullying remains an ever-present problem all over the world.

## **Human Needs**

In this section, I present an overview of three human needs. My overview is built around the human needs presented by Maslow (1943). Although Maslow (1943) presented a hierarchy of five needs, I cover the middle three needs of Maslow's five-need hierarchy. Specifically, I cover perceived safety, sense of belonging, and sense of self-worth. I close the section with a summary on human needs.

### **Perceived safety.**

Perceived safety describes conclusions individuals draw from thinking about threats which affect their sense of security (Maslow, 1943). Individuals' sense of security is affected when they are faced with uncertainty (Maslow, 1943; Milliken, 1987; Pyszczynski, Greenberg, Solomon, 1997; Van den Bos & Lind, 2002). When individuals are faced with uncertainty, they experience anxiety tied to the unreliability and unpredictability of the world around them (Maslow, 1943). This unreliability and unpredictability may leave individuals feeling vulnerable to more anxiety brought upon by a breakdown of anxiety coping mechanisms (Pyszczynski & Kesebir, 2011). To cope with anxiety, individuals may develop beliefs (Greenberg et al., 1992; Hayes, Schimel, & Williams, 2008) and engage in self-defeating behaviors (Prince & Howard, 2002; Greenberg et al., 1990) aimed at restoring individuals' sense of security.

In education, perceived safety has been examined in contexts such as school-community violence (Ozer & Weinstein, 2004), school climate (Bosworth, Ford, & Hernandez, 2011), ethnic diversity (Juvonen, Nishina, & Graham, 2006), and bullying (Batsche & Knoff, 1994; Glew, Fan,

Katon, & Rivara, 2008; Goldstein et al., 2008; Graham, 2006). Individuals' perceived safety has been measured through risk and protective factors (Aisenberg & Herrenkohl, 2008; Horner et al., 2009; Sharkey, You, & Schnoebelen, 2008). Examples of measured risk and protective factors include school size (Bosworth et al., 2011); presence of security personnel (Bachman, Randolph, & Brown, 2011; Perumean-Chaney & Sutton, 2013); and involvement in criminal and violent behavior (Brand, Felner, Shim, Seitsinger, & Dumas, 2003). Despite the variety of measures used to investigate perceived safety across a range of educational contexts, I now turn my attention to the context of bullying in educational settings.

The effect of bullying on individuals' perceptions of safety in educational settings has been associated with several negative outcomes and various forms of psychological distress. Negative outcomes include increased school absenteeism (Esbensen & Carson, 2009), self-injury (Schneider, O'Donnell, Stueve, & Coulter, 2012), attempted suicide (Borowsky et al., 2013), bringing weapons to school (Dukes et al., 2010; Malecki & Demaray, 2003) and decreased academic achievement (Card & Hodges, 2008). Forms of psychological distress include suicide ideation (Borowsky et al., 2013), depression (Glew et al., 2008), adopting retaliatory attitudes (Bradshaw, O'Brennan, & Sawyer, 2008), feelings of insecurity associated with competence (Card & Hodges, 2008), and loss of hope (Hong & Espelage, 2012; Kvarme, Helseth, Saeteren, & Natvig, 2010). The effect of bullying on individuals' perceptions of safety spans a complex mix of phenomenon.

Adding to this complex blend, researchers have also examined the relationship between perceptions of safety and bullying in environmental contexts and diverse groups. Environmental contexts include perceptions of safety regarding various locations on- and off-campus (Goldstein et al., 2008; Vaillancourt et al., 2010), individuals' perceived safety when traveling to and from

schools (Espelage et al., 2000), the presence of gangs (Forber-Pratt, Aragon, Espelage, 2014), and school disorder (Swartz, Reynolds, Henson, & Wilcox, 2011). Explorations into diverse groups includes studies on gifted children (Peterson & Ray, 2006), individuals with diverse sexual orientations (Goodenow, Szalacha, & Westheimer, 2006; Toomey, McGuire, & Russell, 2012), ethnicity (Bachman et al., 2011; Juvonen et al., 2006), student athletes (Steinfeldt, Vaughan, LaFollette, & Steinfeldt, 2012) and students with special needs (Saylor & Leech, 2009). Although a relationship between bullying and perceived safety is evident, I postulate that the extent of the effects produced by this relationship is influenced to some degree by contextual factors and individuals' identities.

In summary, perceived safety is an elaborate construct that spans a range of phenomena. This range encompasses individual and social contexts as well as risk and protective factors which collectively influence individuals' perceived safety. In the context of bullying in education, individuals who do not feel safe are likely to experience negative outcomes and various forms of psychological distress. I speculate that these negative outcomes and psychological distress may have resulted from a breakdown of coping mechanisms or as a means to restore a sense of security during uncertain times. Regardless of my speculation, individuals' perceived safety is tied to conclusions individuals draw about threats to their sense of security.

### **Sense of belonging.**

*Sense of belonging* refers to the extent to which individuals' perceives themselves to be an indispensable and integral part of a system (Anant, 1967). Sense of belonging emerges after individuals' physiological and safety needs have been addressed (Anant, 1967; Maslow, 1943). After individuals address these needs, a sense of belonging can be developed through meaningful relationships with others (Baumeister & Leary, 1995). Individuals in meaningful relationships

recognize their reciprocal influence and relatedness to others (Baumeister & Leary, 1995; McMillan & George, 1986). By recognizing their reciprocal influence and relatedness to others, individuals are able to experience a sense of belonging to a system.

In education, sense of belonging describes individuals' attachment (Hill & Werner, 2006), bonding (Maddox & Prinz, 2003), connectedness (Libbey, 2004), relatedness (Furrer & Skinner, 2003), and engagement (Fredricks, Blumenfeld, & Paris, 2004) towards individuals and their schools (Jimerson, Campos, & Greif, 2003; Osterman, 2000). Individuals' sense of belonging has been measured by studying individuals' enjoyment with school (Hill & Werner, 2006), their ability to make friends (Hamm & Faircloth, 2005), their participation in school activities (Goodenow & Grady, 1993), and the degree to which individuals can establish relationships with school personnel (Gutman & Midgley, 2000). Sense of belonging has been found to be negatively correlated with conduct problems (Loukas, Ripperger-Suhler, & Horton, 2009) and emotional distress (Wilkinson-Lee, Zhang, Nuno, & Wilhelm, 2011), and positively correlated with student-teacher relationships (Wentzel, 1998) and achievement (Konishi, Hymel, Zumbo, & Li, 2010). Despite these findings, the nature of sense of belonging appears to differ in the context of school bullying.

Although individuals who feel disconnected to others and schools are likely to bully (Hong & Espelage, 2012; Wilson, 2004), individuals' underlying motive for bullying may be tied to their desire to attain or maintain a sense of belonging (Burns, Maycock, Cross, & Brown, 2008; Salmivalli, 2010). Bullying provides empowering opportunities for individuals to express their sense of belonging (Burns et al. 2008; Nation, Vieno, Perkins, & Santinello, 2008). Additionally, bullying may serve as a mechanism for using attention to create a path for acceptance (Espelage, Bosworth, & Simon, 2001; Swearer, Espelage, Vaillancourt, & Hymel,

2010; Veenstra, Lindenberg, Munniksma, & Dijkstra, 2010). In some situations, individuals use bullying to establish themselves as leaders (Boulton & Smith, 1994), achieve valued goals held in esteem by others (Dijkstra, Lindenberg, & Veenstra, 2008), and avoid emotional loneliness (Ireland & Power, 2004). In sum individuals may turn to bullying as a means and end for expressing their sense of belonging.

While individuals who turn to bullying may experience an enhanced sense of belonging, individuals who are bullied may experience a diminished sense of belonging (Bacchini et al., 2009; Kearney, 2008; Pryce & Frederickson, 2013, Salmivalli, 2010; You, Furlong, Felix, Sharkey, Tanigawa, & Green, 2008). In fact, researchers (Bacchini et al., 2009; Morrison, 2006; O'Brennan, Bradshaw, & Sawyer, 2009) have suggested that increased exposure to bullying regardless of involvement can influence individuals' sense of belonging. Further, non-involved individuals can also influence and have their sense of belonging influenced by involved and other non-involved individuals (Gini, Pozzoli, Borghi, & Franzoni, 2008; Loge & Frydenberg, 2005; Salmivalli, 2010). Taken together, the effect of bullying on individuals' sense of belonging appears to be varied across individuals.

Although the effect of bullying on individuals' sense of belonging appears to be mixed, I would like to contain the message of this section in three points. First, sense of belonging is a complex construct in which individuals can feel a sense of belonging to other individuals and entities such as groups and schools. Second, in the context of education, sense of belonging can be an antecedent and a consequence of bullying. Third, the role individuals play in a context of bullying may also influence their sense of belonging.

## **Sense of self-worth.**

*Sense of self-worth* refers to individuals' desire to possess a stable positive evaluation of themselves (Maslow, 1943). The development of self-worth can come from feelings of adequacy and recognition (Covington, 1984; Maslow, 1943). An individual's need to feel adequate and be recognized is an essential part of their subjective life experience (Crocker & Wolfe, 2001; Maslow, 1943). As part of an individual's life experience, self-worth plays a role in determining behavioral choices (Heine, Lehman, Markus, & Kitayama, 1999). When individuals are unable to locate pathways for attaining a positive sense of self-worth, they are at risk of becoming discouraged (Maslow, 1943), acting violently to deal with threats to self-worth (Baumeister, Smart, & Boden, 1996), suppressing threats to ego by inflating self-worth (Greenberg & Pyszczynski, 1985), and engaging in avoidant behaviors (Adler, 1927).

For the context of education, individuals' sense of self-worth is a product of their socialization (Rosenberg, Schooler, & Schoenbach, 1989). Although socialization is a broad concept, researchers have discussed self-worth in educational contexts such as social ability (Wigfield, Eccles, Iver, Reuman, & Midgley 1991), social comparison (Crocker & Major, 1989), self-worth management strategies (Thompson, 1994), and temporal and situational social development (Harter, Waters, & Whitesell, 1998; Harter & Whitesell, 2003). Self-worth has been linked specifically to processes such as goal setting (Schunk, 1990; Zimmerman, Bandura, & Martinez-Pons, 1992), academic attainment (Zimmerman et al., 1992), achievement task valuation (Wigfield & Eccles, 2002), and student engagement (Ames, 1992). To sum, when individuals are situated in educational contexts, they have a variety of outlets for evaluating their self-worth.

