

PARENTING FOR THE LEARNER STAGE OF GRADUATED DRIVER LICENSING

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ABSTRACT

Lawrence Erik Scholl: Parenting for the Learner Stage of Graduated Driver Licensing
(Under the direction of Susan T. Ennett)

Background: The learner stage of graduated driver licensing provides an opportunity for parents to provide teens with supervised driving experiences. However, teens typically receive less practice time and exposure to challenging conditions than necessary in preparation for independent driving. I aimed to explore differences among parents in how they prepare teens during the learner stage. I analyzed data collected by the University of North Carolina Highway Safety Research Center to examine differences in parents' behavior and communication as well as a subset of teens' independent driving behaviors.

Study 1: I developed a typology of parenting practices by qualitatively analyzing data from 352 interviews and 595 video clips. Guided by the Integrative Model of Parenting, I examined whether parenting style and goals varied across the typology. Two groups, the *independence promoters* and the *conscientious adapters*, possessed preferable constellations of parenting practices. In both groups, teens received more average driving practice than in the three other groups. Teens whose parents were in the independence promoter group exhibited the lowest proportions of several unsafe behaviors during the initial months of independent driving. Conscientious adapter parents had the most desirable parenting style, with the highest average levels of responsiveness and demandingness.

Study 2: I sought to analyze the average trajectory of supervising driving time across the learner stage. A random intercept model found that greater parental responsiveness was

associated with significantly more driving practice, and setting a generic, unambitious goal for the learner stage was associated with significantly less driving practice. However, individual trajectories exhibited considerable within-person fluctuation. Counterintuitively, teens' lack of willingness to participate in supervised driving practice, and actual opportunities for driving practice, contributed to within-individual fluctuation.

Conclusion: Parents are not a homogenous group in their supervision of driving practice. Parents also differ substantially in their goals for the learner stage. Findings affirm the need to account for the influence of teens on the quantity and quality of supervised driving. Adopting a more nuanced understanding for intervening with parents, allowing for flexibility and adaptability and the bidirectional parent-teen relationship, will help interventions be more effective to prepare teens for independent driving.

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CHAPTER ONE: INTRODUCTION

Problem Statement

Graduated driver licensing (GDL) is a crucial strategy implemented to curb teen motor vehicle crashes by providing a structure within which young drivers can progressively gain experience necessary to develop safe driving habits (Foss, 2007; Waller, 2003).¹ The initial of three GDL stages, the learner stage requires that teens drive while supervised, typically by their parents. The learner stage is followed by an intermediate stage during which teens can drive without adult supervision but with specific restrictions. In the final stage, teens graduate to full licensure with few if any restrictions (Foss, 2007; Foss & Goodwin, 2003; National Highway Traffic Safety Administration, 2008; North Carolina Department of Transportation, 2014). Parents have a critical role as driving supervisors during the learner stage of GDL because they provide access to vehicles and opportunities for teens to gain experience (Simons-Morton & Ouimet, 2006; Williams, 2013). Researchers have found that parents often do not take full advantage of the time dedicated to supervising teen driving practice (Goodwin, Foss, Margolis, and Harrell, 2014; Goodwin, Foss, Margolis, and Waller, 2010; Goodwin, Waller, Foss, & Margolis, 2006; Tronsmoen, 2011), and teen crash rates peak during the start of the intermediate stage as teens begin to drive independently (Lewis-Evans, 2010; Mayhew, Simpson, & Pak, 2003; Shope, 2013; Twisk & Stacey, 2007).

¹ A more detailed description of GDL is provided within Chapter 2.

Specific Aims and Research Questions

My investigation of the learner stage focuses on the principal objective of the stage: to prepare teens to drive safely when they begin to drive independently. By using both qualitative and quantitative data, I aimed to gain a detailed understanding of how parents prepare teens during the learner stage, and I applied Darling & Steinberg's (1993) Integrative Model of Parenting as the guiding conceptual framework. In conducting my research, I aimed to: 1) determine whether a typology of parenting for supervised driving during the learner stage can be defined such that groups of parents can be distinguished who share similar patterns of supervised driving-specific parenting practices; 2) identify theory-guided relationships between these parenting practice typology groups and parenting style and parenting goals; 3) assess whether and how teens' independent driving behaviors varies among the parenting practice groups; and 4) use growth curve modeling to examine the trajectory of time parents spent supervising teen driving over the course of the learner stage. My study has three specific aims:

Specific Aim 1: *Develop a typology of parenting practices for supervised driving and examine it relative to parenting style dimensions and parenting goals for supervised driving and the learner stage.*

Research Questions:

- 1) Do patterns of parenting practices emerge that form a typology of parenting practice groups for supervised driving during the learner stage?
- 2) How do parenting style dimensions and parenting goals vary across parenting practice typology groups?

- 3) What factors promote and facilitate parenting practices for supervised driving during the learner stage?

Specific Aim 2: *Examine relationships among parenting practice typology groups and teens' independent driving behaviors during the start of the intermediate stage of GDL.*

Research Questions:

- 1) How do teens' independent driving behaviors during the start of the intermediate stage vary across parenting practice typology groups?
- 2) Are teens with parents in certain typology groups better prepared than others for independent driving during the start of the intermediate stage?

Specific Aim 3: *Assess between-parent differences in the average trajectory of time spent supervising teen driving practice across the learner stage.*

Research Questions:

- 1) How much variability in driving practice time can be accounted for by between-parent differences?
- 2) What is the shape of the average trajectory of hours per week parents spent supervising driving practice?
- 3) What parenting goals are predictors of between-parent differences in the average trajectory of the time parents spent supervising driving practice?

To achieve these aims and address these research questions, my study focused on supervised driving during the learner stage of GDL and independent teen driving during the first

four months of the intermediate stage. I conducted an analysis of multiple sources of data from the University of North Carolina Highway Safety Research Center (HSRC) driving study of 50 families in North Carolina conducted during 2007-2009 (Goodwin et al., 2010). These data include parent and teen questionnaires, semi-structured parent interviews, and video clips of teens driving with parents (during the learner stage) and independently (during the intermediate stage of GDL). In addressing study aim 1, I conducted qualitative analysis of longitudinal parent interview and video clip data to identify parenting practice patterns. I determined how parents were distinguished into meaningful groups based on similar profiles of parenting practices and assigned parents to the groups. I then examined relationships between parenting practice typology groups and: a) parenting goals for the learner stage and b) parenting style dimensions. To accomplish study aim 2, I identified a subset of driving behaviors to assess from video clip data previously coded, and then examined proportions of teens observed to engage in those behaviors across groups to assess potential differences. For study aim 3, I used quantitative growth curve modeling to develop a base model examining between-individual differences in the average trajectory of time spent supervising driving practice across the learner stage and the patterns of supervised driving time across the learner stage. I examined parenting goals for the learner stage to assess between-individual differences in the average trajectory of supervised driving time.

Study Rationale

Teenage drivers are injured and killed at disproportionately greater rates when compared to adult drivers (Ferguson, Teoh, & McCartt, 2007; Shope & Bingham 2008; Williams, 2003). After examining more than 2000 police reports of nonfatal young driver crashes, McKnight &

McKnight (2003) concluded that the majority resulted from failure to engage in routine safe driving practices—much more often related to a lack of recognition of the danger in failing to employ safe driving practices than deliberately taking risks. This helps underscore the point that sufficiently mastering how to operate a motor vehicle safely requires substantial experience over time (Foss, 2007; Gregersen & Bjurulf, 1996; Transportation Research Board, Board on Children, Youth, and Families, 2007). Overall, novice drivers have limited hazard and risk perception and judgment (Brooks-Russell, Simons-Morton, & Ehsani, 2014; Ferguson 2003; Hedlund, 2007). This appears to be because they have not yet had sufficient exposure to a wide range of driving scenarios to develop both an intuitive ability to recognize and respond appropriately to potentially hazardous driving situations (Kinnear, Kelly, Stradling, & Thomson, 2013). Increasing exposure to driving practice in a variety of conditions and situations fosters the development of these more efficient automated recognition and decision-making systems (Gregersen, Berg, Engström, Nolén, Nyberg, & Rimmö, 2000).

Crash risk is substantially lower during the learner stage than during licensed driving (i.e., without supervision) (Gregersen, Nyberg, & Berg, 2003), with the greatest risk to young drivers manifesting during the immediate period after licensure to drive independently (Lewis-Evans, 2010; Mayhew, Simpson, & Pak, 2003; Shope, 2013; Twisk & Stacey, 2007). Although GDL has reduced young driver crashes, injuries, and deaths dramatically among high school age drivers (Foss, Feaganes, & Rodgman, 2001; Masten, Foss, & Marshall, 2011; McCartt, Teoh, Fields, Braitman, & Hellinga, 2010; Russell, Vandermeer, & Hartling, 2011; Shope 2007; Shope & Molnar, 2003), the graduated approach to licensing has not delivered as expected on its promise to create substantially better, safer young drivers (Masten & Foss, 2010; Masten, Marshall & Foss, 2011). Given the central role of parents and the potential malleability of their

supervisory role there is an urgent need to better understand, and improve, parents' supervisory behaviors during the learner stage.

Although some of the benefits of the supervised driving experience may be lost after the learner stage concludes, some teens likely are prepared more thoroughly than others during the learner stage. By design in modern young driver licensing systems, parents have both an obligation and a unique opportunity to influence the driving of their teenage children. They may have the ability to alter the course of driving in a way that is rare when compared to other behaviors teens may engage in as they mature through adolescence into early adulthood (e.g., sexual behavior, substance use). Given this opportunity, there is a critical need to understand further how parents interact with their teens during the learner stage. My study aimed to determine whether there is merit in considering different types of parenting for the learner stage rather than treating parents as a single, homogenous group. If the approaches parents take to supervising their teens during the learner stage can be distinguished through a typology, such that groups of parents who share similar approaches are identified, it will be informative to consider whether teen driving differs across parent typology groups. If so, this would help identify whether some parents might prepare teens more effectively during the learner stage based on their patterns of behavior and communication.

Although a growing number of studies has examined interactions between parents and teens during the learner stage (e.g., Goodwin, Foss, Margolis, and Harrell, 2014; Goodwin, Foss, Margolis, and Waller, 2010; Goodwin, Waller, Foss, & Margolis, 2006; Mirman & Kay, 2012; Tronsmoen, 2011), none has identified a typology of how parents supervise teens. Nevertheless, these studies have been critical for gaining initial insights into the relationships between parents and teens during the learner stage, and these investigations have helped identify certain

distinctions between and commonalities across parents. My research also differs from these earlier studies in applying theory to identify factors that might help explain differences between parents and across groups of parents.

Understanding differences in how parents facilitate supervised driving exposure should add to our understanding of how to help them take full advantage of the opportunity provided by the mandatory learner stage in modern licensing systems. If parenting practices for the learner stage differ in meaningful ways, this might help explain why some teens are more willing to gain experience behind the wheel to develop their driving skills and why there are differences in teens' independent driving behaviors. Differences in parenting practices for the learner stage also might support the development and implementation of interventions that can be adapted to different types of parents and that account for differences between parents in their styles of parenting and the goals they establish for the learner stage and supervised driving.

Organization of the Dissertation

My dissertation consists of six chapters. Following this brief overview in Chapter One, Chapter Two synthesizes relevant literature in order to understand the context and theoretical foundation for my research. Chapter Three describes the primary research study from which I derived samples for addressing each of my study aims. Chapter Four reports findings from the qualitative study, and Chapter Five reports findings from the quantitative study. Both Chapters Four and Five are presented in manuscript format. Chapter Six provides a synthesis of findings and implications from both studies and my work to address my three study aims.

CHAPTER TWO: BACKGROUND AND LITERATURE REVIEW

Crash rates for young drivers are much greater than for older, more experienced drivers (Insurance Institute for Highway Safety [IIHS], 2013a; Ferguson, Teoh, & McCartt, 2007; Mayhew, Simpson, & Pak, 2003; Shope & Bingham 2008; Williams, 2003). Shope and Bingham (2008) highlighted data showing that crash fatality rates per number of miles driven were considerably and consistently higher for drivers aged 15 to 19 years than adults aged 45-54 years between 1989 and 2004. Additional analysis of Fatal Analysis Reporting System (FARS) data from the National Highway Traffic Safety Administration (NHTSA) identified that 16-19 year-old drivers sustained fatalities at a rate of 4.6 deaths per 100 million miles traveled in 2008 (IIHS, 2013a). This was the highest rate for any age group in 2008 other than drivers older than 79 years (IIHS, 2013a).

A 2003 review of teen driving risk (Williams, 2003) provided results from analysis of several key national data sources (including FARS, the National Automotive Sampling System/General Estimates System,² National Personal Transportation Survey,³ the Federal Highway Administration,⁴ and the U.S. Census). In general, Williams reported that younger drivers aged 16-19 years in 1995 had higher crash rates than drivers in older age groups, with 16

² The National Automotive Sampling System/General Estimates System provided a national probability sample of police-reported crashes.

³ The National Personal Transportation Survey provided a source of data for estimating mileage.

⁴ Annual tabulated data published by the Federal Highway Administration provided a source of licensing data.

year-old drivers having the highest rates of crashes and fatal crashes per million miles traveled (Williams, 2003). Williams' analysis also showed that 16 year-old drivers had the highest rates of crashes per 1000 licensed drivers and the highest rates of fatal crashes per 100,000 licensed drivers in 2000 (Williams, 2003). Nearly all of Williams' analyses showed declining rates by age group, with 19 year-olds having lower crash and fatality rates per number of licensed drivers and million miles traveled than 16-year olds. Most of these analyses also found that 16 year-old drivers had higher crash and fatality rates than drivers of any other age (Williams, 2003).

Subsequent analyses of data from these same sources yielded similar findings (Ferguson, Teoh, & McCartt, 2007; Shope & Bingham 2008). Examining data for 2001 and 2002, Ferguson et al. (2007) found that 16 year-old drivers drove the fewest average miles per year, yet they had the highest fatal crash rates per million miles driven among teenage drivers. In addition, 16 year-old drivers had the highest rates of police-reported crashes per mile driven between 2001 and 2002, with an estimated 26 police-reported crashes per million miles driven compared to approximately 14 crashes per million miles driven for 18-19 year-old drivers (Ferguson et al., 2007).

Factors Affecting Novice Driver Motor Vehicle Crashes

Driving is a cognitively demanding activity (Foss, 2000) that comprises a complex set of tasks, requiring coordination between psychomotor functioning, perceptual capacity, and the ability to make and act on quick judgments about a wide variety of ever-changing driving environments (Williams & Ferguson, 2002; Foss, 2007; Shope & Bingham, 2008). Sufficiently mastering how to operate a motor vehicle safely requires substantial experience over time (Gregersen & Bjurulf, 1996; Foss, 2007; Transportation Research Board, Board on Children,

Youth, and Families, 2007). Lack of experience is a major contributor to crashes of newly licensed drivers, with crash rates declining after more miles driven (Groeger, 2000; McCartt, Shabanova, & Leaf, 2003).

Due to their lack of sufficient exposure to highly varied, challenging conditions, novice drivers have limited hazard recognition and risk perception abilities (Brooks-Russell, Simons-Morton, & Ehsani, 2014; Ferguson 2003; Hedlund, 2007). Novice drivers are less equipped than experienced drivers to assess road hazards and respond appropriately (Ferguson, 2003), and their driving errors tend to involve poor judgment and decision-making, lack of hazard recognition, judgment errors in assessing driving risks, poor decision-making under stress, and delayed reactions following indecision (Hedlund, 2007). In contrast to more experienced drivers, novices have not had sufficient exposure to a wide range of driving scenarios to develop both their conscious ability to appraise varied scenarios and their automated or intuitive ability to recognize potentially hazardous driving situations (Kinnear, Kelly, Stradling, & Thomson, 2013).

In addition to lack of experience as drivers, teens still are maturing neurobiologically and have not fully developed their capacity for impulse control and self-regulation (Steinberg, 2004; Dahl, 2008). Biological changes during adolescence precipitate an imbalance between teens' heightened need for stimulation to achieve adequate subjective feelings of pleasure and their still maturing self-regulatory capabilities (Steinberg, 2004). This imbalance can influence adolescents' abilities to attend to driving tasks and apply good judgment while driving (Steinberg, 2004; Transportation Research Board, Board on Children, Youth, and Families, 2007; Dahl, 2008; Keating & Halpern-Felsher, 2008).

Coupled with (and perhaps because of) their limited experience and continued maturation, young drivers also are more likely to engage in risky driving behaviors (e.g.,

speeding, tailgating, unsafe passing, failure to yield) (Jonah & Dawson, 1987; Ferguson, 2003; Shope & Bingham, 2008). In part, young drivers' perceptions of their skills are not aligned with their limited driving abilities (Ferguson, 2003; Keating & Halpern-Felsher, 2008). However, even with an appreciation of driving dangers and consequences, teens tend to be willing to accept greater risk while behind the wheel (Lee, 2007). In comparison to drivers aged 26-49 years, teen drivers in fatal crashes seem more likely to make driver errors, speed, or carry passengers (Ferguson, 2007). A study of more than 20,000 novice drivers in Australia found that self-reported risky driving behaviors (e.g., driving faster than the speed limit; texting while driving) were associated with increased crash risk (Ivers, Senserrick, Boufous, Chen, Woodward, & Norton, 2009).

Untangling the specific contributions to crashes resulting from inexperience and developmental factors is a formidable challenge; however the intersection between these factors highlights the need for interventions to promote safe driving for all young drivers (Williams, 2006). Of the many interventions developed to reduce teen crashes, graduated driver licensing (GDL) has produced the largest effect.

Graduated Driver Licensing

GDL first was enacted in New Zealand in 1987 (Waller, 2003). GDL was implemented in the U.S. initially in Florida in 1996 (Shope & Molnar, 2003), roughly 25 years after studies conducted in North Carolina highlighted a need to develop a system for introducing young novice drivers into the driving population (Waller, 2003). At its core, GDL is a method of limiting young drivers' exposure to risky driving situations, by instituting a phasing in of driving privileges and providing them with the opportunity to learn from experience in gradually less

controlled conditions (Waller, 2003; Foss 2007). The model typically provides three stages (IIHS 2013b; Williams & Shults, 2010; Hartos, Simons-Morton, Beck, & Leaf, 2005; Foss, 2000):

- 1) *Learner Stage*: Initially, beginning teens are allowed to drive while supervised (typically by a parent);
- 2) *Intermediate (or Provisional) Stage*: Teens are allowed to drive unaccompanied but with specific restrictions (primarily limits on passengers and nighttime driving hours); and
- 3) *Unrestricted (full licensure) Stage*: A largely unrestricted driver's license allowing them to drive any time, under any conditions.

GDL provisions have evolved since initial adoption and vary by state (Foss, 2007; Foss, 2000; IIHS 2013b). Prior to GDL some states did not require a learner's permit at all, and it was not uncommon to have a learner's permit for a very short duration (e.g., two weeks) (Goodwin, Waller, Foss, & Margolis, 2006). As of February 2015 nearly all states and the District of Columbia had a three-stage GDL system and required a learner's permit, with most requiring a minimum of six months for this initial driving stage (IIHS, 2015). However, there is at least some evidence that six months may not be sufficient for supervised driving, with potential benefits to starting drivers off with a 12-month learner's stage with supervised driving (Foss, 2007). In addition, as of February 2015 all but four states required a minimum number of supervised driving hours, with most states also requiring that a small proportion of supervised driving occur at night (IIHS, 2015). Tables 2.1 and 2.2 highlight the distribution of state requirements for the minimum numbers of months for the learner stage and hours of supervised driving.

Table 2.1. Distribution of State Requirements for the Minimum Duration of the Learner Stage	
Minimum Duration of the Learner Stage	Number of States (includes District of Columbia)
12 months	9
9 months	3
6 months	35
6 months (4 with driver education)	1
6 months (3 with driver education)	1
10 days	1
No minimum	1

Source: (IIHS, 2015)

Table 2.2: Distribution of State Requirements for the Minimum Hours of Supervised Driving	
Minimum Hours of Supervised driving	Number of States (includes District of Columbia)
> 60 hours	2
60 hours	3
50 hours	24
45 hours	1
40 hours	11
30 hours	4
20-25 hours	2
No minimum	4

Source: (IIHS, 2015)

GDL was enacted in North Carolina in 1997 (HSRC, 2001; Shope & Molnar, 2003).

Teens in North Carolina can obtain a learners permit at 15 years of age, they can obtain an intermediate stage license to begin driving unsupervised (with restrictions) after 12 months of the learner's stage and upon reaching 16 years of age, and they can obtain a full, unrestricted drivers license after six months of driving with an intermediate license (North Carolina Department of Transportation, 2014). North Carolina currently requires 60 hours of supervised driving during the learner stage, with at least 10 of those hours having to occur during nighttime hours.⁵ Only

⁵ There was no minimum number of supervised driving hours required when HSRC collected data during 2007 and 2008 (Goodwin et al., 2010).

one passenger younger than 21 years of age is allowed to ride with a driver during the intermediate stage. Family members younger than 21 years of age are allowed to ride with the intermediate stage driver, and a non-family passenger is not permitted if a family member younger than 21 years already is a passenger. In addition, North Carolina restricts night driving at 9:00 pm during the intermediate stage (North Carolina Department of Transportation, 2014).

GDL Effectiveness

The primary, if not sole, purpose of GDL is to provide a means for progressively building driving experience for young drivers in gradually less supervised and restricted environments (Waller, 2003; Foss, 2007). Although accounting for some specific risks to safe driving, GDL is not intended to mitigate risk-taking behavior (Waller, 2003). Appreciating GDL's effectiveness necessitates the understanding that GDL is based on the principle of human learning that it takes a considerable amount of practice to learn a complex and demanding skill (Foss, 2007). GDL accounts for the notion that it takes multiple years of experience to develop reasonable coordination of the psychomotor, perceptual, and decision-making functions that are necessary to safely handle a vehicle in a wide variety of ever-changing driving environments (Foss, 2007).

Overall, GDL has reduced young driver fatal and nonfatal crashes (Shope 2007; Russell, Vandermeer, & Hartling, 2011; Masten, Foss, & Marshall, 2011; McCartt, Teoh, Fields, Braitman, & Hellinga, 2010; Shope & Molnar, 2003; Foss, Feaganes, & Rodgman, 2001). However, crash risk is substantially lower during the learner stage than during licensed driving (i.e., without supervision) (Gregersen, Nyberg, & Berg, 2003), with the greatest risk to young drivers manifesting during the immediate period after licensure to drive independently (Lewis-Evans, 2010; Mayhew, Simpson, & Pak, 2003; Shope, 2013; Twisk & Stacey, 2007).

Providing teens with substantial varied experience over a sufficient period of supervised driving is important given that young drivers will need to learn additional lessons that cannot be grasped until they begin driving without supervision (e.g., self-regulation when solely responsible for operating the vehicle) (Masten, Foss, & Marshall, 2011). Although more supervised driving hours (e.g., more than 100 hours) may be more protective than fewer (Twisk & Stacey, 2007; Gregersen, Berg, Engström, Nolén, Nyberg, & Rimmö, 2000), it is unclear what minimum number of supervised driving hours is needed to produce a beneficial effect (O'Brien, Foss, Goodwin, & Masten, 2013). Some findings suggest that a mandatory minimum number of supervised driving hours has no effect on crash rates (Masten, Foss, & Marshall, 2011; O'Brien et al, 2013; Simons-Morton, 2007). This may be because many parents are unaware of minimum supervised driving requirements (O'Brien et al, 2013).

Although GDL has reduced crashes and injuries, additional gains should be possible (Foss 2007; Foss & Goodwin, 2003), Table 2.3 highlights five domains where GDL could be improved to yield greater benefits (Foss and Goodwin (2003).

Table 2.3. Domains where GDL could be Improved to Yield Greater Benefits
1) Structuring the system to provide maximum protection 2) Structuring the system to encourage compliance with provisions 3) Ensuring that the pertinent elements of the system are readily enforceable and enforced 4) Structuring the system to ensure that the most useful practical driving experience is obtained 5) Ensuring that parents play the most effective possible role

Source: (Foss & Goodwin, 2003)

The current research focuses predominantly on a combination of the fourth and fifth domains by investigating the role parents play in helping to promote the most useful practical driving experience for young drivers.

Parental Influence on Teen Driving

Given their roles in teens' lives, parents are positioned to be the most critical driving mentors and gatekeepers of driving privileges for their teenage children (Preusser, Williams, & Lund, 1985; Beck, Hartos, & Simons-Morton, 2002). Parents have an opportunity to increase safe driving in their teens because they typically are involved in their teens' driving experiences from the beginning (Hartos, Shattuck, Simons-Morton, & Beck, 2004; Simons-Morton, Hartos, & Leaf, 2002), and GDL offers parents leverage to influence their teens' driving (Hartos et al., 2005; Foss & Goodwin, 2003). Findings indicate that parents generally approve of existing teen driver licensing requirements—including those that require more parent involvement (Williams, Braitman, & McCartt, 2011; Brookland & Begg, 2011; Chaudhary, Williams, & Casanova, 2010; McKay, Coben, Larkin, & Shaffer, 2008; Waller, Olk, & Shope, 2000). As one example, a study found that parents approved of being required to participate in teen driver education courses (Hartos & Huff, 2008). A national survey found that parents were in favor of a learner period with at least 100 required hours of supervised driving (Williams, Braitman, & McCartt, 2011).

Although parents appear to support the idea of providing teens with substantial practice, findings indicate that parents actually provide relatively little supervised driving (Goodwin, Foss, Margolis, & Waller, 2010; McKay et al., 2008). It may be challenging for parents to find the time to supervise their teens' driving, with some parents seeing driving practice as a major time commitment (Jacobsohn, García-España, Durbin, Erkoboni, & Winston, 2012). Some parents don't enter the learner stage with a specific plan for instructing teen drivers (Goodwin et al., 2010), and they may not know what to teach to their children or what driving experiences they should provide (Mirman & Kay, 2012). As a result, parents might not provide teens with an adequate amount and variety of driving experience during the learner stage. Parents may limit

exposure to more challenging driving situations and many seem to focus on vehicle handling rather than the higher-order driving skills (e.g., scanning and hazard detection) that help teens anticipate and avoid potentially dangerous situations (Mirman & Kay, 2012; Jacobsohn et al., 2012, Goodwin et al., 2010; Simons-Morton & Ouimet, 2006).

Limited Information about Learner Stage Experiences

There is limited knowledge about what parents are doing during the learner stage (Williams & Shults, 2010; Foss, 2007). Obtaining a better understanding of how parents influence teenage driving was among five critical research areas identified during a 2008 meeting of the Transportation Research Board's Subcommittee on Young Drivers (Williams, 2013). Among a set of five research questions described, two relate specifically to my dissertation research (Williams, 2013):

- “What is the progression and variability of parent involvement in (a) teaching and supervision of practice driving; (b) determining readiness for licensure; and (c) and managing the early driving experience (including vehicle access, adherence to GDL provisions, and driving privileges)?”
- “How does the variability in parental involvement in supervised practice driving, driver education, and provisional licensure relate to teenage driving behavior and performance?”

These research questions underscore the need to obtain a clearer understanding of what parents are doing during the learner period and how, in turn, parent involvement affects teen driving. Investigating this phenomenon will help elucidate whether certain experiences provided during the learner stage promote safer driving following the learner stage.

Since GDL and other teen driving provisions largely are self-enforcing (Foss & Goodwin, 2003), there may be considerable variability between parents and the specific learner stage experience provided to teens in different families. Therefore, one key question is whether a learner stage experience that includes a lot of supervised driving overall with many hours spent driving in diverse and challenging driving scenarios provides for a more prepared, perhaps safer novice driver at the start of the intermediate stage of GDL. To address this question, research studies should account for whether the quality and quantity of supervised driving during the learner stage vary between parents in meaningful ways. In turn, it would be important to determine whether any such meaningful differences have an impact on teen driving upon receipt of their second stage licenses when teens can drive without a supervising adult.

Parent-Teens Relationships and Key Constructs

The parent-child relationship shares similarities of other close relationships, but it differs in several important ways: 1) there is a heightened obligation of parent to child; 2) the connection between parents and children is enduring with children not free to leave the relationship during their childhood; and 3) there are ways in which parent-child relationships evolve and adapt that are unlike other types of adult relationships (Maccoby & Martin, 1983). Parents specifically have certain required duties that include providing for children's basic needs, deciding how and where children will spend their time, and acting on behalf of their children in many types of circumstances (Maccoby & Martin, 1983). Of additional critical importance is the role parents have in educating and socializing their children to help them learn to adopt socially-acceptable behaviors and develop a sense of responsibility for their actions, thoughtfulness toward others, self-reliance, and gradual acquisition of skills required to be function as an adult

(Maccoby & Martin, 1983). Parents and children exist within the family structure which, in turn, functions within broader societal and cultural spheres (Maccoby & Martin, 1983). Parenting evolves across the lifespan as children age and mature and reach different milestones and require different types of parental support (Maccoby & Martin, 1983).

Although adolescence is a development period frequently thought of more for the psychological and emotional distance between teens and their parents, teens benefit from a balance between having structure and connectedness within the family and freedom to explore and develop a sense of individuality (Baumrind, 1991). Developing one's sense of individuality during adolescence should not require teens to break from adherence to parental values or to seek emotional distance from parents overall (Baumrind, 1991).

Parents play a key role in helping to guide the ongoing development of their children—to socialize them through the delivery of specific experiences and parenting approaches that, at least in part, are guided by a desire to have children internalize parenting goals and values and exhibit desired behaviors (Spera, 2006; Grusec & Goodnow, 1994; Simons-Morton & Hartos, 2002). Different approaches to parenting can yield different effects with respect to children's emotional security, self-control, sense of independence, and internalized standards for their own behavior (Spera, 2006; Grusec & Goodnow, 1994; Baumrind, 1991).

A growing body of literature continues to support the importance influence that parents have teenage behaviors. This influence depends on what parents do and how they take action (Burrus, Leeks, Sipe, Dolina, Soler, et al., 2012). Parents appear to have an important influence on teenage behaviors during the adolescent stage of development when it is might be expected that teens will be more likely to take risks (Steinberg, 2004; 2007). Therefore, healthy navigation through adolescence can be promulgated more fully for teens whose parents remain invested in

their development, provide adequate supervision and communication, help teens negotiate risks and risky behavior, and continue to monitor and guide their teens (Burrus, et al., 2012; DeVore & Ginsburg, 2005).

To understand the protective effects of parenting requires considering fundamental ways in which parents influence their children. Children's receptivity to their parents' actions and children's achievement of goals are influenced by the goals parents set for their children's achievements, how and what parents do to help their children reach those goals, and the underlying emotional climate established for parent-child interactions (Darling & Steinberg, 1993; Hartos & Simons-Morton, 2006; Jackson & Dickinson, 2009; Simons-Morton & Hartos, 2002). Independently these factors are important, and they interact in various hypothesized ways to yield specific outcomes. I first will review each of these factors independently, referencing research that has explored and seen effects for each, and then I will present a model that ties these factors together into a comprehensive approach.

Parenting Style

Maccoby & Martin (1983) and Baumrind (1991) were some of the initial researchers to describe key facets of parenting posited to play important roles in how parents interact with their children and how different approaches to parenting may result in different child outcomes. Building on prior work, Maccoby & Martin (1983) and Baumrind (1991) provided a foundation for distinguishing between types of parents, vis-à-vis the styles of parenting they used in interacting with their children.

Parenting style is considered a broad global attribute that describes the overall emotional climate and the tone parents set for how they interact with their children (Darling & Steinberg, 1993; Jackson & Dickinson, 2009; Simons-Morton & Hartos, 2002; Steinberg & Silk, 2002).

Parenting styles fundamentally are distinguished by relative differences across two primary dimensions: parental *responsiveness* to and *demandingness* of children (Jackson & Dickinson, 2009; Jackson, Henriksen, & Foshee, 1998; Steinberg, Lamborn, Darling, Mounts, & Dornbush, 1994; Darling & Steinberg, 1993; Baumrind, 1991; Maccoby & Martin, 1983). As described by Baumrind (1991), Maccoby & Martin (1983), and others researchers, responsiveness refers to parents being affectionate and accepting toward their children in concert with parental attention to children's needs, academic and social development, individuality, self-regulation, and self-assertion (Hartos, Eitel, Haynie, & Simons-Morton, 2000; Jackson, Henriksen, & Foshee, 1998; Patrick, Hennessy, McSpadden, Oh, 2013; Simons-Morton & Hartos, 2002). In contrast, demandingness refers to parental efforts to set and enforce specific standards of behavior, maintain structure in the child's daily life, monitor children's activities, provide supervision and discipline, and confront disobedience in an effort to compel children to integrate into the family and behave in specific, preferable ways (Baumrind, 1991; Hartos, Eitel, Haynie, & Simons-Morton, 2000; Jackson, Henriksen, & Foshee, 1998; Maccoby & Martin, 1983; Patrick, Hennessy, McSpadden, Oh, 2013; Simons-Morton & Hartos, 2002). Baumrind proposed that teens are likely to achieve a preferred balance between individuality and connectedness when parents are both highly responsive and highly demanding, with an evolving balance between freedom and control that is suited to the teen's level of development (Baumrind, 1991).

Studies have found fairly consistent support for the combination of high demandingness and high responsiveness being associated with improved child outcomes (e.g., emotional stability; adaptive patterns of coping) (Power, Sleddens, Berge, Connell, Govig, et al., 2013; Simons-Morton & Hartos, 2002; Jackson, Henriksen, & Foshee, 1998; Darling & Steinberg, 1993). This combination of high responsiveness and high demandingness (identified as the

authoritative parenting style) has been associated with favorable child outcomes across a wide range of developmental issues, such as adolescent school performance (Spera, 2006; Dornbusch, Ritter, Leiderman, Roberts, & Fraleigh, 1987), substance use (Adalbjarnardottir & Hafsteinsson, 2001; Baumrind, 1991), sexual risk-taking behaviors (Huebner & Howell, 2003), and teen driving (Simons-Morton & Hartos, 2002).

Specific to teen driving, Ginsburg, Durbin, García-España, Kalicka, & Winston (2009) examined associations between parenting style and teen driving behavior. The investigators identified that teens with highly responsive and demanding parents had a lower crash risk, were less likely to drive after drinking, and were less apt to drive while using a cell phone than teens whose parents were neither responsive nor demanding (Ginsburg et al., 2009). In comparison to these teens, teens whose parents were highly demanding and highly responsive were more likely to report using seatbelts and less likely to report speeding (Ginsburg et al., 2009).

An important question is whether demandingness and responsiveness should be studied as distinct variables. As an example, a study of teen substance abuse behavior used the Authoritative Parenting Index (Jackson, Henriksen, & Foshee, 1998) to measure the potential protective effects of parent demandingness distinct from parent responsiveness (Piko & Balázs, 2012). The investigators found protective effects for responsiveness, although parents' demandingness predominantly was not protective against teen substance use (Piko & Balázs, 2012). Given the potential for distinct effects of these two dimensions of parenting style, I included demandingness and responsiveness as distinct variables in my analyses.

Parenting Goals

In addition to parenting style dimensions, investigators have focused on examining parenting goals. Broadly defined, goals are “internal representations of desired states, where

states are broadly construed as outcomes, events, or processes” (Austin & Vancouver, 1996). Parenting goals specifically are focused on skills, qualities, or attributes that parents would like their children to obtain or adopt (Jackson & Dickinson, 2009; Simons-Morton & Hartos, 2002). In contrast to parenting style, parenting goals may be specific to certain behaviors (e.g., to develop safe driving habits) or focused more globally (e.g., to become a critical thinker; to develop a healthy sense of independence) (Jackson & Dickinson, 2009; Darling & Steinberg, 1993; Simons-Morton & Hartos, 2002).

Parenting goals typically are at the foundation of interventions aimed at targeting parenting style and parenting practices (Simons-Morton & Hartos, 2002). Parenting goals have been associated with child outcomes across a range of developmental issues, such as adolescent school performance (Spera, 2006), student motivation (Vedder-Weiss & Fortus, 2013), teen employment (Runyan, Vladutiu, Schulman, Rauscher, 2011; Runyan, Schulman, Dal Santo, Bowling, & Agans, 2009) and teen driving (Hartos & Simons-Morton, 2006). Specific to the prevention of risky teen driving, parenting goals might be grounded in the expectation that teens will be safe drivers, with goals related to increased teen driver safety and effective parental management of teen driving (Hartos & Simons-Morton, 2006).

Parents might have goals for teens to obtain their driver’s licenses and begin driving without having equivalent goals for training teens in a manner that provides them with sufficient experience to be safer on the road while driving independently. Parents appear to vary with respect to how they plan to approach the learner stage, what they want their teens to master during supervised driving, what supervised driving experiences they should provide, and how they should be involved in preparing young drivers (Goodwin et al., 2010; Guttman, 2012; Mirman & Kay, 2012; Williams, 2006).

Some parenting goals for the learner stage might be focused on mastery of safe driving behaviors—mastery goals being those developed for the purpose of gaining an in-depth understanding of a subject or skill while developing and improving one’s level of competence of the given subject or skill (Ames, 1992; Vedder-Weiss & Fortus, 2013). For these parents, they might understand that it will take considerable time to develop competence as a safe driver with considerable attention given to the quality of the learning experience for teens to gain some degree of expertise (Ames, 1992). Other parents may not set such goals for their teens to gain mastery as a safe driver; it may be that these parents are not aware of the time and experience required for their teens to develop competence as safe drivers. Some parents might be more focused on the potential benefits of teen licensure, hoping to gain some degree of freedom from serving as a chauffeur to teens and even younger siblings (Goodwin et al., 2010; Hartos & Simons-Morton, 2006). Therefore, I examined parenting goals that were specific to gaining basic vehicle handling skills as well as goals focused on developing driving mastery. I assessed how parenting goals differed with respect to those that were focused on skill development as well as those focused on teen milestone achievement and parent independence.

Parenting Practices

In contrast to parenting style and parenting goals, parenting practices are the specific actions parents take to help their children achieve the goals established (Jackson & Dickinson, 2009; Simons-Morton & Hartos, 2002; Steinberg & Silk, 2002). Parenting practices account for *what* parents actually do, and parenting styles account for *how* parents take action (Patrick, Hennessy, McSpadden, Oh, 2013). Distinct from parenting styles, parenting practices are directly observable and relate to parent behavior in specific contexts (e.g., supervised driving) (Power, Sleddens, Berge, Connell, Govig et al., 2013). Parenting practices are broadly considered to be a

combination of motivating, monitoring, and managing behavior (Borawski, Ievers-Landis, Lovegreen, & Trapl, 2003; Dishion & McMahon, 1998). Parental monitoring itself encompasses supervision and communication between parents and children (DeVore & Ginsburg, 2005).

Parenting practices are associated with improved child outcomes, and studies have identified relationships between parent involvement and desired changes in specific teen outcomes, such as: academic performance (Spera, 2006; Stanton, Cole, Galbraith, Li, Pendleton, et al., 2004); teen dating violence (Foshee, Reyes, Ennett, Cance, Bauman, & Bowling, 2012); substance use (Bauman, Ennett, Foshee, Pemberton, King, & Koch, 2002; Borawski, Ievers-Landis, Lovegreen, & Trapl, 2003; Griffin, Botvin, Scheier, Diaz, & Miller, 2000; Li, Stanton, & Feigelman, 2000; Ryan, Jorm, & Lubman, 2010; Stanton, Cole, Galbraith, Li, Pendleton, et al., 2004), risky sexual behavior (Borawski, Ievers-Landis, Lovegreen, & Trapl, 2003; Li, Stanton, & Feigelman, 2000; Stanton, Cole, Galbraith, Li, Pendleton, et al., 2004), and risky driving behaviors (Simons-Morton & Hartos, 2002; Simons-Morton, Hartos, & Beck, 2004; Simons-Morton, Hartos, Leaf, & Preusser, 2006; Simons-Morton & Ouimet, 2006).

Specific to parenting practices during the learner stage, in general, more supervised driving appears beneficial in contrast to less time behind the wheel (Gregersen, Berg, Engström, Nolen, Nyberg, & Rimmö, 2000); however more driving time might be beneficial to an even greater extent if teens receive more exposure to varied driving conditions (Twisk & Stacey, 2007). Driving is a task that occurs in complex, ever-changing environments (Foss, 2007); therefore the conditions and situations to which teens are exposed during the learner stage are of key importance. However, parents tend to facilitate driving practice in relatively safe conditions to focus primarily on basic vehicle operation and on maneuvering skills and less on helping teens develop higher order skills that might result in reducing crashes after teens begin driving

independently (Goodwin et al., 2010; Simons-Morton & Ouimet, 2006). Parents who provide teens with repeated exposure to varied and challenging driving conditions over time might do a better job to prepare teens and reduce crash risk (Twisk & Stacey, 2007). How parents communicate with their teens also is relevant to their preparation. Teens with parents who co-drive might rely on feedback provided by their parents during supervised driving which in turn might limit their development of scanning and other important safe driving habits during the learner stage (Groeger, 2000; Simons-Morton & Ouimet, 2006). Parents might prepare teens better for independent driving and decision making if they promote teen independent driving, letting teens figure some things out for themselves during driving practice, rather than providing ongoing instruction and co-driving (Simons-Morton & Ouimet, 2006). When parents do communicate with their teens during driving practice, it might help teens to receive guidance about higher-level concepts (e.g., hazard detection); however findings from several studies revealed that parents do not typically discuss these topics with teens during supervised driving practice (Goodwin et al., 2010; 2014; Mirman & Kay, 2012; Tronsmoen, 2011). Therefore, parenting practices relevant to the learner stage might include a combination of the number of supervised driving hours and how they are spent.

Teen Socialization

Although parents might develop a foundation for what they offer their children via parenting style, goals, and practices, ultimately the objective is for children to be socialized to internalize their parents' goals and aspirations for behaving in specific ways (Darling & Steinberg, 1993; Jackson & Dickinson, 2009). Therefore, teens are not passive actors, and whether they behave according to parental desires depends greatly on whether they are willing to accept their parents' efforts to help them attain these goals (Darling & Steinberg, 1993; Grusec &

Goodnow, 1994). Teen willingness to be socialized—to accept and internalize parenting goals and adopt specific behaviors associated with desired outcomes—is influenced by parenting style, goals, and practices and is associated with teen behavior (Jackson & Dickinson, 2009; Darling & Steinberg, 1993). For example, teens whose parents exhibit high responsiveness and high demandingness might be receptive to accept their attempts to socialize them to behave in a specific fashion and, in turn, the teens may adopt desired behaviors (Darling & Steinberg, 1993). Conversely, teens whose parents exhibit high demandingness in the absence of high responsiveness might resist parents’ attempts to socialize them and, in turn, fail to adopt desired behaviors (Darling & Steinberg, 1993).

Integrative Model of Parenting

Accounting for the interactions between key parent and teen variables, Darling and Steinberg (1993) introduced an integrative model of parenting with specific hypothesized relationships between the key constructs. Figure 2.1 provides the model introduced by Darling and Steinberg in 1993.

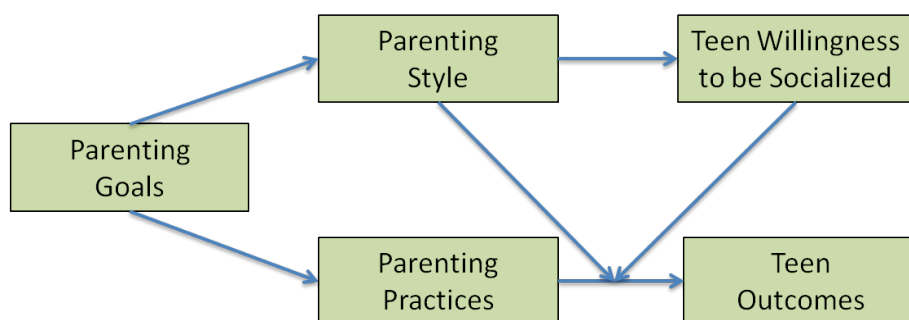


Figure 2.1 Integrative Model of Parenting (Darling & Steinberg, 1993)

As seen in Figure 2.1, Darling and Steinberg (1993) proposed a series of mediating and moderating relationships:

- A relationship between parenting goals and adolescent outcomes that is mediated by parenting practices.
- A relationship between parenting goals and adolescent willingness to be socialized that is mediated by parenting style.
- Moderation of the relationship between parenting practices and adolescent outcomes by parenting style and by adolescent willingness to be socialized.

As a modification to Darling's & Steinberg's (1993) model, Jackson & Dickinson (2009) replaced the construct of teen willingness to be socialized for a broader construct of child socialization. Child socialization is intended to capture children's own beliefs, values, and intentions as well as their access and exposure to various external socialization influences (Jackson & Dickinson, 2009). Figure 2.2 provides the modified model developed by Jackson and Dickinson (2009).

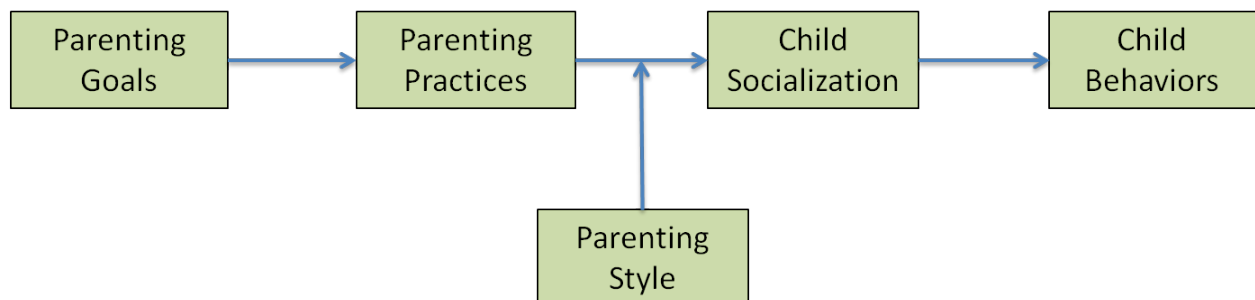


Figure 2.2 Modified Integrative Model of Parenting (Jackson & Dickinson, 2009)

As seen in Figure 2.2, Jackson and Dickinson (2009) proposed somewhat different relationships between the constructs:

- A relationship between parenting goals and child socialization that is mediated by parenting practices.
- A relationship between parenting practices and child behavior that is mediated by child socialization.

- Moderation of the relationship between parenting practices and child socialization by parenting style.

The Integrative Model of Parenting provides a useful lens through which to examine relationships between important aspects of parenting and teen outcomes, and the model provided a salient conceptual framework for my study of parenting during the learner stage. Although the specific mediated and moderated relationships differ between the original model presented by Darling & Steinberg (1993) and the modification presented by Jackson and Dickinson (2009), both illustrate particular influences of parenting on teen outcomes. In my research it was important to consider the relationships between these variables, and my study is the first to use the Integrative Model of Parenting to develop and examine a typology of parenting practices for the learner stage. Findings from my analysis of parenting practice groups, additional parenting factors, and the potential impact of parenting on teen driving behavior should lead to additional research and intervention strategies.