In the context of bullying in education, self-worth can serve as protective factor against bullying (O'Moore & Kirkham, 2001) as well as a conducive factor for bullying (Baumeister et al., 1996). While low self-worth has been linked to victimization (Egan & Perry, 1998; Graham & Juvonen, 1998; Pollastri, Cardemil, O'Donnell, 2010) and anti-social behaviors (Donnellan, Trzesniewski, Robins, Moffitt, & Caspi, 2005), high self-worth has been associated with non-involvement of bullying (Pollastri et al., 2010) as well as involvement in bullying as a bully (Baumeister et al., 1996; Salmavalli, 2001). To elaborate, high self-worth individuals may bully others to suppress threats to their egos (Baumeister et al., 1996), express feelings of superiority over others (Baumeister, 2006), and enact a sense of entitlement to others' resources or to do as they please (Ang, Ong, Lim, & Lim, 2010). One plausible explanation for the mixed nature of high self-worth on bullying involvement appears to be tied to whether individuals are exhibiting narcissistic tendencies (Baumeister, Bushman, & Campbell; 2000; Campbell, Rudich, & Sedikides, 2002). In sum, bullying appears to depend on the level of one's self-worth as well as whether it has a protective or conducive function.

Earlier, I stated via citation of Rosenberg et al. (1989) that individuals' self-worth is a product of one's socialization. Researchers (e.g. Bandura, 1999; Crocker & Wolfe, 2001; Rosenberg, Schooler, Schoenbach, & Rosenberg, 1995) have established a link between the level of individuals' self-worth and learned values. In bullying contexts, bullies and victims may adopt morally disengaging practices that they have learned to manage their sense of self-worth (Bandura, 1999). Morally disengaging practices include displacing responsibility as well as blaming, disregarding, and dehumanizing others (Bandura, 1999). The perceived benefits and consequences of such practices can be attributed to individuals' socialization (Bandura, 1999; Bandura, Barbaranelli, Caprara, & Pastorelli, 1996).



To summarize, self-worth represents individuals' desire to hold a positive evaluation of themselves. That desire can be attributed to individuals' socialization. Differences in an individuals' socialization influence the way and how individuals evaluate the benefits and consequences of their behaviors. When considering bullying, individuals may elect to morally disengage themselves in order to justify their behavior. Individuals' decision to morally disengage themselves are a product of their socialization, namely their level of self-worth and mechanisms for evaluating self-worth such as perceptions about benefits and consequences of their learned behaviors.

### **Studies that have Applied Latent Class Analysis to Study Bullying**

Here I provide a review of studies where LCA was selected to investigate bullying. Despite the small number of published studies, I posit that researchers applying LCA have made a contribution towards understanding bullying. I present three lines of research, of which the third is the basis for my study. Admittedly, while these three lines of research are arbitrary, I conclude they capture the underlying uses of LCA in the study of bullying. Finally, I hope that in addition to the main contributions to the literature from this study, I aim to make an additional contribution through this review.

In preparing my review, I gathered articles from the Google Scholar database. My search began with the keywords *latent class analysis* and *bullying*. Although my search retrieved articles outside my interests, I retained articles whose target population were adolescents. In total, I reviewed 13 articles authored between 2007 and 2013.

In the 13 articles, I noticed researchers applying LCA for three different purposes. These purposes correspond with levels of experience (Nylund, Bellmore, Nishina, & Graham, 2007;

Rosen, Underwood, Beron, Gentschn, Wharton, & Rahdar, 2009), types of involvement (Bettencourt & Farrell, 2013; Giang & Graham, 2007; Goldweber, Waasdorp, & Bradshaw, 2013a; Lawson, Alameda-Lawson, Downer, & Anderson, 2013; Lovegrove, Henry, & Slater, 2012; Waasdorp & Bradshaw, 2011; Williford, Brison, Bender, Jenson, Forrest-Bank, 2011; Whiteside, Ranney, Chermack, Zimmerman, Cunningham, & Walton, 2013), and concomitant experiences associated with types of involvement (Bradshaw, Waasdorp, & O'Brennan, 2013; Goldweber, Waasdorp, & Bradshaw, 2013b; Wang, Iannotti, Luk, & Nansel, 2010). Although some overlap exists across studies and purposes, I use these three purposes as theoretical underpinning for the three lines of research. These lines of research are represented as section headers for the following section on LCA-specific bullying research.

### **Lines of bullying research.**

In this section, I present three lines of research based off three purposes for applying LCA to study bullying. Each line of research is allotted its own subsection. I begin each subsection by describing that line of research's general aim. This is followed by a description of a respective line's latent classes. After presenting the aim and latent classes, I review the work conducted within each line of research. Once all three lines have been covered, I conclude with a summary of all three lines. For more detailed information about the studies being reviewed in this section, I refer interested readers to Appendix A.

### ***Latent class analysis of levels of experience.***

In the first line, researchers identify latent classes which correspond with different levels, degrees, or magnitudes of bullying experiences. Specifically, participants are classified into easy to interpret groups such as no or low, medium, and high (Nylund, Bellmore, Nishina, & Graham, 2007; Rosen et al., 2009). Although only two of the 13 studies (Nylund, Bellmore, Nishina, &

Graham, 2007; Rosen et al., 2009) fall under this line of research, it is distinctly different from the other two. While the scope of both studies was limited to victimization, other types of experiences and involvement can also be modeled by levels.

I present three key findings from Nylund, Bellmore, Nishina, & Graham (2007) and Rosen et al. (2009) who both used longitudinal data. First, both Nylund, Bellmore, Nishina, & Graham (2007) and Rosen et al. (2009) consistently identified low-, medium-, and high-victimization classes across time. Second, latent classes were found to be significant predictors of depression associated with loneliness (Nylund, Bellmore, Nishina, & Graham, 2007), anxiety and withdrawal (Rosen et al., 2009). Third, gender was not a significant predictor in predicting latent class membership.

On top of the findings, I conclude this line has one key limitation. Although Nylund, Bellmore, Nishina, & Graham (2007) and Rosen et al. (2009) were able to identify stable low, medium, and high classes, the underlying meaning of such labels may be different in terms of actual experiences. To clarify, while labels such as low, medium, and high are easy to interpret, the actual experiences underlying these levels are sample-specific. Consequently, boundaries which separate low from medium and medium from high can vary across samples even though these categories remain. Despite this limitation, I adopt the view that this line of research is appropriate and important when a sample is well-understood and the guidelines separating levels of experience of bullying have been well-defined.

### ***Latent class analysis applied to identify types of bullying involvement.***

In this line of research LCA is used to classify individuals into types of involvement. Typically, researchers have classified individuals into groups such as bully, victim, bully-victim,

and non-involved. In my review, this line represents eight of the 13 studies (Bettencourt & Farrell, 2013; Giang & Graham, 2007; Goldweber et al., 2013a; Lawson et al., 2013; Lovegrove et al., 2012; Waasdorp & Bradshaw, 2011; Whiteside et al., 2013; Williford et al., 2011).

Although there is no present standard for naming groups, I emphasize the substantive meaning of groups across studies. I concluded that reviewing the literature in this manner aids in describing groups across the eight studies.

Before moving on, I posit this line of research offers three distinct benefits. First, researchers can identify simple and complex types of involvement. Second, researchers can identify and differentiate between complex types of involvement. Finally, researchers gain valuable insight into their research contexts by considering simple and complex types of involvement. In other words, researchers are able to view multiple types of involvement simultaneously. As a result, researchers have a global view of types of individuals within their research contexts.

#### *Identified types of bullying involvement.*

In this subsection I discuss two types of involvement. The first, which I describe as *simple*, is comprised of involvement types such as bully, victim, non-involved, and positively-involved. The second, which I call *complex*, is composed of bully-victims and victim-bullies. For each type, I describe features of involvement, then offer a critique on the strengths and weaknesses of the involvement types across studies.

The simple involvement type is comprised of four subtypes of involvement, bully, victim, non-involved, and positively-involved. The simple involvement type is characterized by two features. First, individuals have a high probability to endorse items which correspond to a

specific subtype. For example, individuals assigned to the bully subtype have high probabilities for endorsing items which indicate bullying. Second, individuals have low probabilities to endorse items indicating membership in other subtypes. For example, an individual in the bully group will have low probabilities to endorse items which indicate non-involvement or victimization.

Of these four subtypes, bully and victim are the simplest. Individuals assigned to bully or victim subtypes, have high probabilities to endorse items which correspond with bullying or victimization. Across studies, researchers have consistently labeled the victim subtype as the victim class. In my review, all five studies containing a victim involvement class (Bettencourt & Farrell, 2013; Giang & Graham, 2007; Goldweber et al., 2013a; Lovegrove et al., 2012; Williford et al., 2011), researchers explicitly used *victim*.

However, researchers use different terms when describing the bully subtype. While seven out of eight studies (Bettencourt & Farrell, 2013; Giang & Graham, 2007; Lawson et al., 2013; Lovegrove et al., 2012; Waasdorp & Bradshaw, 2011; Whiteside et al., 2013; Williford et al., 2011) identified a type of bully latent class, only one (Lovegrove et al., 2012) explicitly described the class with *bully*. The six other studies described the bully subtype by using *aggressors*. Despite the difference in name, I posit that bully and aggressor classes serve the function of being the opposite of a victim class. To support my view, I found no instances where researchers identified a bully and aggressor class in the same study.

In addition to bully and victim subtypes, non-involvement falls into the simple involvement type. Individuals in the non-involvement subtype are characterized with low probabilities for endorsing bullying and victimization items. In the context of my review, six of

eight studies contained a non-involvement latent class. Individuals in non-involved classes have been described as well-adjusted (Bettencourt & Farrell, 2013), socially adjusted (Giang & Graham, 2007), low-involved (Goldweber et al., 2013a), no-risk (Lawson et al., 2013), and uninvolved (Lovegrove et al., 2012; Williford et al., 2011). While latent classes associated with non-involvement are conceptually similar across studies, differences in interpretation of the literal meaning of non-involvement can present challenges.

*Non-involvement* is the withdrawal from activities of a group (*Merriam-Webster's Collegiate Dictionary, 2005*). This definition creates a challenge because non-involvement can occur without withdrawal from a group. As a result, non-involvement can be interpreted in two ways. First, non-involvement can be interpreted as individuals who are not bullies or victims. Second, non-involvement can be interpreted as a withdrawal from the activities of bullies or victims. The studies being reviewed in this subsection use the first interpretation, and the studies I review in the third line use the second interpretation.

Before closing my review on simple involvement, I happened upon a proactive role, called *active/support seeking* by Waasdorp and Bradshaw (2011). Members of the active/support seeking class had two unique characteristics. First, members had a high probability for endorsing nonaggressive coping strategies such as asking adults for help and talking with bullies. Second, members had a low probability for adopting aggressive coping strategies. These aggressive strategies include bullying the bully in retaliation, bullying others, and being argumentative towards others. Although Waasdorp and Bradshaw (2011) limited their analysis to victimized students, I feel their study can be extended to include students who were not victimized.