CHAPTER THREE: METHODS AND SELECTED FINDINGS FROM HSRC'S STUDY OF PARENTS AND TEENS

This chapter provides a brief description of key methods employed during the University of North Carolina at Chapel Hill's Highway Safety Research Center (HSRC) driving study (Goodwin et al., 2010), which is the source of the data for my research. Key findings from HSRC's study are presented. In addition, descriptions of my samples are presented for each aim followed by a brief overview of my methods and data sources. Detailed methods for my dissertation analyses are presented Chapters 4 and 5.

Learner Stage Data Collection

Between January 2007 and June 2008, HSRC staff collected data from 50 families for the study of parents and teens during the learner stage of GDL (Goodwin et al., 2010). HSRC staff recruited families from two North Carolina Division of Motor Vehicles offices (Goodwin et al., 2010). HSRC staff conducted semi-structured telephone interviews with parents of all teens at ten distinct time periods across the learner stage, and transcribed the recorded responses to the interview questions (see Table 3.1 for a timeline of these interviews) (Goodwin et al., 2010). These interview data provided the foundation for analyzing parenting practices reported across the learner stage, and data from the first interview were analyzed to identify parenting goals. HSRC also captured g-force event-triggered video clips of teens driving while supervised during the initial four months of the learner stage, with a total of 2,068 supervised driving clips across

the 50 families and a range of 2 to 160 clips recorded per family (an average of 41.4 supervised driving clips per family) (Goodwin et al., 2010). These data provided direct observation of supervised driving that complemented the data analyzed from parent interviews.

Table 3.1. Schedule of Semi-structured Telephone Interviews with Parents	
Parent Interview Number	Time Point for Interview (Approximate number of weeks since teen obtained learners' permit)
1	Within one week of obtaining learner's permit
2	Two weeks
3	Four weeks
4	Six weeks
5	Nine weeks
6	Thirteen weeks
7	Nineteen weeks
8	Twenty-six weeks
9	Forty weeks
10	Fifty-two weeks

* Table based on from Goodwin et al., 2010 (with months converted to weeks for some data collection time points.)

HSRC staff also administered paper-pencil questionnaires to parents and teens at baseline. Data were collected from parents about their driving behavior and family characteristics. Questionnaires were administered to teens to assess parenting style using the Authoritative Parenting Index (Jackson, Henriksen, & Foshee, 1998). Questionnaires were completed by 46 teens from 45 families—including both siblings from a set of identical twins (A. Goodwin, personal communication, December 6, 2013).

Intermediate Stage Data Collection

HSRC staff recorded g-force event-triggered video clips for a subset of 38 teens from the learner stage study (Goodwin, Foss & O'Brien, 2011). These video clips captured teens driving during the first 6 months of unsupervised driving, after teens obtained their intermediate stage

licenses. HSRC sampled and coded 5,845 video clips of these teens driving during the intermediate stage (A. Goodwin, personal communication, December 6, 2013).

Selected Findings from the HSRC Study of the Learner Stage

Among several key findings from the HSRC study, the investigators reported that (Goodwin et al., 2010):

- The majority of parents reported having some goals for supervised driving, with roughly half of parents reporting they wanted their teens to have a lot of practice driving in controlled conditions. Less than one-quarter of parents reported having plans to facilitate supervised driving for their teens in a wide variety of conditions.
- Although parents seemed comfortable introducing teens to less challenging driving conditions (e.g., residential neighborhoods) early on during the learner stage, parents seemed to facilitate practice driving in more challenging conditions much more gradually. Even when more challenging driving conditions were introduced, the video data suggest that these conditions reflected a small proportion of practice driving.
- The majority of practice driving conditions observed from the video data showed that parents were focused on the roadway and not distracted during practice driving. Potentially serious driving events captured by the video recorder were rare. In very few video clips, it appeared that a parent acted to help the teen prevent a crash.
- As the learner stage elapsed, parents reported giving teens less feedback and instruction, with some parents reporting that they did not want to distract their teens or have feedback perceived by their teens as criticism.

- The majority of feedback provided to teens was with regard to vehicle handling, with a small proportion of feedback focused on higher-order driving skills (e.g., scanning, hazard detection).
- Teen driving skills improved quickly during the initial months of supervised driving; however, parents reported that teens had challenges with key aspects of vehicle handling (e.g., braking, turning).
- Although some parents reported their teens were overconfident, leading to less careful driving behaviors (e.g., not maintaining sufficient headway), roughly half of parents reported they would be comfortable if their teens drove independently (i.e., without supervision) in relatively benign driving conditions. However, by the end of the learner stage roughly one-half of parents reported their teens were not ready to drive independently in at least one more challenging driving condition (e.g., heavy traffic, highway, rain).

The HSRC investigation is of key importance to the overall study of the learner stage of GDL, as it allowed for direct observation of supervised driving experiences—driving behaviors as well as the interactions and communication between parents and teens. The HSRC study also helped to draw insights into the evolving perceptions of parents during the full year of the learner stage by examining the data from interviews with parents across this stage. Of primary relevance to my dissertation, the HSRC data allow for examining the relationship between parenting and teen driving outcomes. The HSRC study’s administration of parent interviews permit a longitudinal assessment of the experiences parents provided for their teens, their objectives for the learner stage, and specific interactions with their teens focused on supervised driving.

Study Samples Derived for Addressing Dissertation Aims 1 and 2

Because an aim of my study was to assess the potential relationships between parenting practices and global parenting style dimensions, the sample for my study initially was limited to the 45 families in which teens completed the Authoritative Parenting Index. Also, prior review of the video clips identified significant challenges distinguishing between the identical twins included in the sample (A. Goodwin, personal communication, December 6, 2013). This set of identical twins was excluded from the analysis, reducing the number of families included in my analysis to 44 families. A subsequent review of the data revealed that one family dropped out of the original study after four weeks; therefore this family also was excluded. The resulting 43 families were included to address Aim 1, with analysis of data from the semi-structured interviews, video clips, and teen questionnaires. Thirty of these teens were included in the HSRC's study of the intermediate study and, thus, were included in analyses to address Aim 2. Figure 3.1 provides a flowchart illustrating how the samples were derived for Aims 1 and 2.

Study Samples Derived for Addressing Dissertation Aim 3

To analyze potential between-individual differences in the average trajectory of supervised driving time, the sample for Aim 3 excluded the two parents with twins, for whom goals for the learner stage were not differentiated. In addition, the family that dropped out of the original study after four weeks was excluded. Therefore, the sample for Aim 3 included 47 families with 47 teens. Analysis that examined the potential influence of parenting style dimensions was limited to the subset of 42 families in which teens completed the Authoritative Parenting Index. Figure 3.2 provides a flowchart illustrating how the samples were derived for analyses for Aim 3.

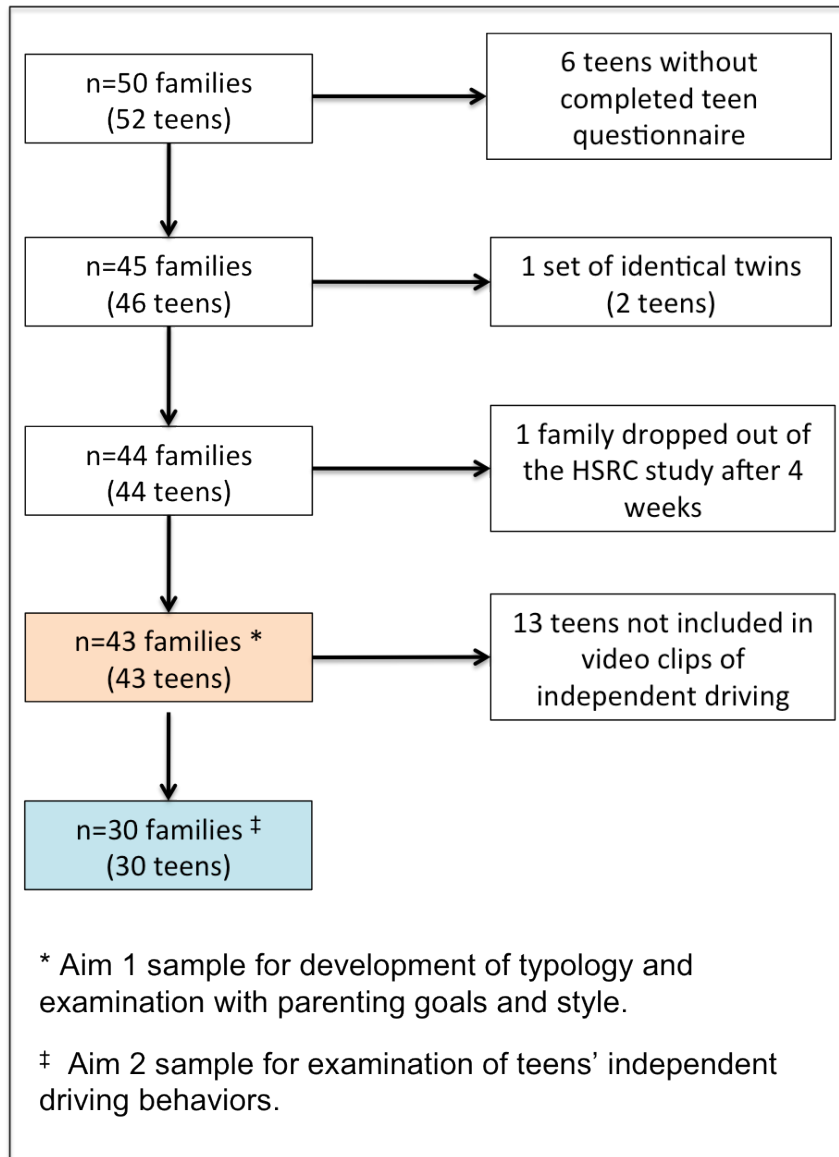


Figure 3.1 Study Sample for Aims 1 and 2

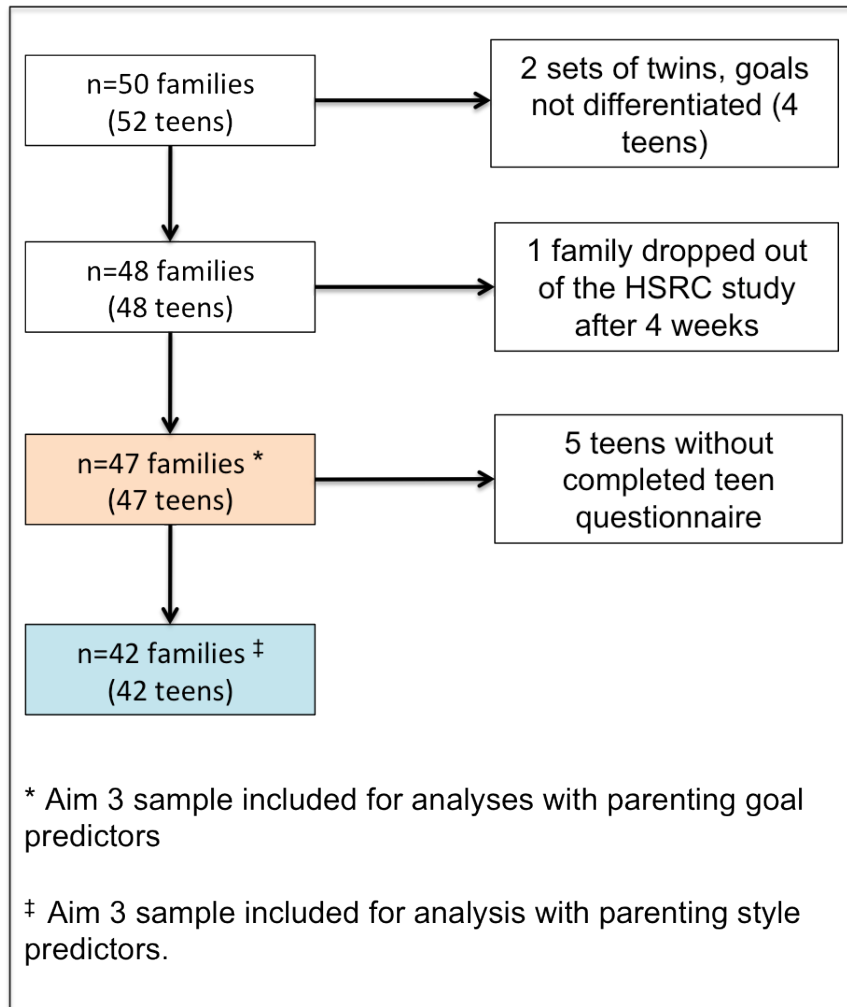


Figure 3.2 Study Sample for Aim 3

Secondary Data Analysis

As described in the sections to follow, for the proposed study, I conducted secondary analysis of data collected in the HSRC study from: parent and teen questionnaires, parent telephone interviews, video clips of supervised driving, and video clips of independent driving. The final codebook developed and used during my qualitative analysis is included as Appendix A. A sample of coded video clips is included as Appendix B.

CHAPTER FOUR: A TYPOLOGY OF PARENTING PRACTICES DURING THE LEARNER STAGE OF GRADUATED DRIVER LICENSING

Introduction

Parents have an essential role to prepare teens to drive during the learner stage of graduated driver licensing (GDL). Because most parents fail to use this time optimally (Goodwin, Foss, Margolis, and Harrell, 2014; Goodwin, Foss, Margolis, and Waller, 2010), there is an urgent need to better understand, and improve, parents' supervisory behaviors during the learner stage. The central aim of this study is to describe parent behavior and communication (i.e., parenting practices) related to training and preparing teens during the learner stage. Foremost, this study aimed to develop a typology of parenting for the learner stage of GDL, distinguishing parents into groups based on their patterns of parenting practices. Guided by the Integrative Model of Parenting (Darling & Steinberg, 1993), data were analyzed to examine potential relationships between parenting practice patterns and: 1) parenting goals for teen driving and 2) parenting style, the latter denoting parents' general approach to parenting.

Secondary analysis of data collected by the University of North Carolina's Highway Safety Research Center from parent interviews, in-vehicle video clips of teens driving with parents, and teen questionnaires was conducted using predominantly qualitative methods to develop the typology and then examine relationships between typology groups, parenting goals, and parenting style. The analysis of data integrated from multiple sources allowed for gaining an in-depth understanding of how different groups of parents provide supervised driving during the learner stage, determining if and what goals might compel their behavior, and if and how

parenting style might relate to different patterns of parenting practices. Finally, the parenting practice typology groups were assessed to identify distinctions in how much driving practice teens obtained during the learner stage and to explore potential differences between groups with respect to teens' independent driving behaviors after the learner stage.

Background

The prevention of young driver motor vehicle crashes remains a major public health challenge. Motor vehicle crashes resulted in over one-third of all fatalities among 15-19 year-olds in the U.S. between 1994 and 2010 (Centers for Disease Prevention and Control, 2013). Teenage drivers are killed and injured at disproportionately greater rates than adult drivers (Boyle & Lampkin, 2008; Ferguson, Teoh, & McCartt, 2007; Hedlund, 2007; Mayhew, Simpson, & Pak, 2003; Shope & Bingham 2008; Williams, 2003).

Graduated driver licensing (GDL) has been broadly implemented to curb teen motor vehicle crashes. GDL provides a structure within which young drivers can progressively gain experience necessary to develop safe driving habits (Foss, 2007; Waller, 2003). The initial of three GDL stages, the learner stage requires that teens drive while supervised, typically by a parent. The learner stage is followed by an intermediate stage during which teens can drive without adult supervision but with some protective restrictions. In the final stage, teens graduate to full licensure with few if any restrictions (Foss, 2007; Foss & Goodwin, 2003; National Highway Traffic Safety Administration, 2008; North Carolina Department of Transportation, 2014). GDL has produced substantial reductions in young driver fatal and nonfatal crashes (Foss, Feaganes, & Rodgman, 2001; Masten, Foss, & Marshall, 2011; McCartt, Teoh, Fields, Braitman, & Hellinga, 2010; Russell, Vandermeer, & Hartling, 2011; Shope 2007; Shope & Molnar, 2003).

Although it has reduced young driver crashes, injuries, and deaths dramatically among high school age drivers, the graduated approach to licensing has not delivered as expected on its promise to create substantially better, safer young drivers (Masten & Foss, 2010; Masten, Marshall & Foss, 2011). Crash risk is substantially lower during the learner stage than during licensed driving (i.e., without supervision) (Gregersen, Nyberg, & Berg, 2003), with the greatest risk to young drivers occurring when novices begin driving without adult supervision (Lewis-Evans, 2010; Mayhew, Simpson, & Pak, 2003; Shope, 2013; Twisk & Stacey, 2007).

Parent Involvement during Graduated Driver Licensing

Parents are positioned to be the most critical driving mentors and gatekeepers of driving experiences for their teenage children (Beck, Hartos, & Simons-Morton, 2002; Preusser, Williams, & Lund, 1985). GDL relies on parents and provides them with an important opportunity to influence teen driving (Foss & Goodwin, 2003; Hartos, Simons-Morton, Beck & Leaf, 2005; Simons-Morton, 2007; Simons-Morton & Ouimet, 2006). Although parents are generally supportive of measures aimed at increasing teen driver safety, including GDL (Brookland & Begg, 2011; Chaudhary, Williams, & Casanova, 2010; McKay, Coben, Larkin, & Shaffer, 2008; Waller, Olk, & Shope, 2000; Williams, Braitman, & McCartt, 2011), they do not understand and do not always do what is necessary to adequately prepare teens during the learner stage (Foss, 2007; Goodwin et al., 2010; 2014; Goodwin, Waller, Foss, & Margolis, 2006; Guttman, 2012; Mirman & Kay, 2012).

In general, more supervised driving practice during the learner stage appears more beneficial than less supervised driving practice (Gregersen, Berg, Engström, Nolén, Nyberg, & Rimmö, 2000). However, more driving time might be beneficial to an even greater extent if teens

receive more exposure to varied driving conditions (Twisk & Stacey, 2007). Driving is a task that occurs in complex, ever-changing environments (Foss, 2007); therefore the conditions and situations to which teens are exposed during the learner stage is of key importance. However, parents tend to facilitate driving practice in relatively safe conditions to focus primarily on basic vehicle operation and on maneuvering skills and less on helping teens develop higher order skills that might result in reducing crashes after teens begin driving independently (Goodwin et al., 2010; Simons-Morton & Ouimet, 2006). Parents who provide teens with repeated exposure to varied and challenging driving conditions over time may do a better job to prepare teens and reduce crash risk (Twisk & Stacey, 2007). How parents communicate with their teens also is relevant to their preparation. Teens with parents who co-drive might rely on feedback provided by their parents during supervised driving which in turn might limit their development of scanning and other important safe driving habits during the learner stage (Groeger, 2000; Simons-Morton & Ouimet, 2006). Parents might prepare teens better for independent driving and decision making if they promote teen independent driving, letting teens figure some things out for themselves during driving practice, rather than providing ongoing instruction and co-driving (Simons-Morton & Ouimet, 2006). When parents do communicate with their teens during driving practice, it might help teens to receive guidance about higher-level concepts (e.g., hazard detection); however findings from several studies revealed that parents do not typically discuss these topics with teens during supervised driving practice (Goodwin et al., 2010; 2014; Mirman & Kay, 2012; Tronsmoen, 2011).

Parenting Theory

The Integrative Model of Parenting was based on an extensive literature on how parents socialize their children (Darling & Steinberg, 1993). In the context of the learner stage and

supervised driving, this socialization equates to teens learning to drive and adopting safe driving habits. Figure 4.1 provides the conceptualization of the relationships between parenting goals, parenting style, parenting practices, and teen outcomes proposed by the Integrative Model of Parenting. Specifically, the intersection of practices, style, and goals has been shown to have an impact on teen behavior (Simons-Morton & Hartos, 2002; Darling & Steinberg, 1993). The primary focus of this study is on parenting practices, while also examining potential relationships between parenting practices and parenting goals and style.

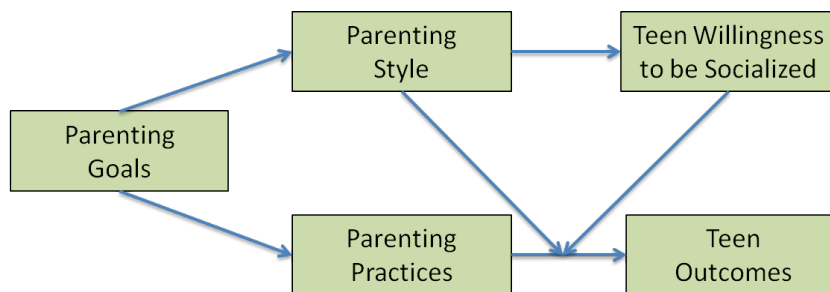


Figure 4.1 Integrative Model of Parenting (Darling & Steinberg, 1993)

As shown in Figure 4.1, parenting goals are hypothesized to influence parenting practices (Darling & Steinberg, 1993). Parenting goals are focused on specific skills, qualities, or attributes that parents would like their children to obtain or adopt (Jackson & Dickinson, 2009; Simons-Morton & Hartos, 2002). For the learner stage, parenting goals might reflect the types of experiences that parents want for their teens and the conditions to which teens should be exposed during the learner stage. Goals also might reflect the driving skills they want teens to obtain throughout and by the end of the stage (Goodwin et al., 2010). Parents also might have goals related to potential benefits of teen licensure, with some hoping to gain some degree of freedom from serving as a chauffeur to teens and even younger siblings (Goodwin et al., 2010; Hartos & Simons-Morton, 2006). Given the Integrative Model of Parenting's theorized relationship

between parenting goals and practices, this study aimed to identify and describe potential relationships between different parenting goals and patterns of parenting practices.

Although goals are theorized to influence parenting practices, parenting practices, in turn, are hypothesized to have a direct influence on teen outcomes and specific behaviors (Darling & Steinberg, 1993; Jackson & Dickinson, 2009). Parenting practices are directly observable (Power, Sleddens, Berge, Connell, Govig et al., 2013) as the specific actions or behaviors parents engage in to help their children achieve specific goals (Jackson & Dickinson, 2009; Simons-Morton & Hartos, 2002; Steinberg & Silk, 2002). For the learner stage, parenting practices equate to what parents do and say to prepare teens for independent driving during the intermediate stage of GDL.

In contrast to parenting goals and practices, parenting style reflects ways in which parents create an overall emotional climate and sets the tone for interactions with their children (Darling & Steinberg, 1993; Jackson & Dickinson, 2009; Simons-Morton & Hartos, 2002; Steinberg & Silk, 2002). Parenting style establishes the environment for parent-child interactions and has a moderating influence on the relationship between parenting practices and teen outcomes (Darling & Steinberg, 1993). Parenting style is fundamentally characterized by the relative balance between two primary dimensions: parental *responsiveness* to children and *demandingness* of parents on children (Baumrind, 1991; Darling & Steinberg, 1993; Jackson & Dickinson, 2009; Jackson, Henriksen, & Foshee, 1998; Maccoby & Martin, 1983; Simons-Morton & Hartos, 2002; Steinberg, Lamborn, Darling, Mounts, & Dornbush, 1994). As described by Baumrind (1991) and Maccoby & Martin (1983), responsiveness refers to parental support and attention to children's needs and parental efforts to promote individuality, self-regulation, and self-assertion (Simons-Morton & Hartos, 2002). In contrast, demandingness refers to parental efforts to require

mature behavior, compel children to integrate into the family, provide supervision and discipline, and confront disobedience (Baumrind, 1991; Maccoby & Martin, 1983; Simons-Morton & Hartos, 2002). In this study responsiveness and demandingness were analyzed to help understand how they are aligned with the typology groups based on patterns of parenting practices and how they established the climate for facilitating the learner stage.

Although parents might develop a foundation for what they offer their children via parenting style, goals, and practices, ultimately the objective is for children to be socialized to internalize their parents' goals and aspirations for behaving in specific ways (Darling & Steinberg, 1993; Jackson & Dickinson, 2009). Teens are not passive actors, and whether they behave according to parental desires depends greatly on whether they are willing to accept their parents' efforts to help them attain these goals (Darling & Steinberg, 1993; Grusec & Goodnow, 1994). Teen willingness to be socialized—to accept and internalize parenting goals and adopt specific behaviors associated with desired outcomes—is influenced directly by parenting style (Darling & Steinberg, 1993; Jackson & Dickinson, 2009). The type and tone of communication parents foster with their teens (e.g., encouraging teens' to offer their perspectives and reciprocity of communication) influences the potency of parent efforts to compel teen behaviors (Darling & Steinberg, 1993; Simons-Morton & Hartos, 2002). Teens whose parents exhibit high responsiveness and high demandingness should be more willing to be socialized and, in turn, might adopt desired behaviors (Darling & Steinberg, 1993; Jackson & Dickinson, 2009; Simons-Morton & Hartos, 2002). By comparison, teens whose parents exhibit high demandingness in the absence of high responsiveness would be more likely to resist parents' attempts to socialize them and, in turn, fail to adopt desired behaviors (Darling & Steinberg, 1993; Jackson & Dickinson,

2009; Simons-Morton & Hartos, 2002). For the learner stage, teens should be more willing to spend time driving with parents who are highly responsive and demanding.

Identifying Distinct Groups of Parents

Guided by the Integrative Model of Parenting (Darling & Steinberg, 1993), this study was designed to build on prior research to determine whether a typology could be developed such that parents could be assigned to distinct groups based on the integrated assessment of their reported and observed practices across the learner stage. The study aimed to explore potential relationships between parenting practice typology groups and: 1) parenting goals specific to preparing teens during the learner stage, and 2) parenting style dimensions of responsiveness and demandingness. This study also aimed to examine distinctions across parenting groups with respect to supervised driving practice time across the learner stage to determine whether teens of parents in certain typology groups had more practice during the learner stage than other teens. This study also examined a subset of independent driving behaviors teens exhibited during the intermediate stage to determine whether teens of parents in certain typology groups drove more safely during the intermediate stage than other teens.

Study Strengths and Gaps Addressed

Research is needed to explore further what different parents do to prepare teens during the learner stage, to understand differences among parents, and to identify strategies that might lead to safer driving post-licensure (Simons-Morton & Ouimet, 2006; Williams, 2013). This study intended to address the gap in the current understanding about whether and how distinct groups of parents facilitate the learner stage in substantially different ways. Though most parents may not provide teens with an optimal learner stage experience, parents are not identical, and

some may do a better job preparing teens for independent driving than others. Parents vary with respect to their goals for the learner stage, the types of supervised driving experiences they provide their teens, and the communication they have with their teens about driving (Goodwin et al., 2010). Given varying parent behaviors (Goodwin et al., 2010; 2014) and perspectives about how best to prepare teens to drive (Guttman, 2012; Mirman & Kay, 2012), different groups of parents should be discernible based on their patterns of behavior during the learner stage. This is important because parents do not uniformly conceptualize or carry out their roles during the learner stage, and different approaches might need to be developed to guide parents to make the most of their limited time in preparing their young novice drivers for independence behind the wheel.

This study aimed to build on prior studies of the learner stage of GDL and address certain gaps in this area of research. GDL provides an important framework for parents, but as noted parents fail to take optimal advantage of the learner stage. Given that teens appear to receive less driving practice and high-level instruction than might be desirable, coupled with a rise in crashes during the start of the intermediate stage, we need to understand much more about what different parents are doing to prepare teens and whether certain groups of parents might be facilitating the learner stage in preferable ways more so than others. Although prior studies have examined multiple parenting practices individually, a key aim of this study was to identify patterns of behavior and develop a typology based on those patterns. A typology will provide insights to guide future research and development of parent interventions, with the ultimate goal of finding ways to help parents do a better job preparing teens for independent driving.

The analysis of patterns of parenting practices in the context of a broader set of relationships with parenting goals and style is grounded in the Integrative Model of Parenting

(Darling & Steinberg, 1993), an established parenting theory that has given rise to a considerable body of research. The use of theory to guide this research addresses a critical need within the field of young driver safety, as very few studies have been guided by behavioral theory to explore how parents administer the learner stage. This study also aimed to take advantage of conducting secondary analysis of a very rich data set that permitted use of sophisticated qualitative methods and integration of data from multiple sources to obtain a more in-depth understanding of parenting practices during the learner stage than has been gathered from previous studies.

Methods

The description of methods begins with a brief review of salient details from the University of North Carolina Highway Safety Research Center's study of parents and teens during the learner stage. The methods continue with a detailed account of the strategy employed for analyzing parenting practices, identifying the typology, and assigning parents to groups. Analytic procedures for examining parenting goals and parenting style dimensions follow the description of methods for analyzing parenting practices. The methods conclude with a description of analyses conducted to assess specific teen independent driving behaviors across typology groups.

Participants and the Original Research Study

This study was a secondary analysis of data collected between January 2007 and June 2008 for a study of parents and teens during the learner stage conducted by the Highway Safety Research Center (HSRC) at the University of North Carolina (Goodwin et al., 2010). Fifty

families were recruited from two North Carolina Division of Motor Vehicles offices when teens applied for their learner's permits (Goodwin et al., 2010). During HSRC's study, parent and family characteristic data were gathered using a questionnaire administered to parents at baseline. Questionnaires were administered to teens at baseline to assess parenting style using the Authoritative Parenting Index (API) (Jackson, Henriksen, & Foshee, 1998). Semi-structured interviews were conducted with parents of all teens at ten time points across the learner stage, with recorded responses transcribed. A single member of the HSRC research team conducted all semi-structured telephone interviews. Only one parent was included during a given interview; however the parent interviewed sometimes changed (e.g., main supervising parent was not home when the interviewer called and both parents had been driving with the teen). Some interviews were missed due to lack of parent availability, and a small number of interviews were not recorded due to equipment malfunctions. Table 4.1 provides a timeline of these interviews. Video clips of teens driving while supervised also were recorded during a period of approximately four months during the first half of the learner stage, with a total of 2068 supervised driving clips across the 50 families and a range of 2 to 160 clips recorded per family (Goodwin et al., 2010). Video clips often showed teens driving with just one supervising parent; however many clips also included multiple passengers, including both parents, siblings, or other individuals.

The HSRC study identified primary behaviors and overall practices exhibited by parents that provided the foundation for this study. Overall, the HSRC study found that parents provided teens with less practice time than had been expected, relatively little exposure to challenging driving conditions, and very limited communication about high-level driving concepts (Goodwin

et al., 2010; 2014). Goodwin et al. (2010) provides a detailed description of the data collection procedures, analysis, and findings from the primary study of these families.

Analysis of parenting practices in this study involved a comprehensive approach to distill a large amount of data from multiple data sources using a combination of raw data coding, matrices, narrative development, identification of main concepts, and cluster analysis techniques (Creswell, 2009; Gibbs, 2007; Miles & Huberman, 1994; Saldaña, 2013; Spencer, Ritchie, O'Connor, Morrell & Ormston, 2014; Spencer, Ritchie, Ormston, O'Connor & Barnard, 2014).

As an aim of this study was to assess the potential relationship between parenting practice typology groups and global parenting style dimensions, the sample was limited to the 45 families in which teens completed the Authoritative Parenting Index. In addition, prior analysis determined that a set of identical twins could not be distinguished in the video clips (A. Goodwin, personal communication, December 6, 2013). As a result, this family was excluded from the current study. A subsequent review of the data revealed that another family dropped out of the original study after four weeks; therefore this family also was excluded. The resulting 43 families were included for the current study, with analysis of data from the semi-structured interviews, video clips, and teen questionnaires. Data also were analyzed from HSRC's prior coding of video clips that provided direct observations of teens' driving during the intermediate stage of GDL. These data from previously coded video clips were analyzed for a subset of 30 teens to examine relationships between the typology groups and teens' independent driving behaviors.

Table 4.1 Schedule of Semi-structured Telephone Interviews with Parents	
Parent Interview Number	Time Point for Interview (Approximate number of weeks since teen obtained learners' permit)
1	Within one week of obtaining learner's permit
2	Two weeks
3	Four weeks
4	Six weeks
5	Nine weeks
6	Thirteen weeks
7	Nineteen weeks
8	Twenty-six weeks
9	Forty weeks
10	Fifty-two weeks

* Table based on from Goodwin et al., 2010 (with months converted to weeks for some data collection time points.)

Sample Characteristics

Parent supervisors of 29 female and 14 male teens, all between the ages of 15 and 17 at the start of the learner stage, were included in the analysis. Most teens (88.4%) were in either ninth or tenth grade at the start of the learner stage. The majority of parents (76.7%) in the current sample were married. More than half of parents (55.8%) reported having two children, with more than one-third (34.9%) having three or four children. Over three-quarters of parents (76.7%) reported that they had two or more children living at home at the start of the learner stage. Parents' average age at the onset of the learner stage was 46 years (n=42). Most parents (88.4%) had earned at least a bachelor's degree from a college or university, and the majority of parents (93.0%) were employed.

Almost half of the parents in this sample had prior experience serving as a supervisor of a novice teen driver. In 22 families, there was one primary parent supervisor working with the teen driver, and the other 21 families had multiple adult supervisors. The majority of parents (81.4%) in the current sample reported at the start of the learner stage that their own driving styles were about the same or more cautious as most drivers. Roughly sixteen percent (n=7) of families had a

teen with knowledge of someone involved in at least one serious crash just prior to or during the learner stage. Teens primarily were not involved directly in crashes; rather teens knew others (i.e., relatives, friends, peers) who were involved in serious crashes, typically involving fatalities or serious injuries. Only one teen reportedly was involved directly in a serious crash during the learner stage. No teens were involved in crashes while they were driving during the learner stage.

Analysis of Parenting Practices

The analysis of parenting practices and subsequent typology analysis required multiple steps. As shown in Figure 4.2, interview data were coded and analyzed distinctly prior to review and analysis of data from selected video clips. Interview data were coded using process codes to capture parents' actions (i.e., behavior and communication) (Saldaña, 2013). Video clip data also were coded using process codes and assessed for each family and integrated with findings from the interview coding. In brief, analysis included initial review and coding of interviews and video clips, identification of parenting practices across participants and time then, creation of participant-specific narratives and matrices, and assessment of output from the cluster analysis to define the typology and assign parents to typology groups. Table 4.2 provides a detailed list of steps involved in conducting the analysis of parenting practices.

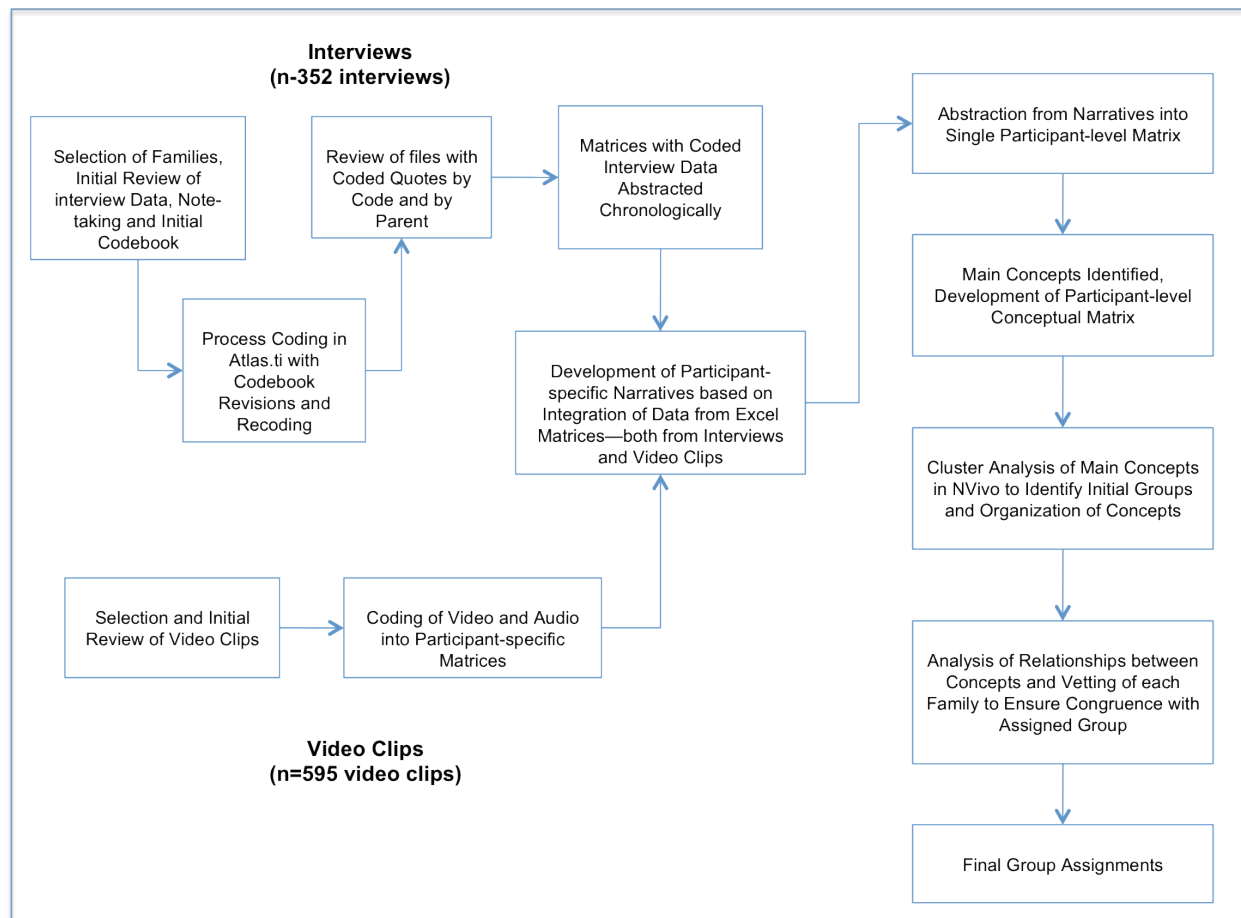


Figure 4.2 Qualitative Analysis of Parenting Practices

Review of Interview Data

As an initial data preparation step, all semi-structured interview transcripts were de-identified to remove names of parents, teens, and other family members. Analysis of parenting practices from interviews was restricted to data collected after the first interview. The first interview was excluded from analysis of parenting practices because it was assumed that not all parents would have had an opportunity to have teens drive before Interview #1. In total, 352 available interviews were included for the analysis.

Table 4.2. Methods for Analyzing Data about Parenting Practices	
Parenting Interviews	• Initial review and note-taking of sample of interviews for initial selection of parents • Development of initial codebook with process codes • Initial inductive process coding of interview data with memo-writing and new codes added to codebook • Revisions made to codebook revisions and recoding • Completion of process coding of all interviews • Review of coded data, coded quotes by code and by participant • Development of participant-specific matrices including coded data abstracted chronologically across interviews
Video Clips	• Selection and initial review of video clips • Review of video clip data in concert with codebook used for coding interviews • Assessment of additional process codes and fields to help code video data • Coding of video and audio to capture direct observations of parenting practices • Coding of video and audio into participant-specific matrices
Integrated Data	• Development of participant-specific narratives, accounting for reported and observed parenting practices • Abstraction of data from narratives into a single participant-level matrix of descriptive codes • Review of data entered into matrix to identify main concepts and to create a participant-level matrix of conceptually coded data • Cluster analysis of main concept coding to identify initial patterns of main concepts and initial groups of participants • Analysis of relationships between concepts and vetting of each participants to ensure congruence with its assigned group • Reassignment of small proportion of participants and final group assignments

A subset of five families was selected at random to begin an initial process of becoming familiar with the interview questions and parent responses. During this review, notes were taken to capture observations and potential process codes. This note-taking process was akin to developing a set of contact summaries to capture ideas generated during the initial transcript review (Miles & Huberman, 1994). This process was repeated for two additional subsets of five families, accounting for a total of 15 families for which transcripts were reviewed to become familiar with the data to record initial observations and potential codes. Ultimately this inductive exercise led to a greater understanding of the data prior to coding and to the development of the initial codebook.

During the review of the interview transcripts it became apparent that some parents had limited information to share during certain interviews if they had not spent time supervising driving practice for their teens during the week preceding the interview. At times, this seems to have been a result of practice time competing with other life priorities, and at other times it seems that parents struggled with teens who were disinterested in driving practice.

Coding Interview Data

All 352 transcript files were uploaded into Atlas.ti (version 7). Coding of the interviews commenced with the codebook developed from initial review of transcripts. Given the inductive and iterative nature of this early data management and analysis process, new codes were added continually to the codebook. Some coding definitions were revised while reflecting back on previously coded data to ensure that codes were applied consistently (Gibbs, 2007; Miles & Huberman, 1994). Recoding of data was conducted as needed. Coding within an interview also was reviewed to identify inconsistencies in parents' reported practices.

In addition, memo-writing was conducted to capture ideas about coding definitions, links between codes, broader parenting practice concepts identified, and the coding process itself (Gibbs, 2007; Miles & Huberman, 2014; Saldaña, 2013). Memos also were used to identify potential inconsistencies reported within and between interviews for a given family including changes over time for specific parenting practices. Ultimately, the codebook was reviewed for its utility after reaching more than one hundred codes. Redundant codes were merged. Codes with limited utility and application were dropped from the codebook (Miles & Huberman, 1994). The resulting reduced codebook included a set of 29 process codes.

Review of Coded Interview Quotes

Following the completion of this initial, iterative coding exercise, all memos were reviewed to identify key concepts that emerged from the data during initial coding. All coded quotes were reviewed to identify additional main concepts and to identify connections between certain sets of codes. This review also identified quotes that required recoding. The majority of recoding reflected coder mistakes in selecting an adjacent code from the drop-down list in Atlas.ti, and others required a more substantive adjustment in how the quote was coded. Although few coding errors were identified overall, this was an important step to ensure coding was conducted consistently and as intended for ongoing data analysis.

A subsequent assessment was conducted to review coded quotes by each participating family in chronological order to identify potential main concepts as well as any progression of parenting practices overall and across the learner stage. Additional memos captured findings from this review. This led to the development of four main descriptive categories of parenting practices and the allocation of codes fitting within each; therefore to help organize the data, each of the 29 process codes was assigned to one of these main descriptive categories. Table 4.3 provides the organization of process codes within each of the four descriptive categories, which included types of communication facilitated, the learning environment promoted, the degree of opportunity provided for driving practice, and specific driving practice experiences provided.

Table 4.3. Process Codes Organized within Descriptive Categories			
Types of Communication (n=9 codes)	• Advising general • Chatting (non driving) • Debriefing • Directing • Dismissing • Guiding • Instructing non-verbally • Responding to correct • Warning to prevent	Opportunity Facilitated (n=5 codes)	• Creating/ expanding opportunities • Declining opportunities • Giving teen the driver's seat • Limiting exposure • Relying on teen to initiate practice
Learning Environment Promoted (n=11 codes)	• Constraining communication • Creating relaxed/positive atmosphere • Creating stressful/negative atmosphere • Encouraging/praising • Focusing parent attention elsewhere • Negotiating/modifying practice • Policing practice/threatening consequences • Promoting independence • Reacting physically • Reducing distractions • Scripting practice	Experiences Provided (n=4 codes)	• Modeling/showing teen how • Practicing specific • Providing specific challenging exposures • Teaching/modeling risky driving behaviors

Construction of Matrices from Coded Interview Data

Data matrices were created for each of the 43 families to organize the coded data to help with systematically comparing segments of coded text and to identify common elements or patterns in responses (Gibbs, 2007; Miles & Huberman, 1994; Saldaña, 2013; Spencer, Ritchie, O'Connor et al., 2014; Spencer, Ritchie, Ormston et al., 2014). These family-specific matrices allowed for making comparisons across interviews to consider patterns of consistency, discordance, and change across time (Gibbs, 2007; Spencer, Ritchie, O'Connor et al., 2014). Within each family-specific matrix, codes were distinguished across each of the four main descriptive categories, with rows designating codes assigned and columns designating each of the interview time points (i.e., interviews #2-10).

The depth and richness of data across interviews was predominantly inconsistent, both within and across families. This largely reflected the semi-structured nature of the interviews and that many practices were not reported consistently across time by parents. However, viewing coded data across time permitted identifying some longitudinal patterns. This was apparent primarily for the few data elements that captured parents' responses to questions consistently asked across interviews (e.g., challenging situations to which teens were exposed during the week prior to the interview). Examining the coded data within these matrices also allowed for gaining initial insight into how the data could be condensed into a reduced set of higher-level concepts reflecting parent behavior during the learner stage.

Selection of Video Clips

There was a wide range in the number of video clips available from participating families. Thirty-five families had at least 15 video clips available, seven families had between three and fourteen clips available, and there were no video clips available for one family. All video clips were selected for families with less than or equal to 15 clips available; 15 clips were selected at random for families with more than 15 clips available. Ultimately, 595 video clips were included in the analysis.

Review and Coding of Video Clip Data

Video clip data were reviewed for a subset of families to identify key elements available for coding. The video and audio portions of clips were reviewed and coded to account for both verbal and nonverbal communication between parents and teens. The final codebook used for coding the interview data was compared with notes taken from reviewing these initial video clips, and several additional data elements were added to account for details regarding the driving practice environment—primarily to account for driving conditions (e.g., time of day;

weather). Coding of the video clip data then commenced, using an individual Excel file for each family to capture information about parenting practices. Although coding began using codes and descriptive categories developed from the final interview codebook and initial review of the video clips, other process codes would have been added if necessary. Ultimately, there were no additional process codes added, but specific data elements were included to capture the context of each clip (e.g., weather, night or daytime).

Development of Narratives from Matrices

Coded data from matrices then were abstracted into comprehensive descriptive narratives (Spencer, Ritchie, O'Connor et al., 2014). This step facilitated the integration of coded data from interviews and video clips that previously were in distinct matrices. Narratives were written descriptions of parenting practices, each approximately five pages long, that provided a richness of detail regarding parent behavior and communication across the learner stage. Therefore, narratives for each family captured the comprehensiveness of parenting practices across the learner stage—both those reported during interviews and observed from video clips—telling the story of supervised driving across the learner stage for each family. These family-specific integrated narratives facilitated making comparisons between the coded data within and across interviews in concert with data coded from video clips to consider patterns of consistency, discordance, and change across time.

Participant-level Matrix

The family-specific narratives then were abstracted into a single participant-level matrix. Using conceptual definitions of parenting practices identified during the analysis—captured in memos, family-specific matrices, and narratives—this participant-level matrix allowed for identifying conceptual similarities and distinctions across parents. Moving from the descriptive

nature of supervised driving to broader concepts was done while creating and refining conceptual definitions of parenting practices and specific dimensions of each practice (e.g., presence or absence of communication about higher-level driving concepts). Vetting of assigned dimensions in concert with conceptual definitions was conducted to ensure consistency in assigning dimensions of each practice across families. The final participant-level matrix included each family's assignment to a particular dimension for each parenting practice and specific descriptions from the coded data to present the rationale for the assignment given.

Cluster Analysis

Data from the participant-level matrix were used to create family-specific text files. Each of these 43 files was uploaded into NVivo (version 10) qualitative analysis software for subsequent review and analysis. Within NVivo, each of the files was coded to match the parenting practice dimensions assigned in the participant-level matrix. Cluster analysis then was conducted to form initial groupings of parents based on this coding of parenting practices (Miles & Huberman, 1994). To accomplish this, the cluster analysis function within NVivo was used to distinguish initial groups of parents based on relationships between coded parenting practice dimensions. Initially, four groups of parents were identified from the cluster analysis.