The complex type is composed of two subtypes, bully-victims and victim-bullies. Membership in these subtypes is marked by high probabilities to endorse items which indicate bullying and victimization. Subtypes such as bully-victims and victim-bullies suggest that involvement is not static. Hence, individuals can assume more than one role. Additionally, bully-victims and victim-bullies are not interchangeable terms that refer to the same type of involvement.

Three concerns arise when viewing bully-victims and victim-bullies as equivalent subtypes. First, researchers may draw incorrect conclusions due to differences in underlying attributes of bully-victims and victim-bullies. Second, researchers have to determine the substantive equivalency of roles. Third, despite underlying differences, researchers have a tendency to use *bully-victim* interchangeably to describe different bullying experiences. The nonequivalence of bully-victims and victim-bullies is why I placed them into a complex type of involvement.

To elaborate on my first concern, I noticed four different variants of the bully-victim and victim-bully subtype. In the first variant, members had high probabilities for endorsing bullying and victimization items (Bettencourt & Farrell, 2013; Giang & Graham, 2007; Goldweber, Waasdorp, Bradshaw, 2013a; Lovegrove et al., 2012; Williford et al., 2011). In the second variant, individuals were likely to endorse bullying but not victimization (Bettencourt & Farrell, 2013; Giang & Graham, 2007; Lawson et al., 2013; Whiteside et al., 2013). A third variant, is the opposite of the second, individuals were likely to endorse victimization but not bullying (Bettencourt & Farrell, 2013; Giang & Graham, 2007; Lawson et al., 2013). Lastly, Waasdorp and Bradshaw (2011) identified a type of class where membership is indicated by endorsement of aggressive and non-aggressive forms of coping with bullying.

I propose that differences in the four variants of bully-victim and victim-bully classes can lead researchers to draw incorrect conclusions. To illustrate my point, I refer to Lawson et al. (2013) and Lovegrove et al. (2012). In both studies, a *bully-victim* class was identified. However, the underlying attributes associated with bully-victim are different. In Lawson et al. (2013), bully-victims have a high probability for endorsing victimization items related and a low probability for endorsing bullying items. In contrast, bully-victims in Lovegrove et al.'s study (2012), are likely to endorse items associated with victimization and bullying. Drawing the conclusion that members of these respective *bully-victim* class are similar is fundamentally incorrect.

In addition to drawing incorrect conclusions, researchers have to deal with equating groups who have different names but have similar underlying attributes. To demonstrate, I again refer to Lawson et al. (2013) and Lovegrove (2012). When the bully-victim class from Lawson et al. (2013) serves as a reference group, the equivalent group from Lovegrove et al. (2012) is the *bully* group. However, when Lovegrove et al.'s (2012) bully-victim class is used as the reference group, individuals would be classified into the *multiple risk* group used in Lawson et al. (2013). While this concern appears small when only two studies are presented, the magnitude of this concern increases as more studies and classes are examined.

Finally, I found a tendency for researchers to use *bully-victim* over *victim-bully*. Seven out of eight studies identified a bully-victim class. However, only two (Bettencourt & Farrell, 2013; Giang & Graham, 2007) included a victim-bully class. While victim-bullies had higher probabilities for endorsing victimization than bullying in both studies, bully-victim classes did not necessarily function as the opposite of victim-bullies. In Bettencourt and Farrell (2013), the aggressive-victim class was characterized with endorsing bullying and victimization items,



whereas in Giang and Graham (2007), the probabilities for endorsing victimization were higher than bullying.

In summary, bully-victims and victim-bullies are different subtypes of complex involvement. In this subsection, I presented three concerns regarding the treatment of bully-victim and victim-bully subtypes as equivalent types of involvement. While a tendency for researchers to use bully-victim over victim-bully was evident, I feel there is a need to pay attention to the underlying attributes of bully-victims and victim-bullies.

***Latent class analysis of types of bullying experiences using symptoms.***

For this line of research, researchers classify individuals into latent classes using indicators which correspond with different forms of bullying behavior. One example of an indicator is *being called mean names* (Wang et al. 2010). Further, the indicator *being called mean names* corresponds with a symptom of verbal bullying victimization. Finally, the relationship between types of bullying victimization and their respective indicators should be supported from theory.

In this line of research, researchers (Bradshaw et al., 2013; Goldweber et al., 2013b; Wang et al., 2010) have identified types of bullying such as verbal (Bradshaw et al., 2013; Goldweber et al., 2013b; Wang et al., 2010), physical (Bradshaw et al., 2013; Goldweber et al., 2013b), and relational (Bradshaw et al., 2013, Wang et al., 2010). While indicators for verbal and physical bullying are relatively straightforward, the scope covered by indicators for relational bullying varies across studies. For instance, Goldweber et al. (2013b) included bullying by way of e-mail and electronic messaging as part of relational bullying, while Wang et al. (2010) operationalized e-mail and electronic messaging to be part of cyberbullying. Despite

researchers' preferences as to how indicators were operationalized, the latent classes and characteristics identified by these researchers are consistent with well-established types of bullying found in the literature.

With respect to gender and human needs, gender differences were found for all three studies. Unfortunately, human needs were not explored and as such I limit further discussion to gender differences. Although gender differences were found for all three studies, the direction of these differences differ across the three studies. For Goldweber et al. (2013b) females were more likely than males to be victimized, whereas males were more likely to be victimized in the study conducted by Wang et al. (2010). When bullying was experienced, males were found to experience higher physical victimization while females were found to experience higher relational victimization (Bradshaw et al., 2013). Despite these differences, these findings need to be interpreted with caution as the number of underlying indicators for each type of bullying varies across these studies. However, from what researchers analyzed, gender differences were found in all three studies.

In summary, the third line of bullying research using LCA involves the use of indicators corresponding with bullying behaviors to form types of bullying experiences. At the time of this writing, I was only able to find three relevant studies. Despite the small number of studies, physical, verbal, and relational bullying were identified and investigated in all of these studies. While gender differences were found in these studies, human needs such as perceived safety, sense of belonging, and sense of self-worth were not investigated. Consequently, there is an opportunity to explore the relationship between bullying and human needs.

## **Bullying and Human Needs**

The reduction of bullying coupled with enhanced emphasis on meeting human needs are necessary components in creating positive environments (Bucher & Manning, 2005; Wilson, 2004). While indicators of human needs, such as sense of belonging and perceived safety have been suggested to be positively correlated (Bucher & Manning, 2005; Libbey; Whitlock, 2006), this correlation appears to vary across bullying and bullying-like contexts. Findings from Bradshaw et al. (2008), Glew et al. (2008), and Harel-Finch et al. (2011) support the sense of belonging-perceived safety positive correlation position, while conclusions drawn by Feigenberg, King, Barr, & Selman (2008), Ferrans, Selman, & Feigenberg (2012), Meyer-Adams & Conner (2008) have suggested otherwise. As a result, I conclude there is a need to further investigate the relationship between bullying and human needs.

To examine the relationship between bullying and human needs, I disentangle the previously introduced contrasting conclusions. Feigenberg et al. (2008) found that safety is not necessarily of prime concern when individuals provide protection to those whom they share a sense of belonging. Further, they conclude that when individuals feel they can be proactive, standing up for what they feel is right overpowers concerns about safety. As an extension, Ferrans et al. (2012) concluded that sense of belonging and safety work in tandem but address needs on different levels. The nature of the dynamics between human needs such as sense of belonging and safety are affected by comparative evaluations involving an intrapersonal sense of perceived safety and an interpersonal sense of belonging.

Issues pertaining to the relationship between bullying and human needs emerge from a measurement perspective. Meyer-Adams & Conner (2008) determined that safety although statistically related to their other constructs, was dropped. In Meyer-Adams & Conner (2008)

sense of belonging was retained. In a study by Espelage et al. (2001) sense of belonging to school and perceived school safety were both found to be non-significant predictors of bullying. You et al. (2008) measured school connectedness by including sense of belonging to others and perceived safety at school. Collectively, these findings suggest that the relationship between bullying, sense of belonging, and perceived safety can be examined in an assortment of ways.

To rehash the major points of this section, increasing individuals' sense of self-worth, sense of belonging, and perceived safety while decreasing bullying is critical in creating positive environments. While some researchers have found a positive correlation between sense of belonging and perceived safety, the nature and direction of this correlation is dependent on how sense of belonging and perceived safety are modeled alongside bullying. Finally, when examined in a social context of bullying, findings have indicated that sense of belonging and perceived safety may operate in concert but do so on different levels.

### **Latent class analysis in the context of this study**

Since researchers (e.g. Crick & Grotpeter, 1995; Moon & Jang, 2014; Nansel, Overpeck, Pilla, Ruan, Simons-Morton, & Scheidt, 2001; Olweus, 2003; Rivers & Smith, 1994; Smokowski & Kopasz, 2005) have recognized various types of bullying, data sets may contain several distributions that correspond with these types of bullying. The presence of these distributions suggest that a grouping method such as cluster or latent class analysis is needed (Laursen & Hoff, 2006). Between LCA and cluster analysis, LCA has features that are not found in Cluster Analysis. These features include statistical indices to evaluate models (Muthén & Muthén 2000), allowing for individuals to hold membership in more than one group (Nagin 2002; Wang & Wang, 2012), and accounting for measurement error for the grouping variables (DiStefano &

Kamphaus, 2006). As a result of these features, LCA is more appropriate than cluster analysis for studying types of bullying.

Given the literature I have reviewed, I posit that human needs, particularly sense of self-worth, sense of belonging, and perceived safety as well as gender have an effect on the type of bullying victimization they experience. The following are my research questions

1. Are the three predominantly recognized types of bullying victimization present in this sample of adolescents? If so or not, what kinds of attributes are associated with the identified types of bullying victimization?
2. For the identified types of bullying victimization, are there gender differences? If so, are these gender differences consistent with those reported in the literature (e.g. males with physical aggression, females with relational aggression)?
3. For the identified types of bullying victimization, are there differences in their effects on human needs? If so, what is the magnitude of these differences across these types of victimization?

## CHAPTER 3. METHOD

### Data and Sampling Procedures

I analyzed data from the 2011 Trends in Mathematics and Science Study (TIMSS). The 2011 TIMSS was an international comparative study that assessed math and science knowledge and skills of fourth- and eighth-grade students from over 50 countries (Provasnik, Kastberg, Ferraro, Lemanski, Roey, & Jenkins, 2012). The 2011 TIMSS used the International Standard Classification of Education (ISCED), an international standard for describing levels of schooling to ensure comparability of grade levels across countries (Mullis, Martin, Ruddock, O'Sullivan, & Preuschoff, 2009). Using the ISCED, fourth- and eighth-graders were defined as the fourth- and eighth- year of formal schooling counting from the first year of ISCED Level 1. In addition to assessing math and science, background data from students, teachers, and principals were also collected (Rutkowski, Rutkowski, & Wild, 2013). The 2011 TIMSS used a two-stage stratified cluster design where schools were sampled with intact classrooms. For further details about 2011 TIMSS' sampling procedures, readers are directed to Martin and Mullis (2012).

### Participants

For the 2011 TIMSS, 10,477 American eighth-grade students from nine states participated in the 2011 TIMSS. From the total sample of 10,477 students; I analyzed a subsample of 8,048 students (4,133 females or 51.4% and 3,915 males or 48.6%) from 501 schools (average school sample size of 16.064 students) who reported being bullied at least once during the past school year. The average age for the analyzed sample was 14.40 years old with a standard deviation of 0.551 years. To the best of my knowledge, the 2011 TIMSS data sets do not contain a variable to differentiate individuals by state.

## **Missing Data**

From the sample of 10,477 students, I removed 115 students were from subsequent analyses due to missing data for all of the variables. I then deleted 2,107 non-bullied students. I conducted missing data analyses on the remaining 8,255 students. The results from my missing data analyses, although not included here, suggested that less than two and a quarter percent of the cases and less than three-quarters of a percent of the responses values were missing. Following the missing data analyses, I used listwise deletion to remove an additional 184 students were removed for having missing data on the bullying items.

Of the 8,071 remaining students, I conducted missing data analysis for the human needs items. I found that 23 cases (or about a quarter of one percent) accounted for 27 missing responses (about a tenth of a percent). Subsequently, these 23 cases were deleted. This sample of 8,048 student was the sample I analyzed to obtain the preliminary and main results. Although the deletion of students with missing data leads to a slight underrepresentation of the sample, the issue of non-reporting of bullying, which I mentioned in the introduction section, make estimation of missing data an undesirable choice.

## **Instrument**

### **Indicators of bullying.**

I analyzed responses from *The TIMSS 2011 Students Bullied at School Scale, Eighth Grade* (SBS). The six-item SBS asked respondents to report the frequency of various forms of bullying experiences which occurred during the current school year. Students were given four response options, “Never”, “A few times a year”, “Once or twice a month”, and “At least once a week”. With regards to psychometric properties, as reported in the 2011 TIMSS, the SBS had a scale reliability, calculated as Cronbach’s Alpha of 0.78 and principal component loadings for

items ranging from 0.62 – 0.75. Table 1 includes the item as well as which type of bullying I operationalized each item for this study.

Table 1  
*List of items and operationalization*

<u>Item</u>	<u>Bullying Type</u>
I was made fun of or called names	Verbal
I was left out of games or activities by other students	Relational
Someone spread lies about me	Relational
Something was stolen from me	Physical
I was hit or hurt by other student(s)	Physical
I was made to do things I didn't want to do by other students	Relational

To improve statistical interpretability, I collapsed response options “A few times a year”, “Once or twice a month”, and “At least once a week” into one option and retained the “Never” option. For the purpose of analyses, the “Never” option was recoded to “0” to represent “no bullying experience reported” and the three collapsed options were recoded to “1” to represent “bullying experienced at least once during the current school year”. Although a loss of data may arise as a result of dichotomizing variables (DeCoster, Iselin, & Gallucci, 2009; MacCallum, Zhang, Preacher, & Rucker, 2002), the loss of data does not necessarily suggest that my dichotomized variables will underperform the original variables (DeCoster et al, 2009; Farrington & Loeber, 2000; MacCallum et al., 2002). Additionally, researchers applying LCA to study bullying have regularly converted multiple response choice items into dichotomous variables for analytic purposes (e.g. Bettencourt & Farrell, 2013; Bradshaw et al., 2013; Goldweber et al. 2013b, 2013a; Lovegrove et al. 2012; Nylund, Bellmore, Nishina, & Graham, 2007; Waasdorp & Bradshaw, 2011; Wang et al. 2010; Whiteside et al., 2013; Williford et al., 2011).



### **Predictors of latent class membership.**

I used four predictors of latent class membership. These four predictors correspond with gender and three human needs namely, individuals' sense of sense of self-worth, sense of belonging, and perceived safety. Gender was modeled using a recoded version of the variable "ITSEX", where I used "0" to represent females, and "1" for males. For human needs, I used responses to questions which followed the item stem "What do you think about your school? Tell how much you agree with these statements." For sense of self-worth, participants were asked to respond to the statement "I like being in this school." For sense of belonging, participants were asked to respond to the statement "I feel like I belong at this school" and for perceived safety, participants were asked to respond to the statement "I feel safe when I am at school". Participants were offered the same four choices (agree a lot, agree a little, disagree a little, and disagree a lot) for the three statements. In my study, I collapsed the four choices into two categories, with "0" indicating agreement and "1" indicating disagreement to the original statement.

### **Statistical Analyses**

I used Mplus 7.11 (Muthén & Muthén, 2013) to estimate and analyze two series of latent class model, first without covariates (measurement models) and then with covariates (structural models). For both series of models, I conducted LCA to analyze responses to the recoded dichotomized versions of the six SBS items. Particularly, responses from the SBS were used to group individuals into latent classes. These latent classes are formed by individuals who generate similar response patterns that correspond with different types of reported victimization experiences. For my study, these types of reported victimization experiences coincide with physical, verbal, and relational bullying.

## **Estimating Latent Class Models**

For my study, latent class models were estimated using maximum likelihood via the EM algorithm. Maximum likelihood via the EM algorithm is an iterative process that attempts to converge on the best set of parameters from all possible sets of parameters (Enders, 2010). In short, the EM algorithm is a two-step process. First, the expected value of the log of the likelihood function is computed using initial parameter estimates, then that function is maximized to generate updated parameter estimates (McCutcheon, 2002). The process repeats by using the updated parameter estimates until changes in the estimates or the likelihood reach a predetermined convergence criterion (Enders, 2010; McCutcheon, 2002). For my study, I used Mplus' default value of 0.000001.

One issue with the EM algorithm is local maxima, which refers to convergences at a peak other than the true peak of the log-likelihood function (Enders, 2010; McCutcheon, 2002). The local maxima issue is created when the iterative process prematurely reaches the convergence criterion (Myung, 2003). The cause of the local maxima issue is attributed to the initial parameter values (McCutcheon, 2002; Myung, 2003). The proposed remedy is to use several initial parameter values (Laird, 1978; McCutcheon, 2002; Myung, 2003). To address the local maxima issue, I set Mplus to use 50 different initial parameter values.

## **Evaluating Model Fit**

I evaluate model fit using the following five relative model fit criteria: Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), sample-size adjusted Bayesian Information Criterion (ABIC), the bootstrap likelihood ratio test (BLRT), and the Vuong-Lo-Mendell Rubin Test (VLMR). I use these relative model criteria fit to compare the fit between two neighboring models, particularly a model with “k” number of latent classes against

a model with “ $k - 1$ ” number of latent classes. For the AIC, BIC, and ABIC, the model with the smaller AIC, BIC, and ABIC scores is considered to be the better-fitting model (Nylund, Bellmore, Nishina, & Graham, 2007). For the BLRT and VLMR, a statistical test is conducted to determine whether model fit improves as the number of classes increase (Nylund, Asparouhov, & Muthén, 2007). A statistically significant BLRT and VLRM (e.g.  $P < 0.05$ ) result suggests that the model with “ $k - 1$ ” classes should be rejected in favor of the model with “ $k$ ” classes (Tofighi & Enders, 2008). For all five relative model fit criteria, the number of classes is increased by one until a model with a one more class does not improve the model fit compared to that of a model with one less class. Although a technical description of these relative model fit criteria lies outside of the scope of this study, I provide the equations in Appendix B and recommend the following resources, Burnham and Anderson (2004) for the AIC and BIC, Sclove (1987) for the sample-size adjusted BIC, Nylund, Asparouhov, & Muthén, (2007) and Feng and McCulloch (1996) for the BLRT, and Lo, Mendell, and Rubin (2001) for the VLMR.

For my study, I place more emphasis on the BIC over the AIC and ABIC. When comparing the AIC to the BIC, the AIC selects the best model from a set of models without taking into account the quality of the set of models, whereas the BIC assumes that a true model exists within a set of models being compared (Burnham & Anderson, 2002). According to Burnham and Anderson (2002), the fundamental difference between the AIC and BIC is that the AIC is aimed at efficiency, whereas the BIC is geared toward consistency. For my purposes, the BIC is advantageous because it is known to have a tendency to outperform the AIC in terms of selecting parsimonious models (Burnham & Anderson, 2002; Dziak, Coffman, Lanza, & Li, 2012). When comparing the ABIC to the BIC, the ABIC is less conservative than the BIC in terms of the penalty imposed for adding parameters with regards to sample size (Wang & Wang;

2012). In sum, although I emphasized the BIC over the AIC and ABIC for the BIC's ability to select parsimonious models under stringent conditions, I use the AIC and ABIC as a complement to the BIC.

### **Evaluating the Quality of the Separation between Latent Classes via Entropy**

To assess the quality of group classification for models, I use the entropy statistic as provided by Mplus. In the context of classification, entropy refers to a model's ability to provide well-defined or distinct classes (Celeux & Soromenho, 1996). A model's ability to provide well-defined classes is measured using values ranging from 0 to 1, where values approaching 1 indicated better separation of classes (Kreuter, Yan, & Tourangeau, 2008). Conversely, values approaching 0 suggest that groups have considerable overlap, which in turn suggest similarities between people assigned to different classes (Ramaswamy, Desarbo, Reibstein, & Robinson, 1993). A thorough discussion on entropy can be found in Ramaswamy et al. (1993), Kreuter et al. (2008). For this study, I use a relative entropy statistic used by Mplus (Muthén & Muthén, 1998-2004). The equation for the relative entropy statistic can be found in Appendix B.

### **Describing Differences for Selected Models**

After I select the best-fitting model, I describe the features of each of the identified latent classes for the series of models with covariates. My description includes type characteristics as well as an item-by-item comparison of the estimated proportion for item endorsement each latent class. Worded differently, I reported the proportion of individuals who are estimated to endorse a specific bullying experience for each types of bullying victimization. The benefit of reporting these estimated proportions aids in interpreting differences in endorsement patterns across each type of bullying victimization.

To explore differences within and across types of bullying victimization I use odds ratios. Odds ratios are preferred over probabilities in contexts where effects of independent variables are of interest (DeMaris, 1995). Specifically, I use odds ratios to describe the magnitude pertaining to the difference in endorsement of bullying experiences across pairs of groups, such as females and males. Odds ratios above 1 indicate that one group has higher odds for endorsing a specific bullying experience than another group. After computing the odds ratio, a statistical test which can be used to assess the quality of the odds ratio was conducted by dividing the odds ratio by its standard error. A statistically significant test ( $P < 0.05$ ) indicates an association between the independent variable and the odds of membership in pair of outcome groups.