Typology Development and Family Assignment to Groups

The resulting cluster analysis output was analyzed further to explore the composition of the groups identified. Each family's cluster analysis group assignment was vetted using data from the participant-level matrix and against other families assigned to the same group from the cluster analysis. This vetting process was undertaken to determine whether the cluster analysis group assignment was a good fit. As needed, some families were reassigned to other groups after vetting their parenting practices alongside members of other groups. Final typology groups were

designated following the review of group-specific matrices, vetting of each assigned family, and re-assignment of some families. Typology group descriptions were developed for each of the groups identified. Parenting practices for each family assigned to a given group then were compared with the typology group descriptions to ensure each family fit within the typology group to which it was assigned.

Analysis of Parenting Goals

In concert with the Integrated Model of Parenting, parenting goals were analyzed to determine whether goals differed across typology groups and whether some goals were better predictors of patterns of parenting practices identified by the typology. During the first interview, all parents were asked questions about their goals for the learner stage overall and supervised driving specifically. Data concerning parenting goals were coded into a participant-level matrix, with new goals added as they were identified. As responses were reviewed and new goals identified, the presence or absence of each goal was indicated for each participating family. Subsequently, different types of goals were distinguished and analyzed overall and across the parenting practice typology groups to identify similarities and differences.

Analysis of Parenting Style

In concert with the Integrated Model of Parenting, parenting style was analyzed to determine whether the general climate of parenting differed across typology groups. Data from the API (Jackson, Henriksen, & Foshee, 1998) were double data entered into Microsoft Excel. SAS 9.3 was used to create an analytic data set for examining the item distributions and subsequent assessment of responsiveness and demandingness. Initial review of the data for the

16 items identified three items with skewness greater than -1.0; all other items had approximate normal distributions. Ultimately, cubed and squared transformations yielded minimally-skewed, approximate normal distributions for these three items for subsequent analysis.

Further data exploration was conducted to confirm the items designed to measure responsiveness and demandingness. Given the small sample for the current study, factor analytic techniques were not appropriate for assessing item loading (Tinsley & Tinsley, 1987); however internal consistency reliability was assessed by examining Cronbach's alpha values for each intended subscale. During development of the API, Jackson, Henriksen, and Foshee (1998) found Cronbach's alpha values that ranged from .71 to .90 for the responsiveness scale and from .65 to .83 for the demandingness subscale. Using data from the existing sample, including data transformations for the three originally skewed variables, standardized Cronbach's alpha values were calculated as .79 for the responsiveness subscale and .75 for the demandingness subscale—both indicating acceptable internal consistency reliability. Following verification of the subscales as derived originally by Jackson, Henriksen, and Foshee (1998), mean scores were constructed for responsiveness and demandingness using non-transformed values for all items. Review of the subscale mean scores identified that both had approximate normal distributions. Mean scores for each subscale then were compared across parenting practice groups to identify potential descriptive differences.

Time Spent Supervising Driving Practice

Starting with interview two, parents reported the length of time they spent supervising teen driving during the previous week. Time spent supervising driving practice was retained as a distinct parenting practice, rather than including time in the formulation of the parenting practice

typology groups. Parents' reported time supervising teen driving was examined to learn whether teens of parents in some typology groups spent more time, on average, practicing than teens of parents in other groups.

Teens' Independent Driving Behaviors

Several independent driving behaviors were examined for a subset of the families with teen independent driving data to explore whether teens' independent driving behaviors differed across parenting practice typology groups. Teens' independent driving behaviors were coded previously by UNC HSRC staff from video clips of teens driving independently during the start of the intermediate stage (Goodwin, Foss, & Obrien, 2011). HSRC staff coded a range of teen driving behaviors (e.g., braking suddenly, speeding, failing to stop at a stop sign), teen-passenger interactions and in-vehicle behaviors (e.g., communication with passengers, horseplay), contextual information (e.g., month, time of day), and details reflecting the driving situation and environment overall (e.g., type of road, amount of traffic). Coded independent driving behavior data were available for 30 teens whose parents were included in the typology analysis. There were 4,814 coded clips in total for this subset of 30 teens.

A broad set of teens' independent driving behaviors was considered for the assessment. Each of several coded behaviors was reviewed to identify a smaller subset of driving behaviors that plausibly would be related to learner stage preparation and that would reflect potential differences in unsafe driving. Teens' independent driving behavior data also were reviewed to ensure there were a sufficient number of coded clips to identify possible distinctions across parenting practice typology groups. Some teen driving behaviors were rarely observed in the video clips and were omitted from this assessment (e.g., driving faster than other moving

vehicles; following too closely; failure to yield by pulling out in front of another vehicle). Six driving behaviors were included in this assessment to explore potential differences across the parenting practice typology groups.

Findings

Parenting Practices

The analysis identified nine dimensions of parenting practices that fit within three broad domains: 1) approach to driving supervision; 2) driving exposures provided; and 3) level of communication facilitated. Each of the nine practices dimensions was distinguished across two or more sub-dimensions. Parents were coded across these dimensions, distinguishing across sub-dimensions, which then facilitated making contrasts across parenting practices and provided input for developing the typology.

Approach to Driving Supervision

Turning it over to Teen versus Keeping Teen under Wing

Some parents allowed teens to take ownership of the driving practice experience. These parents provided little direction and limited step-by-step instructions about how to drive, but rather permitted their teens to learn more independently. Parents providing less instruction seemed focused on promoting a sense of independence and independent decision-making in their teens, several noting that they wanted their teen's to have the confidence and skills to drive on their own after the learner stage when parents would not be in the car. As noted by one parent about letting her son drive without instruction:

I wanted to see how he did without any instruction- I mean, I just watched him, when he pulled out of the driveway, he pulled to the stop sign, he looked both ways, and I didn't have to say 'put your signal on.'
(Parent of male teen at Interview #2)

Similarly, and with an emphasis on future driving without a parent in the car to supervise, another parent stated:

Because, like you say, I will not always be there. So, I want her to be able to say “Well, you know, I know the right thing to do at this particular point in time.” I’m hoping so, ‘cause if I- if I’m always saying something then she’s gonna always rely on me to correct her or fix it, or help out, when she’s gonna have to make decisions on her own. (Parent of female teen at Interview #5)

In contrast, other parents provided their teens with frequent direction and step-by-step instructions about how to drive. Whether intended, this level of instruction during supervised driving might have instilled a greater reliance on parents as the managers of driving practice and as co-drivers. Several parents commented on the consistent manner in which they instructed teens during driving practice. As noted by one parent during the middle third of the learner stage:

I don’t know if I should be doing this or whatever, but we drive the same roads pretty much all the time on the way to school or on the way to the post office or on the way to get gas, something like that. And it’ll be something like “Okay, you can start to signal now” or I guess when you want to start to see something; speed limit changes from 35 to 45, or 45 down to 35, I’ll point it out to her even though I know she’s seen the sign. That kind of thing. Trying to think, other example would be like when we’re coming up on a red light and there are cars in front of us that are stopped, I feel she still takes a little bit too fast. I’m like “[TEEN], at some point you’re going to have to stop. You can’t like crash into these cars in front of you; you can’t kind of ignore them or go around them.” And I try to explain to her it’s okay to use the brake - your not going to hurt the brake, you’re not going to hurt the brake’s feelings. But she tends to be light on the brake which is fine, again we haven’t even gotten close to anything I would call dangerous, but I would rather she be the other way where she’s a little bit jumpy on the brakes, but she doesn’t have that tendency. So I’ll point out to her “The light is red.” “I see it.” “Well the cars are stopped, you can’t go through them.” “I see it.” But that’s the kind of stuff I’m pointing out to her. (Parent of female teen at Interview #7)

In addition, some parents reported that it was challenging to refrain from giving direction and let teens build independence. As acknowledged by parents of two different teens (one toward the start and one toward the end of the learner stage):

I try to do better with letting him be on his own, but of course, then I slip and say, “do this, do that.” (Parent of male teen at Interview #4)

I need to learn how to be less verbal in the car to actually see how she does on her own. I guess because I’m her eyes too. (Parent of female teen at Interview #9)

During analysis, parents were classified as *turning it over to teen* if they specifically reported trying to get teens to make their own decisions while driving and to take greater

ownership of driving. Parents also were considered as turning it over to teen if there was very limited directing, co-driving, and step-by-step instructing provided during driving practice.

Parents were classified as *keeping teen under wing* if they did not specifically report efforts to get teens to make their own decisions and build independent driving skills, while at the same time reporting and exhibiting micromanagement of driving practice. Parents also were considered to be keeping teen under wing if they reported and exhibited a lot of directing, co-driving, and step-by-step instructing.

For some parents, there was relative consistency across the learner stage with respect to how they provided instruction or promoted independence. However, some parents reportedly provided a lot of instruction during the initial months of the learner stage before making an effort to give teens more latitude to make their own decisions during driving practice to develop a sense of driving independence. Therefore, some parents were classified as *gradually turning it over teen*. Ultimately, parents who acted gradually to promote independence did so for the majority of the learner stage.

Giving Teen the Driver's Seat versus Not Pushing Practice

Most parents provided and promoted opportunities for teens to drive, including some outside of normal driving routines (e.g., during family vacations). Some parents also pushed teens to practice when teens seemed less interested in driving. Parents providing teens with more opportunities, or letting teens drive anytime they were traveling by car, seemed intent on giving teens as much experience as possible. Many parents reported that their teens drove anytime they went somewhere together. As noted by one parent:

Every time we pick him up or go anywhere, he gets to drive. He really does. (Parent of male teen, Interview #7)

Many parents were consistent across the learner stage in providing as many opportunities as possible for their teens to practice driving. As noted by the same parent at multiple points across the learner stage:

She always drives when we're together. (Parent of female teen, Interview #4)

Every time, yeah, every time she's in the car she drives. (Parent of female teen, Interview #8)

But every time we're out she's the only one who drives. It's almost natural now. She picks up the keys and not me while we're together. (Parent of female teen, Interview #9)

Although many teens were eager to practice driving during the learner stage, several parents reported their teens were consistently disinterested or lost enthusiasm for driving as the year elapsed. Some of these parents commented about ways in which they negotiated getting teens to drive more when teens seemed resistant. As offered by one parent:

Yeah she sees it as something that she needs to learn. So, we're trying to strike a balance between giving her opportunities to drive and forcing her to drive. You know we're just trying to kind of be chilled out about it. But looking for times for her to drive... (Parent of female teen, Interview #7)

Other parents were more assertive in pushing teens to practice when teens were less interested in driving. As noted by parents of two different teens:

We had rain right after Christmas. So, Christmas day, he drove- 'cause that's when he got some highway time, because his sister was with us, and I said "here you go, you're driving to our friend's house"- which is like 20 miles away, and he did fine. (Parent of male teen, Interview #5)

So really and truly I really have to make her. "Okay, go on ahead and drive," because, otherwise, she'd just sit in the passenger seat, she doesn't even care. (Parent of female teen, Interview #8)

In contrast, there was a small proportion of parents who did little to promote driving practice. Some of these parents limited driving exposure due to inconvenience, lack of comfort, or perceived inability of teen to handle the road. Some parents refrained from promoting practice for teens who were disinterested in driving practice. Some parents felt disinclined to provide teens with opportunities to drive at times or in situations when and where they felt uncomfortable having their teens behind the wheel. As noted by one parent:

Yes, right, right. I'd be comfortable with her driving places she had driven before, and we would go over the route, and that kind of stuff, like if there are any turns. But I wouldn't want her going out on a new route yet. (Parent of female teen, Interview #7)

Some parents' disinclination to let their teens drive stemmed from their feelings that letting teens drive would be a hassle or hamper arriving at a destination if time was limited. As noted by parents of two different teens:

There was a time last week I told him- 'Cause he asked if I could come home and get him to football practice by 5, so I was kinda rushing- I said "Well, I have to go through town, I just can't-you know-you can't drive because you have to drive the speed limit, and I don't have to- I mean, I should drive the speed limit, but I don't have to. So, it's not a good time. (Parent of male teen, Interview #3)

The times when I don't feel comfortable with her taking the wheel is when we have, when we're rushing to get some place and we really have limited time and it would just be more of a hassle to have to let her drive and you know when we get there, then I have to get out and we have to adjust the seats and its' some times its just easier to just get in the car and go. (Parent of female teen, Interview #8)

For some parents, limiting teens' opportunities to drive was a consistent practice across the learner stage. As noted by the same parent at multiple points across the learner stage:

Um, there hasn't been many occasions where he really says much- he wanted to drive last night, and we were kind of- well, it was dark, and it was kinda- we were out away from home, and I just- I donno- didn't want him to be driving, but he hasn't really asked a lot. (Parent of male teen, Interview #3)

...and when there's an opportunity for him to drive, it's probably not a good time of day for him to drive. (Parent of male teen, Interview #4)

a couple of weekends ago, My brother was here and we were going somewhere. Oh, I think we were going somewhere in downtown Durham, and I said "you don't know where you're going and there's three other people in the car. You're not driving." (Parent of male teen, Interview #8)

During analysis, parents were classified as *giving teen the driver's seat* if they predominantly reported letting their teen drive most of the time, limiting teens' opportunities on few occasions. Parents also were classified as giving teen the driver's seat if they pushed teens to practice driving, even when teens were less interested, and did not solely or primarily rely on their teens to initiate driving practice.

In contrast, parents were classified as *not pushing practice* if their reports primarily indicated that they routinely kept teens from engaging in driving practice or limited teens' opportunities on frequent occasions. Parents also were classified as not pushing practice if they

did little to initiate practice when teens were less enthusiastic about driving, instead relying on disinterested teens to initiate driving practice.

For most parents, there was relative consistency across the learner stage with respect to how they promoted driving practice. However, some parents reported initial reluctance to let teens drive followed by a more consistent pattern of providing more opportunities for teens to practice. Therefore, some parents were classified as *gradually giving teen the driver's seat*. Ultimately, parents who acted gradually to promote driving practice did so for the majority of the learner stage, with limited driving exposure confined to the first few months of the stage.

Practicing with a Purpose versus Just Driving

Some parents reported practice they facilitated purposefully to give teens experience in certain driving situations (e.g., highway) or in specific conditions (e.g., rain). As noted by parents of two different teens:

The other day it was raining, and I said “come on, you drive around the block to pick up your friends for carpool.” (Parent of male teen, Interview 3)

Well, whenever I get a chance to put her on the highway, I do. I-40 and night. Whenever I get a chance, I do that, because I think she does need more practice with that. (Parent of female teen, Interview #8)

Some parents seemed to draw a connection between teens getting more practice in specific situations and gaining increased confidence and ability in those situations. As noted by one parent of a different teen:

We've actually been talking about and addressing, for lack of a better term, her insecurities and so one of them is high-speed merges onto the highway. So, last Sunday we did, oh I don't know, five or six. Your familiar with the area, so what we did was get off at 751 onto 40 and went down to Fayetteville road and did that loop three no, four times - no three tops. And so, she did a few high speed merges and after we talked a little about it and that's not a silver bullet, it doesn't make her totally comfortable with it, but, you know, I think it's one of those things you should have to do a lot of to get comfortable with. (Parent of female teen, Interview #3)

A few parents described how they were facilitating practice in specific situations as a means of gradually increasing teens' skill sets. As noted by one parent:

...and today we had her drive with the wet road conditions, I thought that this was a good opportunity for her to learn something new, but steady as she goes. (Parent of female teen, Interview #2)

In contrast, many parents stated they were not working with teens to practice anything specific. These parents were getting their teens behind the wheel without a specific intent to practice in certain conditions or situations. As noted by one parent:

Just getting practice and that kind of stuff- we aren't really working on anything in particular. (Parent of male teen, Interview #8)

During analysis parents were classified as *practicing with a purpose* if they described having teens get specific practice to improve driving in certain conditions or situations (e.g., rain, dark, freeway). Parents also were classified as practicing with a purpose if they described ways in which challenging exposures were introduced in some intentional manner to build exposures and ability over time.

In contrast parents were classified as *just driving* if they neglected to describe practice they facilitated to give teens specific experience in challenging situations or conditions. Parents also were classified as just driving if they specifically stated they did not practice anything in particular with teens but rather let them get behind the wheel and just drive.

Consciously Evolving Supervision versus No Intentional Changes in Parent Behavior

A small proportion of parents described being aware of ways they were behaving that were having an unintended detrimental impact on driving practice with their teens. Predominantly these behaviors related to the atmosphere being fostered by parents during driving practice, with several parents identifying ways in which they were creating a distressful learning environment. As a result of identifying these reportedly disruptive supervisory behaviors, several parents made a specific, conscious effort to modify their actions and communications. As noted by one parent:

I didn't expect her to be, I didn't expect so many tense moments in the car. I didn't expect, to myself, be such a corrector. Well, I am my mother. And I just think it was, you know, we just sort of had to work out

how to communicate with each other while she was driving. No yelling in the car and even when she thought I was yelling, but I didn't think I was, you know, that kind of thing. So, I think that was surprising to me, I didn't quite expect that to happen....I would say it probably took us at least three months. To really get to where if I said "Watch that." She'd "stop yelling!" So I would say at least three months. Yeah I can remember it being late spring before we got it under control and she was really able to take instructions without – and for me to give it properly. (Parent of female teen, Interview #10)

Although not reported consistently, some parents described having communication with their teens to discuss the need to make changes to improve the driving practice atmosphere. One parent described his daughter's feedback about the way in which he provided feedback and instruction excitedly and noted his intention to change his behavior:

It's when I'm putting my hand up in the air trying to encourage her to stop, or when I've, again, used more of a frantic voice at asking her to stop- that's been a time when she's asked me not to do that because it makes her even more nervous. Or kind of rattles her....I just need to give her verbal redirection without raising my voice, or putting my hands in the air, or getting loud or frantic. (Parent of female teen, Interview #5)

In a subsequent interview, this same parent described the driving practice atmosphere and his ability to follow through on his change in behavior to keep a more peaceful driving environment:

Um, pretty relaxed, um, I haven't had any kind of um, reaction that caused her to have a reaction. (Parent of female teen, Interview #7)

During analysis, parents were classified as providing *consciously evolving supervision* if they described specifically that they identified a need to change their behavior and subsequently made changes in an effort to improve the driving practice environment. In contrast, parents were classified as demonstrating *no intentional changes in parent behavior* if they did not report identifying detrimental behaviors and making changes to improve driving practice.

Focused on the Road versus Attention Elsewhere

The majority of parents were focused consistently on their teen's driving, the road ahead, and the driving environment during driving practice. However, a small proportion of parents struggled to pay attention during supervised driving practice. Several parents acknowledged being engaged in other activities (e.g., reading, sleeping, talking on the phone), and some were

observed sleeping or otherwise inattentive in video clips. As described during multiple interviews by the same parent:

Well I kind of have to force myself to pay attention. [Inaudible] let her drive. That's kind of atmosphere is very casual -for me. (Parent of female teen, Interview #6)

Very relaxed, I have to remind myself to look at the road, you know what I mean? It's just nice to get into the passenger seat and be driven and so, yeah, if anything, I really have to work on that. I could, I'd be comfortable enough to fall asleep in the car, even though that would be illegal. (Parent of female teen, Interview #9)

In one video clip reviewed, a parent was looking down and reading as his daughter entered a turn too quickly; the father looked up just briefly before providing a reprimand for driving into the turn too quickly and making it difficult for him to read.

During analysis, parents were classified as *focused on the road* if they primarily, with minimal exception, were observed to be focused on teen's driving during video clips. Parents also were classified as focused on the road if they did not repeatedly report struggling to pay attention to teen's driving, report not paying attention to teen's driving because they did not think it was necessary, or use their time to accomplish other tasks as teen drove (e.g., making calls, reading, napping). In contrast, parents were classified as *attention elsewhere* if they emphasized during interviews that they were not paying attention or if they were not focused on teen's driving in at least several video clips

Driving Exposures Provided

Providing Limited, Moderate, or Lot of Challenge

Across the learner stage, parents facilitated varying degrees of exposure to specific driving challenges. Parents routinely reported whether they supervised their teen changing lanes in traffic and driving: on two-lane roads out in the country, in busy parking lots, in heavy traffic, on a freeway or interstate highway, and in the rain. Video clips also captured parents supervising teens driving in these conditions, and these observations were integrated with reports from parent

interviews to provide a more comprehensive assessment of exposures to challenging driving conditions. Although parents had the opportunity to supervise teens driving in most conditions at any given time throughout the learner stage, it was more difficult for parents to ensure that teens had adequate driving practice in the rain. Although rainy driving conditions appeared to be scarce during certain lengthy stretches of time during data collection, some families reported making a special effort to get their teens driving in the rain—even if the only point of driving was to give teens exposure to driving in rainy conditions. The distribution of the average number of challenging driving conditions allowed for identifying cut points and distinguishing different levels of exposure to challenges across the learner stage.

Parents were classified as *providing a lot of exposure to challenges* if teens were exposed, on average, to at least 4.5 challenging driving conditions per week. Parents also were classified as providing a lot exposure to challenges if teens were exposed to at least five challenging conditions during four or more weeks and with teens having at least some exposure to each of the challenging driving exposures at some point during the learner stage.

Parents were classified as *facilitating moderate exposure to challenges* if teens were exposed, on average, to at least 3 and less than 4.5 challenging driving conditions per week. Parents also were classified as facilitating a moderate exposure to challenges if teens were exposed to at least three challenging conditions during four or more weeks and with teens having at least some exposure to each of the challenging driving exposures at some point during the learner stage.

Parents were classified as *delivering limited exposure to challenges* if teens were exposed, on average, to less than 3 challenging driving conditions per week. Parents also were

classified as delivering limited exposure to challenges if they did not meet other criteria for being classified as facilitating moderate or providing a lot of exposure to challenges.

Providing Fluctuating, Decreasing, Stable, or Build-Up of Exposure to Specific Challenging Exposures

Although some parents provided teens with a relatively stable amount of exposure to challenging driving conditions across the learner stage, other parents facilitated fluctuating, increasing, or decreasing levels of exposure across time.

Parents were classified as providing *stable exposure* if a pattern was established of relative consistency in the number of challenging conditions to which teens were exposed, allowing for increases and decreases not to exceed a range of two challenging exposures across time points. Figure 4.3 provides an example of a family in which the parent provided a pattern of stable exposure to challenging conditions across time points.

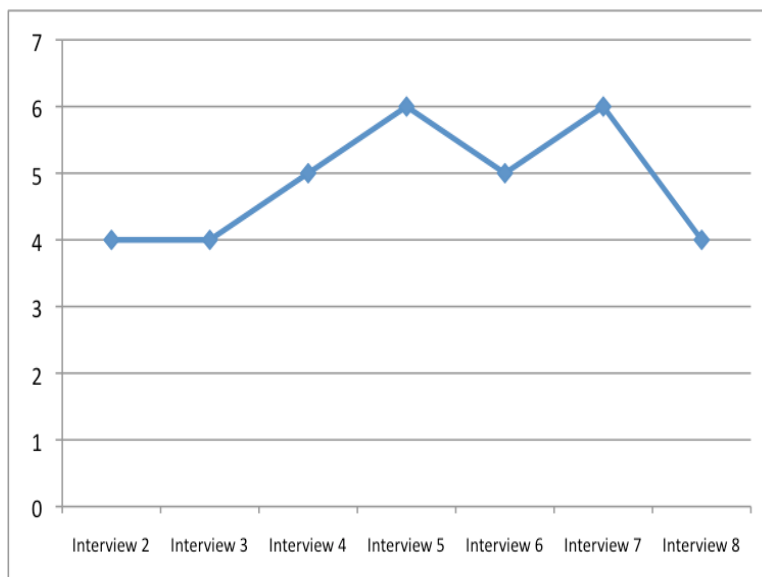


Figure 4.3 Example of Relatively Stable Exposure to Challenging Driving Conditions across the Learner Stage

In contrast, parents were classified as providing *fluctuating exposure* if there was a pattern identified of increasing and decreasing number of challenging conditions to which teens

were exposed across the learner stage, with a range exceeding a decrease or increase of more than two challenge exposures across time points. Figure 4.4 provides an example of a family in which the parent provided a pattern of fluctuating exposure to challenging conditions across time points.