### **Preliminary Results**

In Table 2, I present the descriptive statistics for the predictors of perceived safety and sense of belonging as well as the six indicators of bullying victimization type. Additionally, I report the intraclass correlation coefficients (ICC) and the design effect statistic (DEFF) for the six indicators of bullying victimization type. After calculating for the six ICCs, I used them to calculate the DEFF. I then used the ICC and the DEFF to gauge the efficacy of using multilevel models against single-level models. For the ICC, I used the value of 0.05 to gauge the viability of multilevel modeling as recommended by Hox (2010). The equations for the ICC and the DEFF can be found in Appendix B.

Although researchers have not set a specific threshold value for the DEFF, I used the recommended DEFF value of two or more suggested by Maas and Hox (2005) and empirically studied by Muthén and Satorra (1995). For my study, DEFF values above two indicate that a two-level model, where students are nested within schools is more informative than a single level

model consisting of students. As the ICC values are less than 0.05 and the DEFF values in Table 2 are all under two, I proceeded with single level models for subsequent analyses.

Table 2.  
Descriptive Statistics, Intraclass Correlation Coefficients, and Design Effect Sizes ( $N = 8,048$ )

Variable	Mean	SD	ICC	DEFF
<u>Predictors of bullying victimization type</u>				
Sense of Self-worth	.27	.445		
Perceived safety	.22	.414		
Sense of belonging	.27	.446		
<u>Indicators of bullying victimization type</u>				
Being teased	.76	.430	.029	1.437
Excluded	.39	.487	.045	1.678
Lies spread	.65	.478	.035	1.527
Stolen things	.44	.496	.040	1.603
Hit	.33	.469	.036	1.542
Forced	.15	.358	.025	1.377

### Summary of the Method Section

For this study, I applied LCA to investigate bullying typologies which resemble the typologies I presented in my review of the literature. Specifically, I analyzed data collected as part of the 2011 TIMSS to first identify bullying typologies; then second investigate the effects of human needs in the formation of these typologies. Since the 2011 TIMSS data are known to have a hierarchical structure, I used the ICC and DEFF as tools to determine the use of a single-level LCA over a two-level LCA. With this single-level LCA, I answered my research questions

1. Are the three predominantly recognized types of bullying victimization present in this sample of adolescents? If so or not, what kinds of attributes are associated with the identified types of bullying victimization?
2. For the identified types of bullying victimization, are there gender differences? If so, are these gender differences consistent with those reported in the literature (e.g. males with physical aggression, females with relational aggression)?
3. For the identified types of bullying victimization, are there differences in their effects on human needs? If so, what is the magnitude of these differences across these types of victimization?

## **CHAPTER 4. RESULTS**

For my results section, I allocate one subsection for each of my three research questions. For each subsection, I start with the model fit statistics. I follow with a description of the attributes of the latent classes. Finally, I end with a comparison of the latent classes. To end the results section, I provide a short summary of my results.

### **Findings associated with Research Question #1**

In this subsection, I present my findings associated with whether the three predominantly recognized types were identified from the observed sample of adolescents. Namely, I present an interpretation of the model fit statistics, which are presented in Table 3. Afterward, I present the findings pertaining to the attributes of the latent class model (Table 4) that I have selected. Finally, I provide a comparison of each class from the selected latent class model (Table 5).



Table 3. Fit Indices for Latent Class Models for Bullying Types (No Predictors)

Classes	Free Parameters	AIC	BIC	ABIC	Entropy	Adj. LMR	BLRT
1	6	58171.134	58213.093	58194.026	1	N/A	N/A
2	13	55761.194	55852.105	55810.793	0.701	2386.038*	2423.940*
3	20	55390.046	55529.909	55466.353	0.765	379.125*	385.148*
4	27	55058.097	55246.913	55161.112	0.793	340.539*	345.949*
5	34	54933.715	55171.483	55063.437	0.855	135.096*	138.382*
6	41	54743.223	55029.944	54899.654	0.800	204.772*	208.024*

AIC = Akaike Information Criterion;  
 BIC = Bayesian Information Criterion;  
 ABIC = Sample Size Adjusted BIC;  
 Adj. LMR = Lo-Mendell-Rubin test;  
 BLRT = Bootstrap Likelihood Ratio Test.

\*sig.  $p < 0.05$

Although the values for the AIC, BIC, and ABIC suggest that I can select a six-class model and the BLRT and LMR pointing to a five-class model, I have decided to proceed with the three-class model. My decision to use the three-class model is based on the instability of the optimal value when replicating the log likelihood (output available on request). This is important because the log likelihood appears in the computation of the AIC, BIC, ABIC, BLRT, and the LMR-test (equations presented in Appendix B). The optimal value for the log likelihood was replicated all 50 times for the two-class model. For the three-class model, the optimal value for the log likelihood was replicated 41 times. The number of replications drops down to 24 times for the four-class model and less than 10 times out of 50 for both the five- and six-class models. In sum, despite the model fit indicators pointing to the selection of the five- or six-class model, I selected the three-class model due to the stability of the optimal log likelihood value.

While the entropy value of 0.765 for the three-class model is lower than the entropy of the four-, five-, and six-class models, the model's ability to separate classes improves while the model itself starts to encounter instability to converge on an optimal log likelihood value. As I noted earlier in the method section, entropy values that approach zero suggest similarities between people assigned to different latent classes. My decision to proceed with the three-class model over the four-, five-, or six-class models means that I have accepted a little more similarity between students that have been classified into types of bullying.

With the respect to the item attributes for the three class model (presented in Figure 1), classes #1 and #2 (representing 18.5% or 1486 students and 76.4% or 6,152 students, respectively) were similar with students exhibiting similar patterns for endorsing items. The main difference between those two classes was that Class #1 had higher probabilities than individuals in Class #2 for endorsing all six items. Class #3 (representing 5.1% or 410 students)

was characterized by a different pattern. Students in Class #3 had a high probability of endorsing the item corresponding to having items stolen from them, while having low probabilities of endorsing the five other items. In Table 4, I present the results for endorsing each item for the three latent classes.

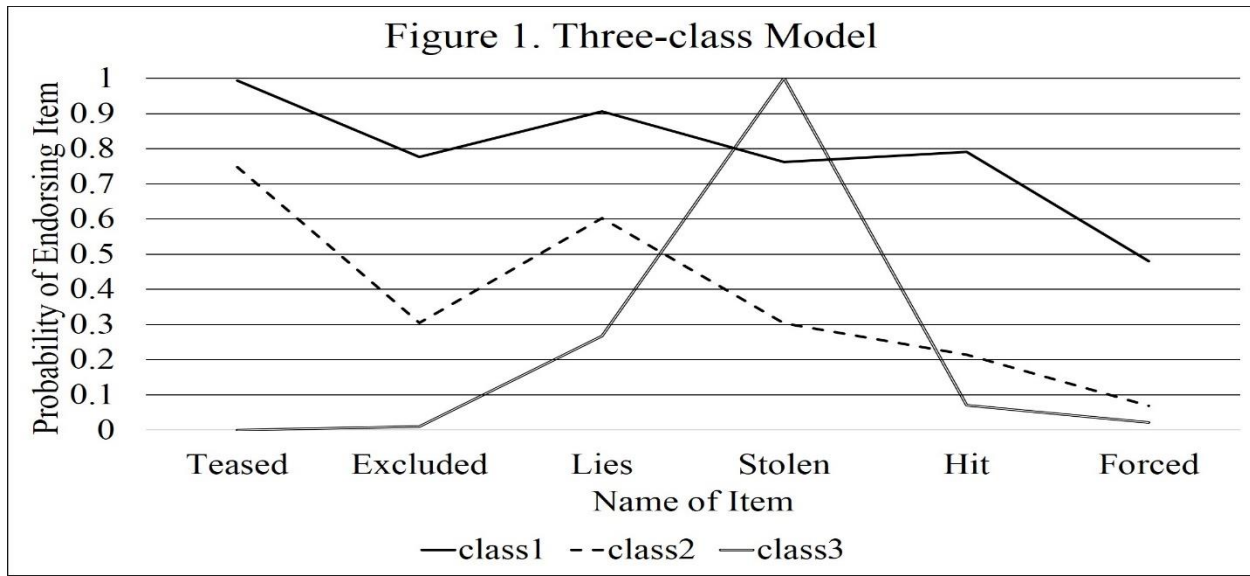


Table 4. Response probabilities for latent class analysis with no covariates

<u>Item</u>	<u>Class #1</u>	<u>Class #2</u>	<u>Class #3</u>
Teased	0.994	0.748	0.000
Excluded	0.777	0.305	0.010
Lied to	0.906	0.602	0.267
Stolen	0.762	0.303	1.000
Hit	0.791	0.214	0.071
Forced	0.480	0.068	0.022

Although I will not go through every single response probability, I interpret the result for the Teased item. For Class #1, 99.4% endorsed the item corresponding with being teased. In other words, of the 1,486 students classified into Class #1, 1,477 students experienced being

teased. For Class #2 which had 6,152 students, 74.8% or 4,823 students were teased. Finally, none of the 410 students in Class #3 endorsed the item for being teased.

With respect to comparisons between pairs of latent classes (e.g. Class #1 versus Class #2), I present the odds ratio for each item in Table 5. To avoid redundancy, I will explain only the most relevant results.

Table 5. Odds ratios for pairs of latent classes

Pair	Item	Teased	Excluded	Lied to	Stolen	Hit	Forced
1 vs. 2	Est.	56.995	7.937	6.380	7.376	13.879	12.591
	S. E.	45.801	0.835	1.003	0.742	1.670	1.239
	Est /S. E.	1.244	9.500	6.360	9.944	8.312	10.159
	p-value	0.213	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*
1 vs. 3	Est.	---	337.413	26.439	0.000	49.564	41.844
	S. E.	0.000	734.273	6.009	0.000	16.616	25.031
	Est /S. E.	---	0.460	4.400	---	2.983	1.672
	p-value	---	0.646	<0.001*	---	0.003*	0.095
2 vs. 3	Est.	---	42.513	4.144	0.000	3.571	3.323
	S. E.	0.000	92.390	0.722	0.000	1.142	2.031
	Est /S. E.	---	0.460	5.738	---	3.127	1.637
	p-value	---	0.645	<0.001*	---	0.002	0.102

\*sig.  $p < 0.05$

For the Teased item, students in Class #1 were 56.995 times more likely than students in Class #2 to have experienced being teased versus not being teased. Note, the non-significant p-value of 0.213 suggests that a statistical difference between these two classes was not observed. When comparing either Class #1 or Class #2 to Class #3, I did not report an estimate or a p-value because no one in Class #3 reported being teased. However, if an estimate could be calculated, that estimate would be much larger than the 56.995 from the comparison between Class #1 and Class #2.

In the column for the item corresponding to having things stolen, I did not include a p-value for the comparison between Classes #1 and #2 to Class #3. Students in Classes #1 and #2 were zero times more likely than students in Class#3 to have their things stolen versus not having their things being stolen. A comparison between Classes #1 and #2 to Class #3 should not be made because everyone in Class #3 indicated that they experienced having their things stolen.

To conclude my findings for research question #1, I did not find the three predominant types of bullying victimization in this sample of adolescents. However, I did find three types of bullying victimization. Two of these types were similar, with one having higher probabilities than other for endorsing all of bullying victimization items. The third type was composed of students who had low probabilities for endorsing all of the items except for having their things stolen.

### **Findings associated with Research Question #2**

In this subsection, I present findings associated with gender differences in the three types of bullying I found when answering research question #1. Specifically, I start with the reporting of the model fit statistics (Table 6). I then offer the results pertaining to attributes of the latent classes in Table 7 and Figure 2. This is followed by the resulted associated with gender's influence on the formation of the latent classes (Table 8). This will be followed by a comparison of the latent classes (Table 9). Finally, I wrap up this subsection with a review of the findings.

Table 6. Fit Indices for Latent Class Models with ITSEX as predictor

Classes	Free Parameters	AIC	BIC	ABIC	Entropy	Adj. LMR	BLRT
2	14	55711.007	55808.912	55764.422	0.707	2442.181*	2476.126*
3	22	55256.420	55410.270	55340.358	0.513	464.136*	470.587*
4	30	54812.064	55021.859	54926.525	0.663	454.045*	460.356*

AIC = Akaike Information Criterion;  
 BIC = Bayesian Information Criterion;  
 ABIC = Sample Size Adjusted BIC;  
 Adj. LMR = Lo-Mendell-Rubin test;  
 BLRT = Bootstrap Likelihood Ratio Test.

\*sig.  $p < 0.05$

From the results presented in Table 6, statistical indices suggest that I can select the four-class model over the three-class model. However, in order to properly answer research question #2, I stuck with the three-class model. The lower AIC, BIC, ABIC values and statistically significant p-values of less 0.001 for the Adjusted LMR-test and the BLRT suggest that three-class model fits the data better than the two-class model. With respect to entropy, the three-class model has the smallest value of the three models. This finding suggests that between the two-, three-, and four-class models, the three-class model has the most overlap for the latent classes. I will present implications related to the decision to stick with the three-class model in the general discussion section.

In Figure 2, I present the item endorsement probabilities associated for each of the three latent classes. Students in Class #1, which was composed of 1,822 or 22.6% of students had higher probabilities for endorsing all of the items than the other two classes. Class #2, which was the largest class with 4,041 or 50.2% of students, is characterized by high endorsement probabilities for having being lied to and teased. Lastly, there were 2,185 or 27.2% of students were classified into Class #3. This class is characterized with students having a high probability for endorsing the being teased item and lower probabilities for the other five items. All of the response probabilities can be found in Table 7.

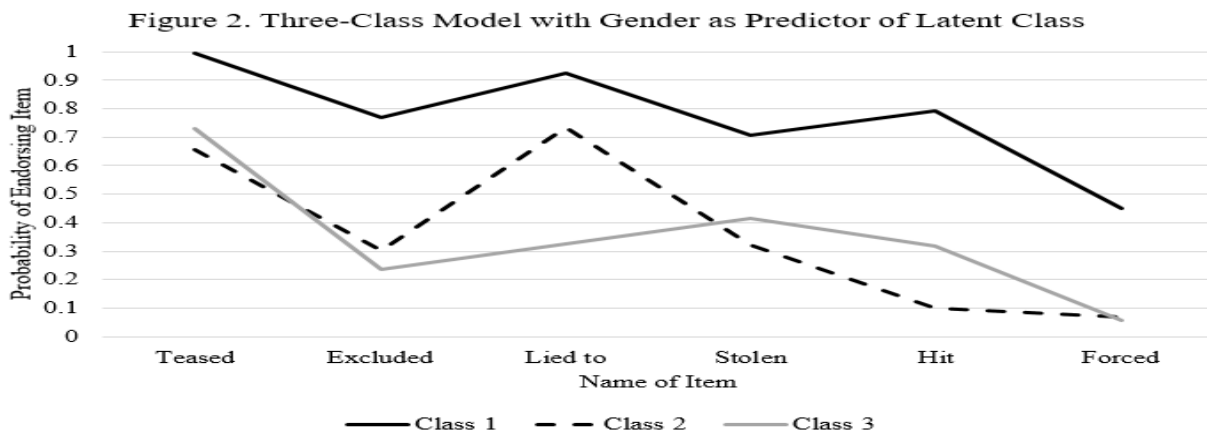


Table 7. Response probabilities for latent class analysis with Gender as predictor

<u>Item</u>	<u>Class #1</u>	<u>Class #2</u>	<u>Class #3</u>
Teased	0.995	0.655	0.730
Excluded	0.769	0.302	0.235
Lied to	0.925	0.736	0.327
Stolen	0.705	0.323	0.413
Hit	0.793	0.099	0.316
Forced	0.450	0.069	0.058

Turning my attention to Table 8, where Class #3 is the reference group, the intercepts correspond with the odds of being in Class #1 or Class #2 for females. The slopes, represent the influence of ITSEX on the odds of being in Class #1 or Class #2 compared to Class #3. To obtain the odds ratio, I used the exponential of the slope. For Class #1, the value of -0.963 was converted into an odds ratio of 0.382. This suggests that males were 2.62 (1 / 0.382) times less than likely than females to be in Class #1 when it is compared to Class #3. For Class #2, the estimate of -2.642 can be converted into an odds ratio of 0.085. Males were about 11.76 (1 / 0.085) times less likely than females to be in Class #2 when it is compared to Class #3.

Table 8. Regression coefficients of ITSEX on Latent Classes #1 and #2

	<u>EST</u>	<u>S.E.</u>	<u>EST/S.E</u>	<u>p-value</u>
<u>slope</u>				
Class #1	-0.963	0.280	-3.435	0.001*
Class #2	-2.462	0.264	-9.322	<0.001*
<u>intercept</u>				
Class #1	0.288	0.331	0.871	0.384
Class #2	1.577	0.399	3.953	<0.001*

\*sig p<0.05

To interpret the findings in Table 9, which is composed of the item-by-item odds ratio for pairs of latent class, I used the same approach as the one used in Table 5.



Table 9. Odds ratios for pairs of three class ITSEX Model

Pair	Item	Teased	Excluded	Lied to	Stolen	Hit	Forced
1 vs. 2	Est.	98.976	7.686	4.451	5.009	34.721	11.090
	S. E.	75.946	0.810	0.959	0.526	6.818	1.334
	Est /S. E.	1.303	9.490	4.642	9.530	5.093	8.314
	p-value	0.192	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*
1 vs. 3	Est.	69.322	10.837	25.495	3.398	8.252	13.222
	S. E.	53.880	1.355	6.080	0.364	1.239	2.120
	Est /S. E.	1.287	0.996	4.193	9.339	6.661	6.238
	p-value	0.198	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*
2 vs. 3	Est.	0.700	1.410	5.728	0.678	0.238	1.192
	S. E.	0.098	0.174	0.987	0.082	0.040	0.246
	Est /S. E.	7.113	8.082	5.803	8.310	5.887	4.855
	p-value	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

\*sig.  $p < 0.05$

For the Excluded item, students in Class #1 were 7.686 times more likely than students in Class #2 to have experienced being excluded versus not being excluded. The significant p-value of less than 0.001 suggests that a statistical difference between these two classes was observed. The same approach can be applied to the comparison of Class #1 to Class #3 as well as Class #2 to Class #3. In other words, students in Class #1 were 10.837 times more likely than students in Class #3 to report being excluded. Further, students in Class #2 were only 1.410 times more likely than students in Class #3 to have been excluded.

To summarize the findings for research question #2, gender appears to have a meaningful influence on the number and composition of latent classes. In sticking to answering research question #2, I analyzed a three-class model. The finding I wish to emphasize is that males were less likely than females to be assigned to Classes #1 and #2, when those classes are compared

individually to Class #3. Again, Class #1 had higher probabilities than Class #2 and Class #3 for endorsing items.

### **Findings associated with Research Question #3**

Here I present the results to research question #3, where I investigate gender and human needs as predictors of latent class membership. Although latent class models with multiple predictors should be built by adding one predictor at a time, for the purposes of answering researching question #3, I report results associated with all of the predictors included. As with the research questions #1 and #2, I open with the model fit statistics (Table 10). This is followed by the results pertaining to attributes of the latent classes in Table 11 and Figure 3. I then report my findings pertaining to the predictors' influence on the formation of the latent classes (Table 12) and a comparison of the latent classes (Table 13). To close, I offer a review of the research question #3 findings.

For the latent class models with all of the predictors, the statistical indices (presented in Table 10) suggest that I can select the four-class model over the three-class model. Much like the case with research question #2, to properly answer research question #3, I stuck with the three-class model. The three class-model was shown to statistically better than the two class model as evidenced by lower AIC, BIC, and ABIC values as well as statistically significant p-values of less than 0.001 for the Adjusted LMR-test and the BLRT. The value of the entropy statistic for the three-class model was 0.517. In relation to the two- and four-class models, the classes in the three-class model have more overlap. In other words, the classes are not separated as much with three-class model as the classes are in the two- and four-class models. Again, the decision to favor the three-class model over the two- and four-class models will be discussed in the general discussion.

Table 10. Fit Indices for Latent Class Models with gender and human needs as predictors

Classes	Free Parameters	AIC	BIC	ABIC	Entropy	Adj. LMR	BLRT
2	17	55375.643	55494.527	55440.504	0.705	2789.294*	2817.491*
3	28	54909.432	55105.241	55016.262	0.517	483.325*	488.211*
4	39	54452.807	54725.540	54601.606	0.670	473.836*	478.626*

AIC = Akaike Information Criterion;  
 BIC = Bayesian Information Criterion;  
 ABIC = Sample Size Adjusted BIC;  
 Adj. LMR = Lo-Mendell-Rubin test;  
 BLRT = Bootstrap Likelihood Ratio Test.