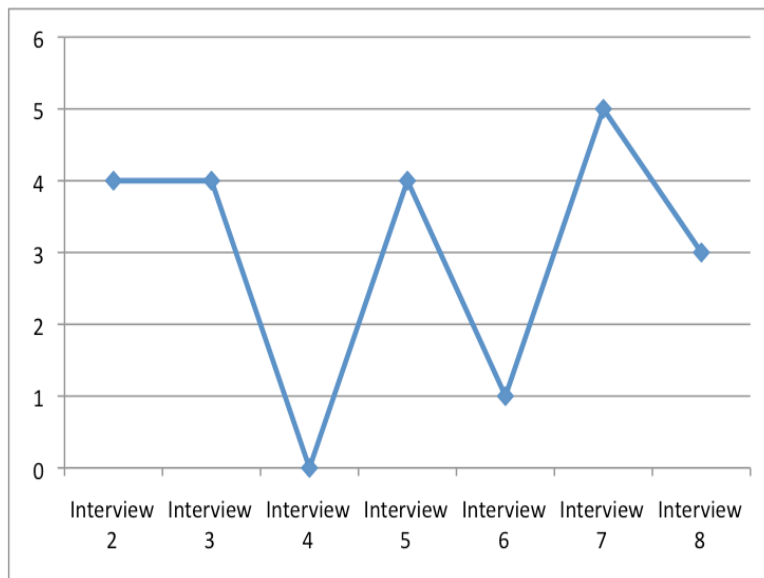


Figure 4.4 Example of Fluctuating Exposure to Challenging Driving Conditions across the Learner Stage

Parents were classified as *building up exposure* if there was a pattern of relative increase in the number of challenging conditions to which teens were exposed, exceeding an increase of two challenging exposures across time points. Figure 4.5 provides an example of a family in which the parent provided a pattern of increasing exposure to challenging conditions across time points.

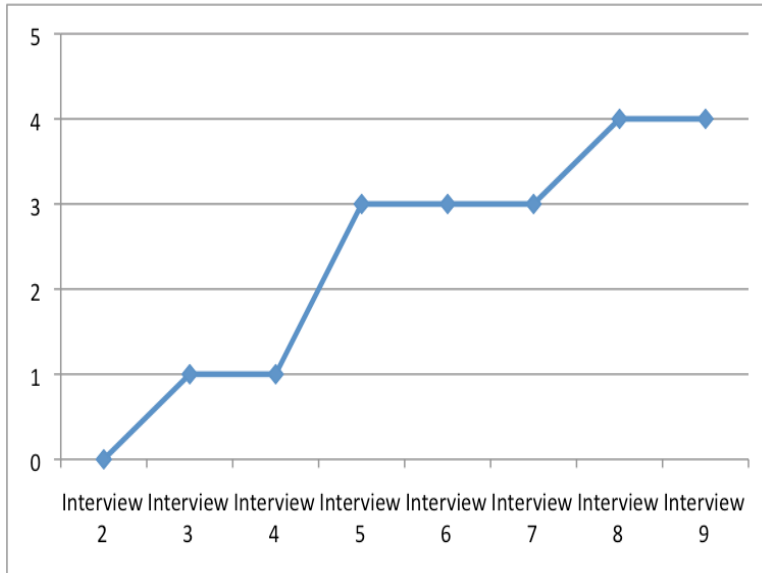


Figure 4.5 Example of Build-up of Exposure to Challenging Driving Conditions across the Learner Stage

Parents were classified as *decreasing exposure* if there was a pattern of relative decrease in the number of challenging conditions to which teens were exposed, exceeding a decrease of two challenging exposures across time points. Figure 4.6 provides an example of a family in which the parent provided a pattern of decreasing exposure to challenging conditions across time points.

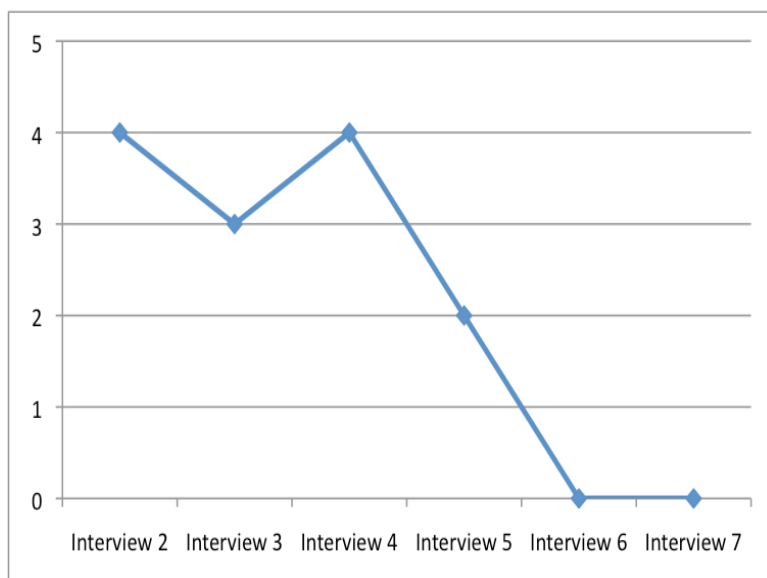


Figure 4.6 Example of Decreasing Exposure to Challenging Driving Conditions across the Learner Stage

Communication Facilitated

Raising Situational Awareness versus Maintaining Proximal Focus

Most communication reported and observed was focused either on non-driving topics or on basic driving skills. However, a relative minority of parents facilitated some communication with their teens that helped draw teens' attention to the broader driving environment. As reported by some parents, there was an intent to help increase teens' awareness of the environment outside the vehicle to help teens appreciate the potential behavior of other drivers, cyclists, and pedestrians, and to anticipate potential challenges and specific hazards. As described by one parent:

You know cause she's aware of the situation that it's, what were we talking about the other day, there 's driving, there's just making the car go and there's making the car go and watching for things like stop signs and you know, just other things and you know there's and watching out for other people....I think this focusing on the fact that I think there are about three levels of skills just kind of just trying to break it down and say there are really three things you have to do at once and being real specific about describing those three tracks. I think that's good to do. Because it there really are three things you need to do at once.
(Parent of female teen, Interview #8)

Although most communication was constrained to vehicle operation and following the rules of the road, parents aimed to raise teens' awareness to the broader driving environment with considerable variability. As noted by these parents of two different teens:

I said something. 'cause matter a fact he ran a light- not a light a week or so ago, 'cause I told him "if you're at an intersection normally, the lights are on like some kinda sensor and if you approach an intersection and you see you're back away, the light's probably gonna turn red before you get there. So, I told him- more likely it will, I will tell you. So, you can't always assume someone is turning 'cause their signal is on- 'cause they don't do it all of the time. So you got to be very careful of that. (Parent of male teen, Interview #6)

Yeah and they happen fast sometimes because the new driver is, can be hyper focused on just driving. To point things out, makes them think about it. And one of the things, too, that I did talk to her about, I don't know if this is helpful or not, but one of the situations that we ran across was she was driving and a car three or four maybe five cars ahead of her didn't put a turn signal on and then slowed down to make a turn, while the car directly behind them had to react quickly because they weren't given any indication that the car was turning and subsequently all of the cars behind that fourth or fifth car ahead of us, had to react quickly and so did [TEEN]. And I, so here was another teachable moment where I said, not only do you need to look at the car that's right in front of you, but I was telling her how I do it, is that I try to scan, not just the cars in front of you but every ten or fifteen seconds the cars that are two, three, four, five cars in front of me for turn signal s or stop lights or anything that will give you an indication that, you know instead of reacting quickly to the car that's right in front of you, gives your brain a little bit of time to react to something that's further down the road. (Parent of a female teen, Interview #8)

Some parents chose to raise teens' awareness to hypothetical driving scenarios during driving practice. As noted by one parent:

Well, for instance, we talked about what you do differently in the rain as far as having your lights on and keeping a safer distance. I try to make him think of things ahead of time, or just review things. Like the time that I felt like he really didn't slow down soon enough, I brought up "what would you do if a dog went out in front of the car?" I just try to think up things that are maybe pertinent to what we're doing, and just say "what would you do?" Or, "what's the right thing?" Or whatever. Stuff like that helps – just to talk about it even if they know what to do. At least you're reviewing with them, or reinforcing what they should be doing. (Parent of male teen, Interview #6)

Some parents described communication that they had with teen while the parent was driving. As reported by one parent:

And the other time, well I guess I give her instruction when I'm driving. We had a situation out of state and we were on the freeway and the debris bounced around the road in front of us and because we were in the middle lane of a three lane road, I couldn't go around it because it was like a box and I had enough clearance on my car – you could see it as an empty box – but it hit the front of our car, it bounced off the grill of the rental car and I didn't move into the other lanes because I knew there were cars on either side of me and I kind of had to deal with the box. And I didn't want to make it worse by side swiping a car. But we kind of talked about that and not to make bad situation, the lesson was on not making something worse. Box is going to hit the car but at least you didn't get into an accident. (Parent of female teen, Interview #8)

During analysis, parents were classified as *raising situational awareness* if they described during multiple interviews specific ways in which they provided some higher-level guidance to teens to help teens become more aware of other drivers and situations to anticipate, and overall to heighten awareness of the environment external to the vehicle. Parents also were classified as raising situational awareness if they were observed in multiple video clips providing this level of guidance to teens. In contrast, parents were classified as *maintaining proximal focus* if the communication they had with teens—reported and observed—was confined to instruction about fundamental aspects of operating the vehicle and obeying traffic laws.

Keeping the Peace versus Sounding the Alarm

Most parents seemed to value and promote a relatively peaceful learning environment, and many of these parents reported various ways in which they tailored their communication to keep teens from becoming anxious or distressed during driving practice. As noted by one parent:

...probably the main thing is like you just have to relax and go with it and try to enjoy the experience and know that it's a stage and it's only going to last so long and you'll want to make the most of it before it's all over because it's not something you can repeat as far as experience goes. (Parent of female teen, Interview #10)

Some parents noted from the start of the learner stage that they were relaxed, and other parents noted that they became less anxious over the initial few months of the learner stage.

Statements provided by these parents of two different teens illustrate this contrast:

Um, well, it's at the point where I forget about who's driving. Well, I don't know if I forget to think about it. Well, I guess I'm relaxing enough that I'm- you know. (Parent of male teen, Interview #2)

Mostly good. A lot more relaxed than it was I'd say two months ago, some more relaxed than last month. (Parent of male teen, Interview #7)

Some parents emphasized specific ways in which they communicated peacefully, including staying calm, providing praise, using humor, and communicating with teens before and after driving practice. As noted by these parents of two different teens:

I'm trying to make it - be sillier with her. And that seems to help....Trying to be funny, so. You know something like that. (Parent of female teen, Interview #7)

So, talking before you go out and then, when you're done just give them feedback. That's, I think, the biggest thing for me, is how did it go. "Oh you did a good job." Or "that was really nice" or "You handled that well." Not all screaming and freaking out, because that's a big turn off. (Parent of male teen, Interview #10)

Although many parents reported or exhibited an occasional moment of distress, a relative minority of parents routinely described and were observed communicating and acting in ways that promoted a persistent stressful learning environment. Some parents reported and were observed yelling at teens or disparaging them. As described by one parent:

(Missing word) 'cause when I tell him stuff before, and you do it again, I just get kinda frustrated- "I've told you this a couple of times before and you still don't listen to me. I talk about complete stops- you do have to- will have to stop. And he like to stop and immediately take off. You gotta wait for like five seconds or so. Yeah. (Parent of male teen, Interview #6)

A specific and severe example of this from a video clip included the following communication between a teen and her mother as the teen made a right turn at an intersection.

Mother: "Where you going?"
Teen: [Name of main road she was driving toward]
Mother (seeming agitated): "Why?!"
Teen: "I want to."
Mom: "Are you retarded?!"
Teen: "I don't like driving on the back road at night."
Mom: "We live right there!"
Teen: "I know, I don't like it though."
Mom: "Stupid!"

A few parents reported stressful occasions during driving practice, where an argument between a parent and teen erupted due to a parent confronting the teen about something unrelated to driving. As noted by one parent:

I'm just trying to think, because I know the last time he drove we had a mega argument and I think it was a whole family argument about his grades at school and how he's dropping everything....I don't know it was really, really heated, it was a bad time. I think we're making some progress now. Totally unrelated to driving... (Parent of male teen, Interview #7)

Other parents seemed to create a stressful learning environment by exhibiting their own nervousness. As succinctly stated by one parent:

I think I still make him a little nervous....Cause I'm acting tense myself. (Parent of male teen, Interview #3)

Some parents also reacted physically in a way that might have promoted a more stressful learning environment. Some of these parents described pressing on imaginary brake pedals or gripping the handles on the doors. A few parents described or were observed reaching for or grabbing the steering wheel. During analysis of video clips, teens often seemed unaware of parents' relatively minor physical reactions (e.g., gripping handles on the doors; grimacing), and it also did not seem apparent that these minor reactions facilitated a stressful learning environment. However, some parents described physical reactions that might have made teens more anxious. As noted by one parent:

Of course I said something! I also have horrible reflexes, where I'm sort of putting on the brakes on the passenger's side and stuff. She gets a lot of non-verbal cues too. (Parents of female teen, Interview #4)

During analysis, parents were classified as *keeping the peace* if the predominance of reports and observations indicated that they were calm and promoted an overall peaceful learning experience. Parents who appeared serious in video clips but who were not observed to be yelling at teens, disparaging teens, reacting physically in ways to make teens anxious, or otherwise creating a stressful learning environment also were considered to be keeping the peace.

In contrast, parents were classified as *sounding the alarm* if the predominance of reports and observations indicated that they were distressed and promoting an overall stressful (negative) experience and learning environment. Parents classified as sounding the alarm reported and were observed in video clips to be yelling at teens, disparaging teens, or otherwise creating a stressful learning environment. For a small subset of parents, reports of promoting a peaceful atmosphere diverged considerably from direct observations of supervised driving practice. That is, video clips showed parents consistently yelling at or disparaging teens during driving practice. Subsequently, parents from these families were classified as sounding the alarm.

For most parents, there was relative consistency across the learner stage with respect to how they promoted either a peaceful or stressful learning environment. However, some parents reported a transition after the initial few months of driving with a change from promoting a stressful atmosphere to fostering a more relaxed and peaceful environment for driving practice. Therefore, some parents were classified as *gradually keeping the peace*. Ultimately, parents who acted gradually to keep the peace did so for the majority of the learner stage, with the predominance of stressful encounters confined to the first few months of the stage.

Patterns of Parenting Practices to a Typology of Practices

The following section describes the results of analyzing patterns of parenting practices, examining and vetting group assignments from the cluster analysis and developing the typology. The analysis helped to identify relationships between specific parenting practices, facilitated assigning parents to groups, and permitted identifying similarities and distinctions between typology groups. Most parents within a given group behaved similarly across the parenting practices assessed; however there was some within-group heterogeneity for some practices within some groups. Although within-group heterogeneity was useful in better understanding a given group, such variability rendered the practice less useful for highlighting distinct characteristics of the group. Patterns of parenting practices differed across groups in this way so that a practice that might have been less useful in distinguish some groups might have been very useful in distinguishing others.

Because not all parents in a given group were identical in how they behaved across parenting practices included for drawing distinctions between groups, there was anticipated within-group heterogeneity and overlap across groups. Therefore, the groups presented below

describe a polythetic typology, with each group possessing prevailing characteristics based on predominant and distinguishing parenting practices (Bailey, 1973).

Ultimately, five groups of parents were distinguished based on the opportunities they provided to teens to get driving experience, exposure to specific challenges, communication with teens, and the atmosphere promoted for driving practice: 1) conscientious adapters, 2) aggressive constrainers, 3) unflappable instructors, 4) casual facilitators, and 5) independence promoters. Table 4.4 included at the end of the following group descriptions provides a summary of parenting practices across groups and highlights similarities and differences. Toward the end of each of the following typology group descriptions, any identified within-group heterogeneity of parenting practices is presented as well as descriptions of specific family circumstances that appeared to affect supervised driving practice. These descriptions are provided to highlight certain aspects of inter-individual variability that might have had an influence on the learner stage experiences and driving practice for different teens.

Conscientious Adapters

The conscientious adapter group was composed of nine families. Conscientious adapters were characterized by several parenting practices. All parents in this group were classified as having consciously evolving supervision, in that they all made an intentional effort to change the way they interacted with their teen to improve the environment for driving practice. All of these parents made these conscious adjustments—that is, they adapted—during the first several months of the learner stage. All but one parent in this group were considered to be maintaining proximal focus, in that they sustained a restricted focus with respect to the information provided to teens during the learner stage. That is, they provided little to no high-level guidance to raise teen’s awareness of the broader driving environment and how to anticipate specific situations.

Nearly all parents in this group were classified as giving teen the driver's seat, in that they encouraged teens to get driving practice by providing ample opportunities for teens to get behind the wheel from the start of the learner stage. Most conscientious adapters were considered to be turning it over to teen, in that that they tended to promote teen independence, providing minimal direction and step-by-step instructing (or micromanagement) of driving practice. Some parents in this group promoted independence from the start of the learner stage, and others did so gradually. Most parents in this group also reported and appeared focused on the road and their teen's driving during practice. Parents in this group also provided either a moderate or high level of exposure across time to challenging driving conditions.

Parenting Practices with Greater Within-group Heterogeneity

Although most parents in this group were similar with respect to previously described practices, there was greater within-group heterogeneity with respect to if and how they facilitated driving practice purposefully to have teens get experience in specific situations (e.g., highway) or conditions (e.g., rain). Some parents facilitated practice purposefully and some did not. Also, although some parents in this group provided teens with a relatively stable degree of exposure to challenging driving conditions across time, other parents in this group provided teens with a largely fluctuating degree of exposure across the learner stage.

Family with Distinguishing Circumstances

Although most group members were similar across the majority of parenting practices, there were some notable family circumstances that appeared to influence driving practice. Among the conscientious adapters, one family stood out based on the teen's exposure to individuals involved in serious crashes. This particular teen reportedly knew of three distinct

fatal crashes involving young drivers. The parent of this teen acknowledged that the accumulation of fatal crashes made the teen more apprehensive about driving practice.

Aggressive Constrainers

The aggressive constrainer group was composed of eight families. In contrast to conscientious adapters, none of the aggressive constrainers made a conscious effort to adapt or change their interactions with their teens during driving practice. In addition, most parents in this group were classified as sounding the alarm, in that they reported and exhibited aggressive interactions with their teens that promoted a more stressful learning environment. Most parents in this group also were considered to be keeping teen under wing because they did not promote teen's independence. Parents in this group maintained teens' dependency on parents by providing a lot of directing of and control over driving practice.

All aggressive constrainers were considered to be maintaining proximal focus, as they provided little to no high-level guidance to raise teen's awareness of the broader driving environment and how to anticipate specific situations. Most parents in this group also were classified as just driving, in that they took teens out for driving practice without attention to what teen would experience overall or to practice driving in specific situations (e.g., highway) or conditions (e.g., rain). Most parents in this group were focused on the road and their teen's driving during practice. Most parents also provided teens with a moderate level of exposure across time, and nearly all parents in this group provided teens with a fluctuating degree of exposure to challenging conditions across time.

Parenting Practice with Greater Within-group Heterogeneity

Although some parents in this group provided teens with ample opportunities to get driving practice from the start of the learner stage, some did so more gradually, and some parents in this group did little to push practice overall.

Families with Distinguishing Circumstances

Among the aggressive constrainers, several families stood out given various life events and family-specific circumstances. One teen from this group turned 18 years of age midway through the learner stage, obtained her full adult license, and was not supervised by a parent during most of the latter half of the learner stage. Another teen competed for practice time with the teen's fraternal twin, and the teen's parents had the added burden of training two teens simultaneously.

Two teens in this group knew someone close to them who had been involved in a fatal crash—both crashes occurring midway through the learner stage respectively. The parent of one of these teens noted that losing his friend had disrupted his interest in driving practice. The sister of another teen included in this group crashed her car midway through the learner stage.

Unflappable Instructors

The unflappable instructor group was composed of fifteen families. Unflappable instructors had a considerably different pattern of common practices from either the conscientious adapters or aggressive constrainers. Although few parents in this group reported making a conscious effort to adapt and improve interactions with their teens during the initial period of the learner stage, most were classified as keeping the peace. That is, they facilitated an overall peaceful, relaxed learning environment across time. In addition, all but one parent in this group were considered to be raising situational awareness, in that they reported having

discussions with their teens to raise their awareness of the broader driving environment and anticipation of specific situations. All parents in this group reported and appeared focused on the road during driving practice.

Nearly all parents in the unflappable instructor group provided ample opportunities for their teens to get driving practice, giving teens the driver's seat, and with some doing so more gradually across the start of the learner stage. Most parents in this group were considered to be practicing with a purpose, in that they facilitated driving practice with the intent to have teens get experience in specific situations (e.g., highway) or conditions (e.g., rain).

Nearly all unflappable instructors provided teens with a limited or moderate level of exposure to challenging conditions, with nearly all facilitating either a fluctuating degree of exposure or building up of exposure to challenging conditions across time. Overall, most parents in this group did not promote teen's independence, rather keeping teen under wing and sustaining teen's dependency on parents by providing quite a bit of instruction and step-by-step directing (or micromanaging) during driving practice.

Families with Distinguishing Circumstances

Among the unflappable instructors, several families stood out given various life events and family-specific characteristics. A teen from one family reportedly had trouble learning to drive as a result of her autism, and this reportedly impacted how her parents instructed her and the driving challenges her parents provided for her during the learner stage. The mother of a teen from another family admittedly was reluctant to serve as her teen's driving supervisor, instead soliciting the involvement of an older adult family friend who facilitated driving practice. This teen drove much less during routine trips with her mother, rather receiving very comprehensive doses of exposure to a high degree of challenge during several scheduled practice sessions

conducted by the family friend. These practice sessions were conducted primarily during the second quarter of the learner stage, with the teen driving seldom prior to and after this period of the learner stage.

Driving practice opportunities for another teen in this group appear to have been limited due to the teen's older sibling driving the teen to most locations. This teen's older sibling was not old enough to serve as a supervisor. Therefore, the teen's opportunities to drive with a parent supervisor were somewhat diminished.

The mother of a teen from one family was involved in a serious crash just prior to the learner stage. This experience reportedly had an impact on the driving challenges she was willing to expose her teen to during the learner stage. The teen from another family reportedly was involved directly as a passenger in two somewhat serious crashes during the learner stage. This teen's father noted that the teen's crash exposure might have diminished the teen's interest in driving practice.

Casual Facilitators

The casual facilitator group was composed of nine families. Most parents in this group provided a low level of exposure to challenging driving conditions, and most parents facilitated a fluctuating degree of exposure over time to challenging conditions. In contrast to the unflappable instructors, most parents in the casual facilitator group were considered to be maintaining proximal focus, as they provided little to no high-level guidance to raise teen's awareness of the broader driving environment and how to anticipate specific situations. Most parents in this group also reported and appeared focused on the road during driving practice.

In contrast to the conscientious adapters, only a few casual facilitators reported making a conscious effort to adapt and improve interactions with their teens during the initial period of the

learner stage; however, nearly all casual facilitators were classified as keeping the peace. That is, nearly all facilitated an overall peaceful, relaxed learning environment across time. Nearly all parents in this group provided ample opportunities for their teens to get driving practice, therefore giving teens the driver's seat. In addition, most parents in this group were considered to be turning it over to teen, in that they tended to promote teen's independence, letting teens figure things out with minimal direction and step-by-step instruction (or micromanagement) of driving practice. In this way, casual facilitators were similar to conscientious adapters and different from aggressive constrainers and unflappable instructors. Some casual facilitator parents promoted teens' independence from the start of supervised driving practice, and others did so more gradually across the initial few months of the learner stage.