\*sig.  $p < 0.05$

For the three-class model with all the predictors, the item endorsement probabilities associated for each class are presented in Figure 3 and Table 11 respectively. Class #1 is characterized by students who had the highest probabilities of the three classes for endorsing all six items. This class was composed of 1,955 or 24.3% of the sample. Class #2 was composed of 2,184 or 27.1% of the students. The most prevalent attributes of Class #2 were being lied to and teased. Finally, 3,909 or 48.6% of students were classified into Class #3. Students in this class had a moderate probability for endorsing the being teased item when compared to the other two classes on the same item. For the most part, students in this class had lower probabilities for the other five items, with the exception of having items stolen when compared to Class #2.

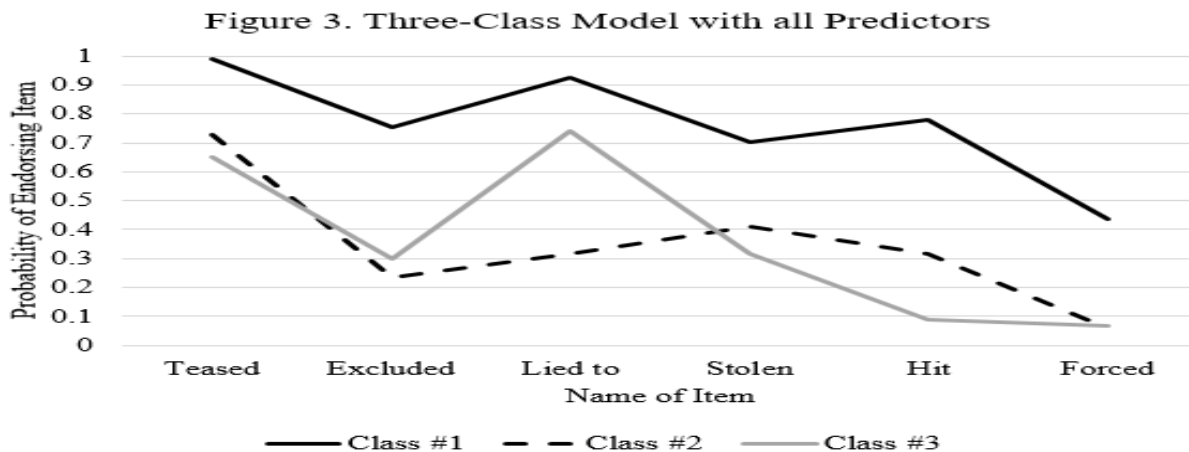


Table 11. Response probabilities for model with gender and human needs as predictors

<u>Item</u>	<u>Class #1</u>	<u>Class #2</u>	<u>Class #3</u>
Teased	0.989	0.730	0.650
Excluded	0.755	0.236	0.299
Lied to	0.927	0.318	0.741
Stolen	0.703	0.410	0.317
Hit	0.779	0.317	0.087
Forced	0.436	0.060	0.066

The findings for the regression coefficients for the three-class model with all of the predictors are presented in Table 12. In similar fashion to Table 9 earlier, Class #3 is the reference group, the intercepts correspond with the odds of being in Class #1 or Class #2 for females. The slopes, represent the influence of ITSEX on the odds of being in Class #1 or Class #2 compared to Class #3. Again to obtain the odds ratio, I used the exponential of the slope. For simplicity I will only interpret the findings for Class #1 and provide a shorter presentation for Class #2.

For Class #1, the value of 1.481 for ITSEX can be converted to an odds ratio of 4.399. This suggests that when the other predictors have been controlled for, females were 0.227 (1 / 4.399) times less than likely than males to be in Class #1 when it is compared to Class #3. Worded differently, males were almost 4.4 times more likely than females to be in Class #1, when Class #1 is compared to Class #3. When looking at the statistically non-significant slope of -0.123 for Self-worth, this means that students in Class #1 who expressed disagreement with the self-worth item were not any more likely than students who agreed and were assigned to Class #1 or #3. In other words, agreement or disagreement to sense of self-worth is not a strong predictor of membership across Class #1 and Class #3.

Continuing on with Class #1, the estimate of sense of belonging is 1.005, which I converted to an odds ratio of 2.73. Controlling for the other predictors, students who disagreed with the sense of belonging item were 2.73 times more likely than students who agreed to be in Class #1, when Class #1 is compared to Class #3. Finally, the sense of safety estimate of 0.745, can be turned into an odds ratio of 2.106. This 2.106 odds ratio can be interpreted after controlling for the other predictors, students who did not feel safe were 2.106 times more likely than students who felt safe to be in Class #1, again when Class #1 is compared to Class #3. The

sense of belonging and safety items were found to be statistically significant with a p-value of less than 0.001.

Table 12. Regression coefficients for predictors on Latent Classes #1 and #2

<u>slope</u>	<u>EST</u>	<u>S.E.</u>	<u>EST/S.E</u>	<u>p-value</u>
Class #1				
ITSEX	1.481	0.169	8.753	<0.001*
Self-Worth	-0.123	0.111	-1.111	0.267
Belonging	1.005	0.121	8.281	<0.001*
Safety	0.745	0.117	6.390	<0.001*
Class #2				
ITSEX	2.368	0.230	10.273	<0.001*
Self-Worth	-0.260	0.151	-1.720	0.085
Belonging	0.350	0.173	2.025	0.043*
Safety	-0.062	0.166	-0.374	0.708
<u>intercept</u>				
Class #1	-1.673	0.118	-14.184	<0.001*
Class #2	-1.443	0.365	-3.956	<0.001*

\*sig p<0.05

When Class #2 is compared to Class #3, ITSEX a proxy for gender and sense of belonging were statistically significant. The slope estimates for ITSEX, 2.368 and sense of belonging, 0.350 can be converted to odds ratios of 10.671 and 1.419, corresponding with ITSEX and sense of belonging, respectively. Males were more than 10 times likely than females to be Class #2 than Class #3. Further, students who disagreed with their sense of belonging were 1.419 times more like than those who disagreed to be in Class #2. Sense of self-worth and sense of safety were not statistically significant for the three-class model.

Moving on to the item-by-item comparisons, the complete results are offered in Table 13. As with Tables 5 and 9, I use the same approach for interpreting the results. Due to space limitations, I interpret only the results for the being teased item.

Table 13. Odds ratios model with gender and human needs

Pair	Item	Teased	Excluded	Lied to	Stolen	Hit	Forced
1 vs. 2	Est.	32.459	10.009	27.313	3.402	7.585	12.134
	S. E.	12.578	1.246	6,651	0.355	1.088	1.893
	Est /S. E.	2.227	8.031	4.107	9.572	6.975	6.409
	p-value	0.026*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*
1 vs. 3	Est.	47.227	7.216	4.467	5.083	36.819	10.928
	S. E.	20.534	0.737	0.999	0.530	7.379	1.339
	Est /S. E.	2.300	9.797	4.473	9.593	4.989	8.162
	p-value	0.021*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*
2 vs. 3	Est.	1.455	0.721	0.164	1.494	4.854	0.901
	S. E.	0.206	0.094	0.030	0.186	0.879	0.188
	Est /S. E.	7.068	7.695	5.522	8.034	5.523	4.795
	p-value	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

\*sig.  $p < 0.05$

For the being teased item, students in Class #1 were 32.459 times more likely than students in Class #2 to have experienced being teased versus not being teased. The significant p-value of less than 0.026 suggests that a statistical difference between these two classes was observed. The same approach can be utilized when comparisons of Class #1 to Class #3 and Class #2 to Class #3 are made. For example, students in Class #1 were 47.227 times more likely than students in Class #3 to report being teased versus not being teased. Further, students in Class #2 were only 1.455 times more likely than students in Class #3 to have been excluded.

In sum, the inclusion of the all of the predictors appears to have a meaningful influence on the number and composition of latent classes. Despite statistical indices pointing to the

selection of a four-class, I analyzed a three-class model to fulfill the objective of answering research question #3. While gender and sense of belonging were found to be statistically significant predictors of latent class membership, findings for perceived safety were mixed across the classes. Sense of self-worth was not found to be significant in any of the class versus class comparisons. Finally, item-by-item comparisons suggest that statistical differences in the odds ratios for pairs of classes being compared.

### **Summary of Findings**

Although I was unable to find the three predominant types of bullying with these data, I was able to find that gender had an influence on the formation and number of latent classes. In remaining consistent with the research questions, I found that the composition of the three classes changes when the human needs predictors were added. Further, sense of self-worth was found to be non-significant while sense of belonging was statistically significant in all analyses involving these two variables. In each subsection of findings, I stated that my decision to retain the three-class model had certain implications. In short, these implications are related to various statistical remedies which can be applied and their effect on future research. Hence, that be discussed in the following section.



## CHAPTER 5. DISCUSSION

For my discussion, I start with the implications of the applications of statistical remedies. From there, I offer thoughts on the effects of statistical remedies to the study of bullying involving latent class analysis. This is followed by my recommendations for applying latent class analysis to study bullying. I end with a final reflection on the problem of bullying.

### **Discussion on applications of statistical remedies.**

Although I did not find the three dominant classes in research question #1, one remedy would have been to analyze the bivariate residuals to assess violations of the assumption of local independence. Given the complex nature of bullying, researchers may expect the assumption of local independence to be violated for some situations but not necessarily for other situations. For example, being hit and being teased may co-occur in one episode, but the nature of their co-occurrence is not always the same across particular episodes. The complexity creates a scenario where researchers have to decide between interpretable models that are not statistically good and statistically good models that are not easily interpretable. Since the respondents were asked to report whether or not victimization occurred as well as its frequency of victimization over the past school year, the practical benefits of using the bivariate residuals are difficult to assess, especially if those benefits are potentially limited to the statistical context.

When I moved from research question #1 to research questions #2 and #3, the addition of the predictors were associated with changes to the size and composition of the latent classes. While I may be able to improve the statistical model by modeling direct relationships from the predictor(s) to the victimization items, this remedy comes at the expense of added computational time and challenges to the model being statistically identifiable as the number of direct relationships modeled increases. In the case where many direct relationships need to be

modeled, this may suggest the need to improve understanding of the theoretical relationships between predictors and victimization items. Further, this need can be addressed by through an interdisciplinary discussion involving bullying research experts and statisticians as to how the theoretical relationships are measured quantitatively.

### **Effects of statistical remedies to latent class analysis related studies on bullying.**

When the implementation of statistical remedies is supported by experts, then these remedies become valuable in understanding latent classes. I believe this is especially essential important when predictor variables included to the study of victimization. To elaborate, a model for victimization without predictors does not take into account critical attributes of individuals such as their gender and sense of connectedness to others. These attributes play an important role in understanding the context in which several types of victimization occurred. The use of the person-centered LCA approach provides an alternative to the implied one-size-fits-all type of paradigm one adopts when utilizing variable-centered approaches such as factor analysis.