Parenting Practices with Greater Within-group Heterogeneity

Overall, roughly half of parents in the casual facilitator group were considered practicing with a purpose, in that they took teens out driving to get specific practice in certain challenging driving situations (e.g., highway) or conditions (e.g., rain). The other half of parents in this group were just driving, approaching driving practice without any specified strategy. Additionally, some parents in this group reported and appeared focused on the road and their teen's driving during practice, and other parents in this group often were distracted or inattentive during supervised driving.

Family with Distinguishing Circumstances

Among the casual facilitators, the mother of one teen noted that her son struggled to build essential skills with operating the stick shift vehicle to which he had access for driving practice. This struggle with basic vehicle operation seemed to hamper his progress and enthusiasm for

practicing. This teen also knew someone who had been in a serious crash that resulted in multiple teens going to a hospital for treatment.

Independence Promoters

The independence promoter group was composed of two families. In contrast to the aggressive constrainers and unflappable instructors, the independence promoters were considered to be turning it over to teen; that is, they fostered teen's independence by letting teens drive with minimal direction and step-by-step instruction (or micromanagement of driving practice). Although parents in the conscientious adapter group mostly were attentive during driving practice, the parents in the independence promoter group frequently were distracted or inattentive during supervised driving. In contrast to the conscientious adapters, aggressive constrainers, and casual facilitators, parents in the independence promoter group reported having discussions with their teens to raise their awareness of the broader driving environment and anticipation of specific situations.

Independence promoters also were classified as giving teens the driver's seat by providing ample opportunities for their teens to get driving experience across the learner stage. In contrast to parents in most other groups, parents in this group facilitated a high level of exposure to challenging conditions. However, the two independence promoter parents were classified as just driving, in that they took teens out for driving practice without attention to what teen would experience overall or to practice driving in specific situations (e.g., highway) or conditions (e.g., rain).

Table 4.4. Summary of Parenting Practice Groups and Prevailing Practices*			
Group	Approach to Driving Supervision	Driving Exposure	Communication
Conscientious Adapters	• Turning it over to teen • Consciously evolving supervision • Giving teen the driver's seat • Focused on the road	• Moderate to high levels of exposure to challenging conditions • Stable or fluctuating exposure across time	• Maintaining proximal focus • Gradually keeping the peace
Aggressive Constrainers	• Keeping teen under wing • Just driving (without attention to provide specific practice experiences) • Giving teen the driver's seat • Focused on the road	• Moderate level of exposure to challenging conditions • Fluctuating exposure across time	• Maintaining proximal focus • Sounding the alarm
Unflappable Instructors	• Keeping teen under wing • Practicing with a purpose • Giving teen the driver's seat • Focused on the road	• Low to moderate level of exposure to challenging conditions • Fluctuating or gradually increasing exposure across time	• Raising situational awareness • Keeping the peace
Casual Facilitators	• Turning it over to teen • Giving teen the driver's seat	• Low level of exposure to challenging conditions • Fluctuating exposure across time	• Maintaining proximal focus • Keeping the peace
Independence Promoters	• Turning it over to teen • Just driving (without attention to provide specific practice experiences) • Giving teen the driver's seat • Attention elsewhere	• High level of exposure to challenging conditions • Stable or gradually increasing exposure across time	• Raising situational awareness • Keeping the peace

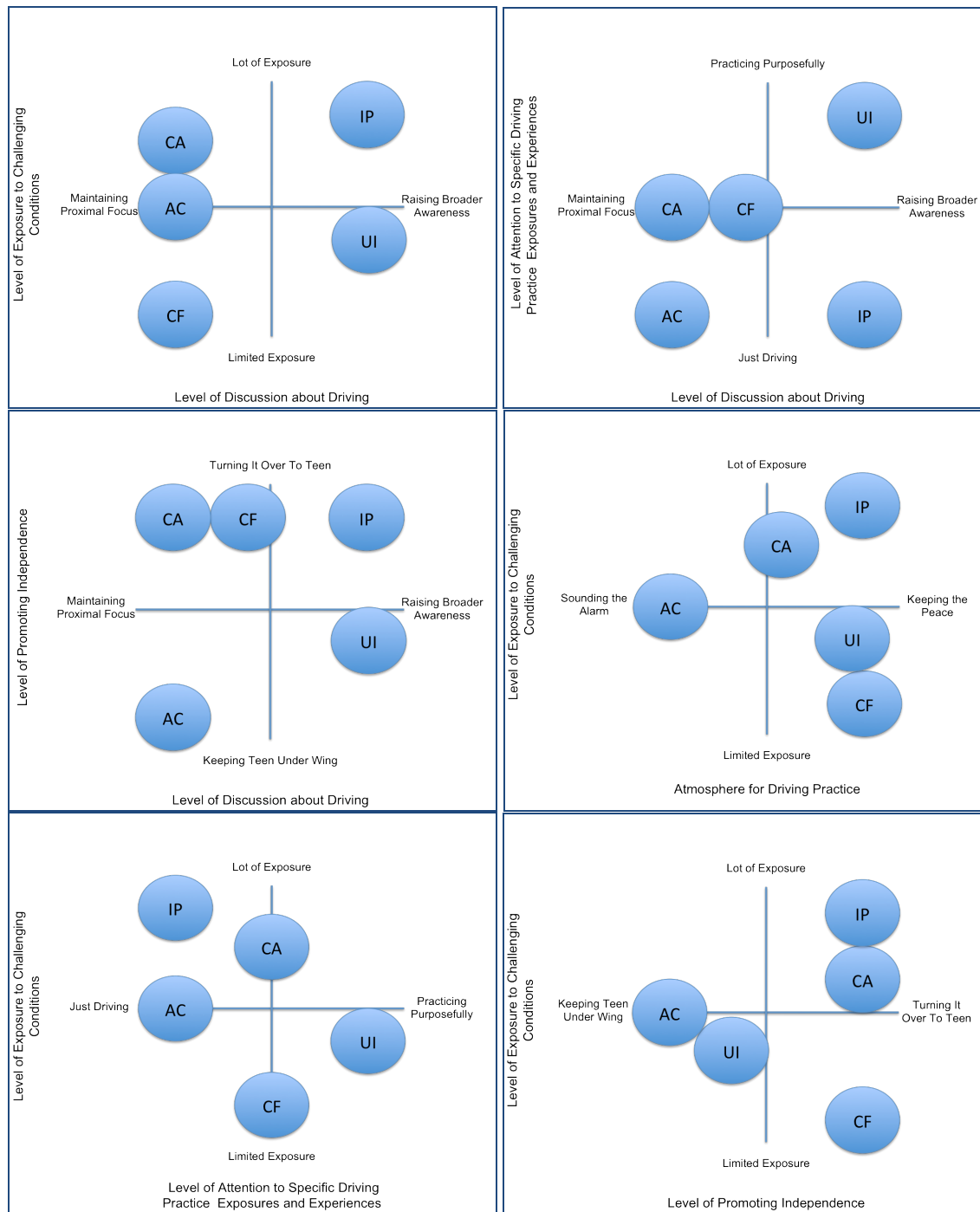
*Although the prevailing practices helped in distinguishing the groups by accounting for those attributes that were shared by most group members, heterogeneity existed within each group on several practices.

Contrasting Groups across Practices

Plots comparing groups across pairings of practices were generated to further examine similarities and differences between the groups. Figures 4.7 and 4.8 present series of plots, each plot illustrating a distinct pair of parenting practice concepts and different patterns across groups. Although the typology analysis accounted for each parenting practice equivalently and

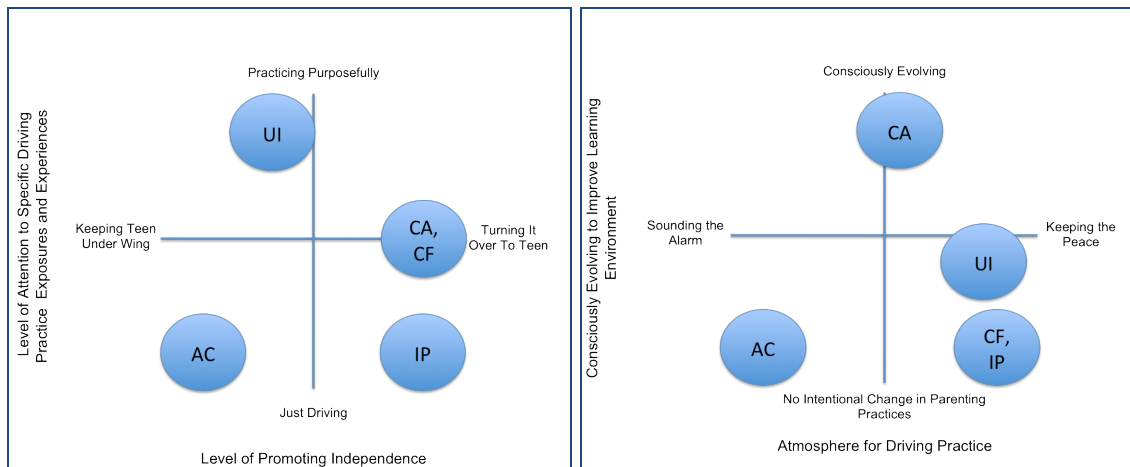
simultaneously, these plots provide added perspective regarding how the groups differed across sets of paired practices.

As shown in the plots in Figure 4.7, certain groups shared similar patterns when contrasting some practices but then differed markedly when contrasting other parenting practices. None of the groups overlapped with another when comparing them across these paired parenting practices. Figure 4.8 presents slightly different patterns, comparing groups across different pairs of parenting practices. These two plots highlight between-group heterogeneity but also show some overlap between groups. The first plot illustrates how the group of casual facilitators overlaps with the conscientious adapters in the plot pairing level of promoting independence and level of practicing purposefully. The second plot illustrates how the group of casual facilitators overlaps with the independence promoters in the plot pairing atmosphere for driving practice and conscious evolution to improve the learning environment. Considering the plots presented in Figures 4.7 and 4.8 as a whole provides further understanding for how each group differed from the others and, ultimately, to support to each being retained as a distinct group.



*Each circle represents one of the typology groups:
AC=aggressive constrainers; CA=conscientious adapters; CF=casual facilitators; IP=independence promoters;
UI=unflappable instructors

Figure 4.7 Plots Comparing Parenting Practice Groups across Paired Concepts



*Each circle represents one of the typology groups:

AC=aggressive constrainers; CA=conscientious adapters; CF=casual facilitators; IP=independence promoters; UI=unflappable instructors

Figure 4.8 Plots Comparing Parenting Practice Groups across Paired Concepts with Some Group Overlap

Comparing Parenting Goals across Typology Groups

In concert with the Integrated Model of Parenting, data were analyzed to identify parenting goals and to determine whether goals differed across typology groups. Several goals emerged from this analysis, all specified at the beginning of the learner stage during the first parent interview. Parenting goals fit within three broad categories: 1) goals specific to how parents would facilitate the learner stage overall and conduct driving supervision; 2) goals focused on learning objectives for teens; and 3) goals regarding parent and teen independence following the learner stage.

Goals Related to Facilitating the Learner Stage

There were several goals identified by parents that were specific to their plans for how they would administer the learner stage for their teens.

Just Driving

Some parents reported a goal to just get teens out on the road—just driving or just practicing without a specific plan. Most parents reporting this goal commented that there would

be ample opportunities for teens to practice across the year of the learner stage. As stated by these parents:

We thought we'd just take it as it comes, ya know, she's gonna want to drive on a regular basis I'm sure- she's very enthusiastic about it, and I'm happy to help her with that- that's fine.

I didn't have any really specific plans. I mean, she'll have her permit for a year so I think giving her plenty of opportunities to drive would be one thing. Probably drive around town first more because the speeds are slower and stuff. (Parents of female teen, Interview #1)

Give Teens as much Driving Practice as Possible

Many parents reported a general goal to have their teens obtain as much time behind the wheel as feasible during the learner stage. Giving teen's as much practice as possible was distinct from the goal of just driving, in that parents seeking to give teens as much practice as possible seemed to value the need to give teens a lot of time behind the wheel. The goal of giving teens as much practice as possible was reported by a predominantly different subset of parents than those reporting the goal of just driving. As noted by these parents:

My plan is to give her as much time behind the wheel with me as possible. (Parent of female teen, Interview #1)

Well, yeah I was going to pretty much let her drive as much as she can...(Parent of female teen, Interview #1)

Give Teens Highly Varied Exposure during Driving Practice

Many parents reported a goal to have their teens practice in a wide variety of conditions and situations. As reported by one parent:

So, that's our plan at the moment, to really just let her drive as much as possible and in as many different situations. (Parent of female teen, Interview #1)

Let Teens Practice Driving During Routine Trips

Many parents reported a goal to let their teens drive during routine trips (e.g., to and from school, local errands). Some of these parents noted their intention to avoid giving teens exposure to any driving that the parent perceived as challenging during at least the initial several months of the learner stage. As stated by one parent:

Um, usually what we did with our oldest- like Sunday mornings, when we go to church, that's a good time to be out on the road because there's not a whole lot going on, and you can go- that's about a 15- minute drive. 15-to 20 minute drive, so that, that's good practice, just getting accustomed to doing the roads and all, and um, and we pretty much try to let them.... We're near the mall where we live, and um, so, nice little errands like that, we try- just work it into our family routine. If we're going somewhere that looks like it's not a threatening or challenging location, we'll let her drive.... (Parent of female teen, Interview #1)

Delay Exposure to Certain Challenges

Many parents specifically reported a goal to build up driving practice over time. As stated by these parents:

Well, yeah, I mean, loosely, progressively, try to advance them into- I mean as an example, we were traveling over the holidays, and I said "you're not driving on the highway." Although he kept asking. I mean, I wanted him to have significant more lower speed driving before I allow him to do any fast speed driving. And this will be true for both of them. (Parent of female teen, Interview #1)

I think I-You know, I think I take her to school every morning- so we're gonna probably work it up to where she drives herself to school in the morning with me in the- ya know- I think that's going to be our little foray into the driving. And then we'll probably advance- you know- a little bit at a time to - you know- highway driving. Try to get her comfortable with driving- you know- in our local area- in our town- you know- in Durham first of all before we try to make any big highway runs. But that's pretty much it- to try to get her to do some of the stuff that we normally do on a normal basis- get that kinda pattern-uh driving- under her belt first, I think for the first couple- first few months. (Parent of female teen, Interview #1)

Driving Practice Facilitation Goals across Parenting Practice Typology Groups

The predominant goals focused on facilitating the learner stage varied somewhat across parenting practice groups. Table 4.5 presents the learner stage facilitation goals previously described as reported by parents in each of the five parenting practice groups. As seen in Table 4.5, certain driving practice facilitation goals were aligned moderately with some practice patterns. Most parents reporting a goal of just driving were from the unflappable instructor parenting practice group, representing one-third of parents in this group, with no parents from the aggressive constrainer group and neither parent from the independence promoter group reporting this goal. Half of the parents in the aggressive constrainer group and more than one-third of parents from the unflappable instructor group reported a general goal to give teens as much driving practice as possible. One-third of the parents in the unflappable instructor group reported a goal to give teens practice driving in a wide variety of situations, and nearly half of the parents

in the aggressive constrainer group reported this goal. None of the parents in the casual facilitator or independence promoter groups reported this goal.

More than half of the parents in the aggressive constrainer group reported a goal to have teens driving during routine trips. Half of the parents in this group also stated they would build up to having teens practice at least some challenging driving. In addition, more than one-third of parents in the unflappable instructor group reported this goal.

Table 4.5. Facilitation Goals Across Parenting Practice Typology Groups					
	Conscientious adapters (n=9)	Aggressive constrainers (n=8)	Unflappable instructors (n=15)	Casual facilitators (n=9)	Independence promoters (n=2)
Just driving (n=7 parents)	1	0	5	1	0
Drive as much as possible (n=15)	3	4	6	2	0
Practice in wide variety of situations (n=10)	2	3	5	0	0
Drive during routine trips (n=16)	3	5	4	3	1
Build up over time/delay in providing some challenging exposures (n=16)	2	4	6	3	1

Goals Related to Parent Learning Objectives for Teens

There were several goals identified by parents that were specific to what they hoped their teens would gain from or learn during the learner stage.

Gain Broader Awareness of the Driving Environment and Ability to Anticipate

More than one-third of parents reported goals related to their teens gaining a sense of the broader driving environment and how to anticipate challenges in certain situations. As described by this parent:

I guess the biggest thing would be expanding his awareness on the road. And you know, his older brother- they start out, and their focus is apparently narrow, and you have to encourage them to- to broaden- and see

more than just the road in front of them, but of course, we'll be getting there- they're involved in the mechanics of keeping the car on the road, and they need- they don't necessarily see the bigger picture item. (Parent of male teen, Interview #1)

Gain Basic Driving Skills

More than one quarter of participants reported a goal to ensure their teens obtained basic driving skills during the learner stage. As stated by these parents:

Um, but really, while she has this permit, we just gonna keep going over- you know- what she need to do on the road and being comfortable, and knowing what width you can turn, right on red, and you know, make sure that you know, everything is clear before you turn, and so, you know- we've been talking about it. (Parent of female teen, Interview #1)

I don't think so. I mean, I don't think there's any point, if there comes a time when she has to parallel park she can try it. But they don't really teach them or test them on that anymore. Nope, I think just regular driving around the town and maybe going some interstate driving in a little while so she can get around on the interstate. I think that's all. There's not any particular thing. (Parent of female teen, Interview #1)

Learn to Drive Safely

Nine parents reported a goal to have their teens learn to drive safely (e.g., learn not to speed, learn to avoid distractions). As stated succinctly by one parent:

Driving the speed limit, staying on the road, not endangering other people. Yeah, that's all. (Parent of female teen, Interview #1)

Gain Skill Driving in Challenging Conditions

Some parents reported a goal to ensure their teens acquired skills driving in challenging conditions. As stated by one parent:

I'd like for her to be as proficient at all types of um, driving atmospheres- you know- from the simple atmospheres- to being in parking lots, and trying to be intuitive, and people may be walking out from being between two cars- people pulling out without the drivers being able to see you, because, vision can be obscured when you're in a parking lot- all types of urban atmospheres, where stoplights, and traffic coming from multiple directions, again- highway safety is very important. I'd like for her to get as much highway time as possible, so, you know, I haven't fully developed my plan yet, I'm trying to think through as many different things as can be difficult, or problematic in, and in a limited capacity at first, put her in these atmospheres and then you know, gradually expose her to it more and more until she has a high level of comfort with them. (Parent of female teen, Interview #1)

Appreciate the Seriousness of Driving

Many parents reported a goal that they hoped their teens would appreciate the seriousness of driving, some noting they wanted their teens to become fearful of driving, understand that

anything can happen while driving, and learn that the driver has limited control over the entire driving environment (e.g., with other drivers who might introduce danger into the environment).

As stated by this parent:

Well, of course, I want her to understand how serious it is to be behind a wheel. She has studied well- in terms of her classroom sessions- and studying before she went to take her permit so- she understands the law. I think she has a pretty good understanding of that, but I want her to understand how serious it is too- what the responsibilities are to be behind the wheel and things that could happen. (Parent of female teen, Interview #1)

Become Comfortable behind the Wheel

In contrast to the goal to appreciate the seriousness of driving, many parents expressed a goal for their teens to become more comfortable driving. None of these parents reported the goal for the teens to become appreciative the seriousness of driving. As stated by this parent:

Um, Well, with her permit, I'm going to try to let her have as much driving experience as possible. Um, because she's definitely going to have to get used- comfortable with it. And she's not comfortable with it. So, I told her- you know, whenever we're going somewhere, she's in the driver's seat. I haven't done- like the busiest times of the day yet, but early morning, um, 'cause like now school is out, and so there's not a lot of buses or anything on the road, she's been doing that, and late evenings- like after rush hour. Just so that she can get used to being on the road and driving some. Um, but really, while she has this permit, we just gonna keep going over- you know- what she need to do on the road and being comfortable, and knowing what width you can turn, right on red, and you know, make sure that you know, everything is clear before you turn, and so, you know- we've been talking about it. (Parent of female teen, Interview #1)

Learning Objective Goals across Parenting Practice Typology Groups

The predominant goals focused on learning objectives for the learner stage varied across parenting practice groups. Table 4.6 presents the learning objective goals previously described as reported by parents in each of the five parenting practice groups. Most goals were reported by at least some of the parents in each group, with the exception being the group of independence promoters for some learning objective goals. As seen in Table 4.6, there was some reasonably strong alignment between some parenting practice patterns and goals focused on learning objectives. The two parenting practice groups with the largest proportions of parents with goals to have teens gain broader awareness of the driving environment and ability to anticipate were the two groups with parents who engaged in discussions with teens to raise their awareness to the

broader driving environment. That is, nearly half of the unflappable instructor group and both independence promoter group parents reported goals to have teens gain this expanded insight into the broader driving environment. Far lower proportions of parents in the other groups—groups with parents who facilitated little to no communication to focus teens’ attention on the broader driving environment—had this goal.

In contrast, neither parent in the independence promoter group reported wanting teens to gain skill driving in challenging conditions; although these parents provided the most exposure to challenging conditions this was not stated as a goal from the outset. However, one-third of parents from the conscientious adapter group had this goal, with parents from this group providing moderate to high levels of exposure to challenging conditions across the learner stage.

One-third of parents in the unflappable instructor group—the group with parents practicing purposefully to give teens specific experiences—reported wanting teens to learn to driving safely, although the proportions of parents reporting this goal were much lower in other groups. Nearly one-third of parents from the unflappable instructor group and over half of the parents from the casual facilitator group had a goal for teens to gain basic driving skills. These two groups with the lowest amount of exposure to challenging conditions also were the two groups that had the highest proportions of parents reporting the goal to have to have teens become comfortable behind the wheel. In contrast the group of parents with the highest proportion of parents wanting their teens to appreciate the seriousness of driving was the aggressive constrainer group with parents who both communicated aggressively and maintained a level of dependency on parents to aid in driving during the learner stage.

Table 4.6: Learning Objective Goals Across Parenting Practice Typology Groups					
	Conscientious adapters (n=9)	Aggressive constrainers (n=8)	Unflappable instructors (n=15)	Casual facilitators (n=9)	Independence promoters (n=2)
Gain broader awareness of the driving environment and ability to anticipate (n=16)	3	2	7	2	2
Gain basic driving skills (n=13)	2	2	4	5	0
Learn to drive safely (n=9)	2	1	5	1	0
Gain skill driving in challenging conditions (n=6)	3	1	1	1	0
Become appreciative of seriousness of driving (n=12)	3	4	3	2	0
Become comfortable behind the wheel (n=10)	2	0	4	3	1

Goals Related to Increased Independence for Parents and Teens

Parents reported two goals related to achieving independence following the learner stage—independence for parents from driving teens around and the milestone teens would achieve from obtaining their driver’s license.