If I were to implement statistical remedies, there is a chance that some of the less desirable findings such as low entropy could have been improved. In other words, the amount of overlap between classes would be reduced. Although such a finding would be better statistically, in practice, higher degrees of separation (i.e. lower degree of overlap) of classes suggests the increasing need to view and treat these classes as different entities in the literature. Researchers face increased challenges when attempting to conduct future studies. The take away point being that desirable findings may become less informative due to their lack of clarity or credibility.

### **Recommendations for applying latent class analysis to the study of bullying.**

In my study, I intentionally stayed away from implementing statistical remedies. My explanation for this is that the literature has already suggested that victimization is difficult to

study, particularly with respect to comparability of findings as well as measurement. Although I studied individuals by way of ruling out multilevel latent class modeling, I am by no means suggesting that the social context should be ignored. As I presented in my review of the literature, there is a branch of studies which emphasizes the social context of bullying and victimization. For all intents and purposes, the utility of latent class analysis hinges on the quality of the indicators used when identifying classes. Unfortunately, no amount of technical proficiency will compensate for models with poor quality indicators.

Looking back on the victimization, the presentation of the content in items could have been clearer. For example, the “hit” item asked students whether they had been hit or hurt. This presents a situation where no matter how the hit item is recoded, the original data was generated from this “hit or hurt” context. While the double-barreled nature of the item may appear to be a weakness to some researchers, this may also be a strength to other researchers. The strength being that opportunities for improving measures are present. Survey items and observed behaviors have to adequately capture the phenomena of victimization in order for results from any technique including LCA to be meaningful.

My recommendations include reducing the use of double-barreled indicators, discussion on the theoretical nature of direct relationships between predictors and indicators of latent class membership, and reflection on the practical benefits and consequences of high and low entropy.

### **Reflection on the problem of bullying.**

As I noted in my introduction section, bullying is major problem in the US as well as the world. I feel that bullying is so problematic that it connects with researchers from several disciplines such as counseling, statistics, and school administration. With that said, the strengths, weaknesses, and limitations of my study are really dependent on the readers’ understanding of

bullying. For instance, statisticians may argue that the decisions tied to statistical analysis were not sound. However, these same arguments may be countered by bullying researchers who would argue that changes to those decisions would defeat the entire premise of running statistics. That sort of argument-counterargument dilemma is reflective of the wide range of paradigms one can hold as one studies bullying. Naturally, the wide range of paradigms leads to a wide range of methodological approaches.

Despite not having found what I sought, my study still contributes to the literature by its recommendations calling for discussion on the nature of the theoretical relationship between predictors and indicators of latent class membership as well as using clearer indicators. The potential return being that the efficacy of latent class analysis in the study of bullying is improved. Specifically, the need to rely on statistical remedies is reduced because one starts with a deeper understanding of this complex problem bullying. Since bullying, much like all problems will evolve, there will be a need to look for literature that is reflective of the times when problems were studied. Even without desirable findings, the findings are indicative of the challenges bullying researchers face.

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## Appendix A

### *Studies on School Bullying Applying Latent Class Analysis Grouped by Line of Research*

#### Studies examining levels of experience

<u>Authors</u>	<u>Identified classes</u>	<u>Secondary Findings</u>
Nylund, Bellmore, Nishina, & Graham (2007)	Non-victimized Sometimes victimized Victimized	Individuals in the sometimes victimized and victimized classes reported feeling less safe in school than the non-victimized class across six waves of data spanning three years
Rosen, Underwood, Beron, Gentsch, Wharton, & Rahdar (2009)	Non-victimized Sometimes victimized Victimized	Victimization at one point does not indicate chronic victimization

#### Studies examining types of bullying involvement

<u>Authors</u>	<u>Identified classes</u>	<u>Secondary Findings</u>
Bettencourt & Ferrell (2013)	Aggressive-victims Non-victimized Aggressive Predominantly victimized Well-adjusted	Aggressive-victims and aggressive students less confident in ability to enact non-violent responses to bullying  Aggressive-victims and aggressive students perceived that aggression was sometimes necessary and can serve as an effective mechanism for retaliation
Giang & Graham (2007)	Victims Aggressors Highly-victimized aggressive-victims Highly aggressive aggressive-victims Socially adjusted	Highly-victimized aggressive-victims reported more loneliness, rejection, and found to be less cool than highly-aggressive victims.  Highly-aggressive aggressive-victims reported less rejection and lower academic achievement than victims
Goldweber, Waasdorp, & Bradshaw (2013a)	Victims Bully-victims Low-involvement	Bully-victims from urban areas more likely to be bullied for money than bully-victims from non-urban areas



		Females more likely to be victims than males, but males more likely than females to be bully-victims
Lawson, Alameda-Lawson, Downer, & Anderson (2013)	No risk Bully-victims Perpetrator victims Multiple risk	Students who felt supported emotionally by teachers were less likely to experience bullying  Students who help other students from being bullied are likely to be classified as bully victims than as not at risk for bullying
Lovegrove, Henry, & Slater (2012)	Victims Bullies Bully-victims Non-involved	Increased school connectedness led to lowered odds of membership in Bullies class Increased social inclusion led to increased odds of membership in Bullies class Increased social inclusion led to decreased odds of membership in Bully-victims class
Waasdorp & Bradshaw (2011)	Undifferentiated/High Aggressive Passive/low Active/support seeking	Undifferentiated/high and Aggressive classes externalized problems more than Members of Passive/low and Active/support seeking
Whiteside, Hanney, Chermack, Zimmerman, Cunningham, & Walton (2013)	Peer aggression Peer aggression and victimization Multiple domains	Multiple domains class characterized with higher odds that other two groups for being injured in a fight, carrying weapons, experiencing family conflict, and alcohol abuse
Willison, Brison-Bender, Jenson, & Forrest-Bank (2011)	Aggressors Victims Aggressor-victims Uninvolved	The number of classes changed from four to three across three time points (fourth through sixth grade) As students got older, the percentage of uninvolved students and aggressor-victims increased The percentage of victims went up from fourth to fifth grade and then went down from fifth grade to sixth grade.

Students who were originally aggressors later moved into one of the other classes

Studies examining types of bullying experiences using symptoms

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<u>Authors</u>	<u>Identified classes</u>	<u>Secondary Findings</u>
Bradshaw, Waasdorp, & O'Brennan (2013)	Low-victimization High (verbal, physical, and relational) Verbal and relational Verbal and physical	Males more likely than females to be in Verbal and physical class Females more likely than males to be in Verbal and relation class High class more likely than other three classes to internalize problems
Goldweber, Waasdorp, & Bradshaw (2013b)	Physical and verbal Verbal only High involvement (physical, verbal, and relational ) Low involvement	Verbal only class reported lower victimization than Physical and Verbal class Low involvement and verbal only class similar in perceptions of safety Low involvement reported highest levels of sense of belonging, other three classes reported similar levels of low sense of belonging
Wang, Iannotti, Luk, & Nansel (2010)	Non-victims Verbal and relational bullying Multiple (physical, verbal, relational, and cyber)	Multiple type victimization linked with higher frequency of injuries requiring medical attention than other three classes Multiple type victimization linked with medicine use to deal with sleeping problems and nervousness.

## Appendix B

### Equations for latent class analysis

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#### Estimating probabilities for latent class models

##### Measurement models

$$\text{Posterior Probabilities } P(c = k | \mu_1, \mu_2, \mu_3, \mu_4, \mu_5, \mu_6) = \frac{P(c=k)P(\mu_1|c = k)P(\mu_2|c = k)P(\mu_3|c = k)P(\mu_4|c = k)P(\mu_5|c = k)P(\mu_6|c = k)}{P(\mu_1, \mu_2, \mu_3, \mu_4, \mu_5, \mu_6)}$$

$P(c = k)$  = the expected proportion of individuals belonging to a particular latent class  $k$  for a latent categorical variable  $c$ .

$P(\mu_q | c = k)$  = the likelihood of endorsing an item  $\mu$  given membership in a particular latent class  $k$  for the latent categorical variable  $c$ .

##### Structural models

$$P(c_i = k | x_i) = \frac{\exp^{\alpha_k + \gamma_k x_i}}{\sum_k \exp^{\alpha_k + \gamma_k x_i}}$$

$P(c_i = k | x_i)$  = the probability than a specific individual  $i$  belongs to a particular class  $k$  for the latent categorical variable  $c$  while consider the covariate  $x$  (Muthén, 2001).

#### Evaluating Model Fit

##### AIC, BIC, and ABIC

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Akaike Information Criterion (AIC) =  $-2LL + 2p$   
Bayesian Information Criterion (BIC) =  $-2LL + 2p(N)$   
Sample size adjusted BIC =  $-2LL + 2p(N + 2)/24$

##### LMR and BLRT

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Likelihood ratio test =  $-2(LL_{k-1} - LL_k)$

##### Lo-Mendall-Rubin Test (VLMR)

A comparison is made between two adjacent models using the likelihood ratio test. The LMR uses an approximated distribution to assess the value of the likelihood ratio test. As noted in the method section, a significant p-value indicates that the model with  $k$  classes fits the data better than the model with  $k - 1$  classes (Nylund, Asparouhov, & Muthén, 2007).

## The Bootstrap Likelihood Ratio Test (BLRT)

The BLRT involves four steps. The first step involves calculating the likelihood ratio test. The second step consisting of generating a bootstrap sample to calculate the likelihood ratio test. This generate and calculate process is repeated a number of times in an effort to estimate the distribution of the likelihood ratio test. Finally, the estimated distribution of the likelihood ratio test is compared to the calculated likelihood ratio test. Similarly to the VLMR, a significant p-value for the comparison indicates that the model with  $k$  classes fits the data better than the model with  $k - 1$  classes (Nylund, Asparouhov, & Muthén, 2007).

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*Note.*  $LL$  refers to log likelihood,  $p$  refers to number of model parameters,  $N$  refers to sample size,  $k$  refers to number of classes

## Evaluating quality of separation of latent classes

### Entropy statistic

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$EN(k) = -\sum_{i=1}^N \sum_{k=1}^K P_{ik} \ln P_{ik}$  as proposed by Celeux and Soromenho (1996)

$REN(k) = 1 - \frac{EN(k)}{N \ln(K)}$ , relative entropy statistic as computed by Mplus (Muthén, 1998 – 2013).

## Preliminary Multilevel Level Analysis

### Intraclass correlation coefficient (ICC) and design effect (DEFF)

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$$ICC = \frac{var(\alpha_{item\ threshold})}{var(\alpha_{item\ threshold}) + \frac{\pi^2}{3}}$$

$$DEFF = 1 + (average\ group\ size - 1) * ICC$$