Roughly one quarter of parents reported wanting to obtain some independence from their pre-licensure chauffer duties. As stated by these parents:

I guess I’m excited about her driving, because she is so busy with school, and extracurricular activities, and I’ve been the taxi for- wow- I’ll say 16 years. (Parent of female teen, Interview #1)

It’ll actually be a good thing for me, because he can get himself to his sports practices, and band, and different things. Because my husband travels, even though he’s the only child left at home, it’s still a dilemma when I’m working, and he needs to be somewhere. So I’m probably looking forward to it. Since he is my third child, I’m not nervous about it. I think it’ll be a good thing. (Parent of male teen, Interview #1)

Some parents reported looking forward their teens reaching the important milestone of licensure at the end of the learner stage. As stated by this parent:

I'm excited. To me, it's like a milestone. And it's another step towards independence- not that I want to push him out, but I want him to be confident, and a good driver and so that when he does get his license, he'll, you know- be able to handle it. As much as he can- as a 16 year old. (Parent of male teen, Interview #1)

Independence Goals across Parenting Practice Typology Groups

The predominant goals focused on achieving independence for parents and teens after the learner stage varied across parenting practice groups. Table 4.7 presents the goals focused on increasing independence as reported by parents in each of the five parenting practice groups. As seen in Table 4.7, goals focused on achieving independence were not aligned strongly with practice patterns. Neither parent from the independence promoter group, none of the parents from the aggressive constrainer group, and relatively few parents from the conscientious adapter group reported goals to increase parents' and teen's independence following the learner stage. In contrast, the casual facilitator group parents promoted teen independent driving. This group had nearly half the parents reporting a goal to increase parent independence and one-third of parents reporting a goal to increase teen independence. The group of unflappable instructors had one-third of parents reporting a goal to increase parent independence.

Table 4.7. Independence-oriented Goals Across Groups					
	Conscientious adapters (n=9)	Aggressive constrainers (n=8)	Unflappable instructors (n=15)	Casual facilitators (n=9)	Independence promoters (n=2)
Increase independence for parents (n=10)	1	0	5	4	0
Increase independence for teens (n=6)	2	0	1	3	0

Comparing Parenting Style Dimensions across Parenting Practice Typology Groups

In concert with the Integrated Model of Parenting, parenting style was analyzed to determine whether the general climate of parenting differed across typology groups. Data were

analyzed from the API to examine parenting style dimensions of responsiveness and demandingness. On average across groups, parents were viewed as being fairly responsive with a mean score of 3.14 (S.D. = 0.43). The range of responsiveness scores extended from 2.00 to 3.78, indicating that some teens viewed their parents as far more responsive than others, and with some teens rating their parents as relatively non-responsive. Similarly, on average, parents were viewed as being fairly demanding with a mean score of 3.22 (S.D. = 0.42). The range of demandingness scores extended from 2.43 to 4.00, indicating that although some teens viewed their parents as moderately demanding other teens viewed their parents as highly demanding. Table 4.8 provides the mean scores for responsiveness and demandingness for each of the groups identified from the parenting practices typology.

Although there was variability in the mean scores across groups, on average, parents in all groups were viewed as relatively responsive. The highest mean responsiveness score was for the group of conscientious adapters (3.40), and the lowest mean scores were for the unflappable instructors and casual facilitators (2.98 and 2.99, respectively). Although there was variability in the mean scores across groups, on average, parents in all groups were viewed as relatively demanding. The highest mean score for demandingness was for the group of conscientious adapters (3.43), and the lowest mean score was for the independence promoters (2.79).

Table 4.8. Mean Parenting Style Scores Across Groups					
	Conscientious adapters (n=9)	Aggressive constrainers (n=8)	Unflappable instructors (n=15)	Casual facilitators (n=9)	Independence promoters (n=2)
Responsiveness (n=9 items)	3.40	3.28	2.98	2.99	3.28
Demandingness (n=7 items)	3.43	3.14	3.19	3.21	2.79

Examining Supervised Driving Time across Parenting Practice Typology Groups

The amount of time parents spent supervising teen driving practice was examined to identify potential differences across parenting practice typology groups. Although it was not possible to analyze driving practice time for statistically significant differences between the parenting practice groups, means were examined descriptively to identify possible distinctions. Table 4.9 provides the average number of minutes of supervised driving practice provided to teens, differentiated by parenting practice group. As noted in the table, on average, teens with parents in the conscientious adapter group had the most driving time per week across the learner stage, followed closely by teens with parents in the independence promoter group. These two groups, on average, provide teens with over an hour more time behind the wheel each week than parents in the other three groups.

Table 4.9. Average Weekly Hours of Supervised Driving Time Across the Learner Stage					
	Conscientious adapters (n=9)	Aggressive constrainers (n=8)	Unflappable instructors (n=15)	Casual facilitators (n=9)	Independence promoters (n=2)
Average Hours per Week	2.64	1.16	1.51	1.31	2.56

Exploring Teens' Independent Driving Behaviors across Parenting Practice Typology Groups

Teens' independent driving behaviors were examined for a subset of the families included in the typology analysis to determine whether teens' independent driving behaviors differed by parenting practice typology groups. The percentages of these coded behaviors by group are presented in Table 4.10, with the numerator equal to the number of coded clips in the group in which the target driving behavior was coded, and the denominator equal to the total number of clips in the group. The findings presented in Table 4.10 indicate that teens with

parents in the independence promoter group had the lowest percentages of most unsafe driving behaviors, including sudden stopping, erratic driving, rolling through a stop sign, and serious driving incidents.

Table 4.10. Proportions of Teen Driving Behaviors Across Parenting Practice Typology Groups*					
	Conscientious adapters (n=7 teens) (1282 clips)	Aggressive constrainers (n=4 teens) (663 clips)	Unflappable instructors (n=11 teens) (1642 clips)	Casual facilitators (n=6 teens) (835 clips)	Independence promoters (n=2 teens) (392 clips)
Sudden, last second stop while braking	65 (5.07%)	36 (5.43%)	118 (7.19%)	42 (5.03%)	10 (2.55%)
Erratic driving on the roadway	71 (5.54%)	23 (3.47%)	97 (5.91%)	30 (3.59%)	4 (1.02%)
Rolling stop through a stop sign	76 (5.93%)	48 (7.24%)	97 (5.91%)	53 (6.35%)	14 (3.57%)
Serious incident**	7 (0.55%)	3 (0.45%)	23 (1.40%)	5 (0.60%)	1 (0.26%)
Driver electronic device use***	99 (7.72%)	14 (2.11%)	62 (3.78%)	27 (3.23%)	17 (4.34%)

*Proportions calculated using, dividing by the number of clips.

**Combination of collisions, near collisions requiring another driver to avoid the crash, near collisions requiring teen to make an evasive maneuver, and other serious incidents.

*** Combination of driver holding phone to ear, talking on a hands-free phone, and observed or suspected of operating an electronic device use.

The number of seconds teens looked away from the road was recorded from each clip in which a teen's gaze strayed from the roadway before the driving event that resulted in the clip to be saved (e.g., hard braking; turning too quickly). The event in each clip marked the midpoint of each 20-second clip; therefore seconds coded looking away from the road represents the amount of time teens looked away during a 10-second driving segment. The group means of these times spent looking away from the roadway are reported in Table 4.11. Teens with parents in the aggressive constrainer group had the highest average number of seconds looking away from the road.

Table 4.11. Average Number of Seconds Teens Looked Away from the Road Across Parenting Practice Typology Groups					
	Conscientious adapters (n=7 teens) (1282 clips)	Aggressive constrainers (n=4 teens) (663 clips)	Unflappable instructors (n=11 teens) (1642 clips)	Casual facilitators (n=6 teens) (835 clips)	Independence promoters (n=2 teens) (392 clips)
Average seconds teens looked away from the road	1.87	2.13	1.87	1.95	1.94

Discussion

The main purpose of this study was to explore different aspects of parent behavior (i.e., parenting practices) related to training teen drivers during the learner stage of GDL, identify relationships between those practices, and determine whether distinct groups of parents could be identified and assigned within a typology based on their practice patterns. Using the Integrative Model of Parenting (Darling & Steinberg, 1993), this study further aimed to identify relationships between parenting practices typology groups and: a) parenting goals for the learner stage and b) dimensions of parenting style. The study also explored whether parenting groups differed with respect to the amount of driving practice time teens received during the learner stage and the proportions of certain unsafe driving behaviors observed at the start of independent driving. Ultimately, the findings help to address questions regarding whether parents should be treated as a single homogenous group during ongoing research focused on the role of parents during the learner stage and intervention planning with parents.

The ensuing discussion is organized around several key subsections, beginning with a review and assessment of key findings and the potential public health impact. This is followed by a discussion of findings through the lens of the Integrative Model of Parenting and a

consideration of components of interventions targeted to parents. Study limitations are described, followed by a discussion of potential avenues for future research.

Distinctive Parenting Practices

Nine main parenting practices sorted within three domains were identified from the analysis, comprising parenting behaviors related to parents' approach to driving supervision, driving exposures provided, and communication between parents and teens. Specifically, these parenting practices related to: 1) whether parents promoted teen independence behind the wheel during the learner stage; 2) the depth of instruction provided to teens; 3) whether communication was predominantly peaceful or aggressive; 4) whether parents made efforts to provide specific driving experiences and exposures; 5) the opportunities provided to teens to get driving practice; 6) degree of parent attentiveness during driving practice; 7) the specific exposures to challenging driving conditions parents provided to teens; 8) the degree of stability or change across the learner stage in the level of exposures to challenging driving conditions; and 9) whether or not parents adapted to improve the climate for driving practice.

Certain aspects of parent behavior differentiated parents more so than others. For instance, although the majority of parents across groups provided teens with opportunities to drive overall, the degree of challenging conditions teens were exposed to differed greatly across groups. Similarly, the notion that some parents were more comfortable letting teens establish a sense of independence while driving helped to differentiate parents across groups, with some parents micromanaging driving practice and others letting teens develop their own decision-making skills. Communication parents had with teens also helped distinguish groups, with few parents providing teens with information to expand their focus to the broader driving

environment. Although prior research findings indicate that relatively few parents provide this higher-level instruction (Goodwin et al, 2010, 2014), this parenting practice was useful in helping to distinguish parents in two of the groups identified.

Typology

Five distinct patterns of parenting practices for facilitating the learner stage were identified; the patterns accounted for change across time for several practices. Parents were assigned to distinct groups of a polythetic typology. That is, distinct yet overlapping groups were identified—each group contained parents who shared the majority of practices distinguishing the group but the groups also allowed for some within-group heterogeneity (Bailey, 1973; 1994). The finding that different groups of parents were identified by different constellations of prevailing parenting practices adds to the existing knowledge base exploring how parents facilitate the learner stage. The identification of these groups was based on analysis of reported and observed behaviors, which permits a deeper understanding of what parents are doing and what different parenting practices teens are exposed to during the learner stage.

Potential Public Health Impact

A critical question is whether there was a group of parents who overall had a most desirable constellation of parenting practices; that is, a group that had done the most to prepare teens prior to the start of the intermediate stage. The group of independence promoters came closest to that ideal in that it was distinguished by parents communicating to raise awareness of the broader driving environment, maintaining a peaceful atmosphere for driving practice, promoting independence, and providing considerable exposure to challenging conditions.

Although these parents also facilitated driving practice without attention toward providing specific exposures, they ensured their teens were able to drive quite a bit in challenging conditions. Although these parents' frequent inattention to driving might raise concerns, their overall approach to facilitating the learner stage included predominantly desirable practices. However, the independence promoter group was the smallest group with only two parents, and thus might present the greatest challenge in drawing conclusions. In addition, the group of conscientious adapters provided teens with ample driving opportunities, provided driving practice with moderate to high levels of exposure to challenging driving conditions, promoted teens' independence during the learner stage, and evolved to maintain a peaceful learning environment for the majority of the learner stage.

Given their respective combinations of parenting practices, both the conscientious adapters and independence promoters would be considered to provide beneficial learning stage experiences for their teens. These parents exhibited the most desirable patterns of behavior and also provided teens considerably more practice time than parents in other groups. As ample driving experience is essential to gain proficiency behind the wheel (Foss, 2007), teens of parents in these two groups should be better prepared for independent driving during the start of the intermediate stage. Although assessing differences in crash rates for teens in this study was not feasible, the study was able to examine whether teens in some parenting practice typology groups exhibited fewer observed unsafe driving behaviors at the start of the intermediate stage. Teens with parents in the independence promoter group had the lowest proportions of clips coded for sudden, last second stops while braking, erratic driving on the roadway, and rolling through stop signs. Teens with parents in the independence promoter group also had the lowest proportion of clips coded for a serious driving incident (e.g., collision, near collision). Therefore,

this group of independence promoter parents might have done the best job to prepare teens during the learner stage to drive safely and avoid crashes.

Integrative Model of Parenting

Guided by the Integrative Model of Parenting (Darling & Steinberg, 1993), this study explored relationships between parenting practices and parenting goals and style. Specifically, this study found plausible connections between certain parenting goals and subsequent parenting practices during the learner stage; however the degree to which parenting goals and practices aligned differed among groups. Parenting style dimensions also differed across groups and elucidated ways in which parents in different groups might have established the climate for supervised driving practice. The study findings also offered some insight into how teens' willingness to be socialized might have differed across groups.

Parenting Goals

Goals focused on learning objectives for teens converged with subsequent parent behavior to a reasonable extent, suggesting that some of these goals were predictive of parenting practices. The strongest example was that many parents in the unflappable instructor group and both parents in the independence promoter groups reported goals to have teens gain broader awareness of the driving environment and ability to anticipate challenges. These parents subsequently demonstrated engaging in discussions with teens to raise their awareness of the broader driving environment. In contrast, far lower proportions of parents in the other parenting practice typology groups—groups with parents who did little or nothing to focus teens' attention to the broader driving environment—had this goal. In addition, half of the parents in the aggressive constrainer group—the group with parents who contributed to a more distressing

learning environment—reported a goal to have their teens become appreciative (some fearful) of the seriousness of driving. This was the highest proportion of parents in any group reporting this goal. Also, more than half of the parents in the casual facilitator group—the group with parents providing the overall lowest level of exposure to challenging driving conditions—reported a goal for their teens to obtain basic driving skills. Fewer than one-third of the parents in this group had a goal for their teens to become skilled in driving in challenging conditions.

Certain goals for facilitating the learner stage were more prevalent in some groups than others, with several of these goals reported by parents in the aggressive constrainer group. Half of the parents in this group reported goals to have teens drive as much as possible, and half reported an intention to build up to certain challenging exposures over time. More than half of the parents in the aggressive constrainer group reported a goal to let teens drive during routine trips. Similarly, over one-third of parents in the unflappable instructor group reported goals to let teens drive as much as possible and to build up to certain challenging exposures over time. Conversely, much lower proportions of parents in other groups reported these goals. Notably, neither parent in the independence promoter group—the group with the highest level of exposure to challenging conditions—reported a goal for teens to practice in a wide variety of situations or to drive as much as possible.

With respect to goals related to increased independence for parents and teens after the learner stage, the casual facilitator group contained the highest proportions of parents reporting these goals. None of the parents in the aggressive constrainer group reported either of these goals, which seems to fit with the approach exhibited by parents in this group. Of interest, two of the groups that did the most to promote independence—the conscientious adapter group and independence promoter group—had relatively few if any parents reporting goals to increase

parents' and teen's independence following the learner stage. Somewhat surprisingly, the group of unflappable instructors—a group that generally had parents not promoting independence—had one-third of parents reporting a goal to increase parent independence.

Across types of goals, the casual facilitator group had the greatest alignment between goals and practices, with some goals related to supervised driving practice facilitation, learning objectives, and independence converging with practices. However, few goals overall aligned with practices across groups. Groups with some reasonable alignment between goals and practices typically did not contain a majority of the parents in that group reporting the goal. Therefore, overall goals did not align strongly with practices at the group level. One way to consider the misalignment between goals and parenting practice groups is to consider that goals might have evolved over time, perhaps more so for some parents than others depending on a variety of factors (e.g., prior experience as a supervisor; parent-teen interactions; parent perceptions of teen ability). Some parents might not have known what they were going to do before they had ample experience supervising their teens. Therefore, future studies might try to account for evolutions in goals across the learner stage to determine whether goals change and, if so, whether practices change as a result. An alternative explanation is that both parents in some families with shared supervision might not have shared some goals. In some of these families, the parent reporting goals during the initial interview might not have been the parent conducting the majority of supervised driving.

These findings suggest that goal setting provides a potentially important but missed opportunity to help parents shape practices for the learner stage. Given the theorized impact of parenting goals on practices, it would be important to help parents develop, revisit, and refine goals across the learner stage. Interventions may help parents work together from the outset of

the learner stage to establish goals that mesh with desired practice patterns, and then review patterns of behavior and communication at regular intervals. Doing so would allow parents to revisit and refine goals in an attempt to maintain useful practice patterns and improve upon others.

Parenting Style

The study identified differences in global dimensions of parenting style across parenting practice groups. The patterns identified provide insight into relationships between parenting style and parenting practices, revealing likely differences in how different groups of parents established the climate for supervised driving practice. The finding that the highest responsiveness score was in the group of conscientious adapters fits with how parents in this group all responded to the needs of their teens to alter their supervision practices. Conscientious adapters also had the highest demandingness score, perhaps reflecting their efforts to get teens to adopt a level of independence while being focused on their driving and providing them with a moderate to high level of exposure to challenging situations. As proposed by parenting theory, the high levels of responsiveness and demandingness indicate that the conscientious adapters might have created an optimal environment for driving practice (Darling & Steinberg, 1993; Jackson & Dickinson, 2009; Simons-Morton & Hartos, 2002).

The finding that the lowest demandingness score was in the group of independence promoters also is reasonable, given that these parents frequently were inattentive to their teens' driving while promoting independence throughout the learner stage. Therefore, this "hands off" versus "hands on" distinction in how parents behaved plausibly relates to the overall degree of parental demandingness perceived by their teens. Yet, parents in the independence group were considered relatively responsive. Teens of independence promoters might have had parents who

routinely placed fewer demands and requirements on their behavior and who overall provided less supervision and discipline, but perhaps the very notion of supervised driving within a structured learning environment provided sufficient limits and behavior prompts for these teens.

In comparison to the conscientious adapters and independence promoters, teens with unflappable instructor and casual facilitator parents were considered less responsive and overall moderately demanding. Although teens with unflappable instructor and casual facilitator parents appeared to drive in peaceful learning environments, these teens also had the lowest levels of exposure to challenging driving conditions. Perhaps parents in these groups were generally supportive of their teens and demanding that teens conform to rules during driving practice but not fully ready to embrace their teens' development as independent drivers. Parents in the aggressive constrainer group were considered relatively responsive and demanding by their teens; however in contrast to parents in the other four groups, the lack of a peaceful atmosphere for driving practice likely dominated the climate during the learner stage.

Teen Willingness to be Socialized

Although teen willingness to be socialized was not analyzed directly in this study, time spent supervising driving could be considered a proxy for teens' willingness to practice driving with their parents. The finding that the group with parents who were rated as both the most responsive and demanding—the conscientious adapters—spent the most average time supervising driving practice during the learner stage converges with what would be predicted by the Integrative Model of Parenting. Conscientious adapters' combination of high demandingness, high responsiveness, and evolution to promote a healthier atmosphere for supervised driving might have contributed to teens having more interest in driving. By comparison, the aggressive constrainer group parents who promoted the least peaceful learning environment spent the least

amount of time driving with teens across the learner stage. Perhaps this is an indication that teens with aggressive constrainer parents were less willing to drive and practice with their parents.

To an extent, aspects of teens' willingness to drive during the learner stage and teens' receptivity to parents' instructions and guidance were captured indirectly during analysis of parenting practices. However, parent-teen relationships not captured in the data, including both the history of relations prior to the learner stage and overall ongoing interactions between parents and teen during the learner stage, might have had an impact on how parents carried out their supervisory duties (Laird, 2014; Mirman, Curry, Wang, Thiel, & Durbin, 2014). Although the current study focused on parent behavior, teen willingness to practice driving and be supervised and instructed by parents played a part in what parents did. Most parents provided descriptions of their interactions with their teen around supervised driving, with many sharing accounts of how they negotiated with their teens about practice—some trying to compel their teens to drive more frequently (or at all) and others needing to tighten the reins on very eager, ambitious teens. The bidirectional relationship between parenting practices was captured only to an extent given the data available and analyses pursued.

The findings from this study confirm that it would be important to conduct a more thorough study of teens' receptivity to supervised driving and parent behavior to facilitate the learner stage across different parenting practice groups. Although this study was able to assess teen receptivity to an extent through the analysis of parent interviews, observed interactions in video clips, and using supervised driving time as a proxy, there is more to learn from teens directly with respect to what compels them to practice with their parents, if and why they attend to parental instruction and guidance, and overall what they learn from driving with and talking with their parents about driving during the learner stage. It would be helpful to identify any

differences across groups and to determine whether teens in certain groups are more receptive to parent instruction and reap greater benefits than others that carry over into the intermediate stage.

Considerations for Parenting Interventions

The finding that the smallest group of parents, the independence promoters, had the most desirable pattern of practices and likely did the best job in preparing teens is congruent with prior findings indicating that most parents miss opportunities to prepare teens optimally during the learner stage (Goodwin et al., 2010; 2014; Mirman & Kay, 2012; Tronsmoen, 2011). Therefore, it should not be surprising that the smallest group of parents prepared teens in the most comprehensive manner. Given that parents play an essential part in preparing teens during the learner stage, and that teen crashes rise dramatically at the start of the intermediate stage (Lewis-Evans, 2010; Mayhew, Simpson, & Pak, 2003; Shope, 2013; Twisk & Stacey, 2007), the independence promoters could serve as a target in designing interventions for parents, to help provide a clarified structure of key instruction points and exposures to provide teens.

Findings from this study support the development and implementation of interventions that account for differences across parents, using approaches that help parents identify ways to strengthen practice patterns. Interventions should account for how different types of parents approach and facilitate the learner stage as well as evolutions in parenting practices across the learner stage. Although it would be infeasible to identify parents who could fit within a given typology group prior to the learner stage, interventions should be designed to be flexible and adaptable to address the needs of different types of parents at the start and throughout the learner stage. Parents might benefit from dynamic interventions that: 1) account for differences in parenting; 2) help parents set and reassess useful and achievable goals for supervised driving and

learning objectives; 3) allow parents to see how well they are doing with respect to meeting those goals; and 4) alter parenting practices to provide teens with a more comprehensive learner stage experience (e.g., Mirman, Albert, Curry, Winston, Thiel, & Durbin, 2014). Parents would benefit from tailored guidance throughout the learner stage, helping them evolve as needed to adopt and maintain useful practice patterns during supervised driving. Such interventions also should account for the bi-directionality of parent-teen relationships, helping parents reassess how their supervisory behaviors and communications are helping or hindering teens' learner stage exposures and experiences.

Study Limitations

Although the findings from this study might generalize to other parents of teens during the learner stage, it is important to consider a few limitations. The sample size of 43 families typically would be considered small for drawing conclusions and making inferences to a broader population. However, this sample size was more than adequate and not small for the type of in-depth qualitative analyses performed for this study to develop the typology. Challenges did arise during the analyses comparing parenting goals and parenting style dimensions across parenting practice groups due to the small numbers in each of the groups and the disparity in the number of parents between groups (e.g., 2 independence promoter parents versus 15 unflappable instructor parents). In addition, most goals were reported by at least some of the parents in each group, and few goals were reported by a majority of parents in any parenting practice group. However, the observed differences in goals and style dimensions still provide insight into the complex relationships between parenting goals, practices, and style.

The small group-level sample sizes also are a possible limitation in drawing conclusions from the differences between groups in teens' independent driving behaviors. Although the numbers of teens included in these groups were small, the numbers of clips per group were large enough to identify important group differences. Even the sample of two teens in the independence promoter group included 392 clips, providing ample opportunities for coding teen behavior, and this group had a higher average number of clips per teen than teens in any of the other four groups. Overall, the findings with these small numbers of parents and teens are useful in identifying patterns of parent behavior and potential consequences of different constellations of parenting practices, and these relationships might be investigated further with a larger sample.

Although parents across groups shared some similarities and not all members of a given group possessed all qualifications of group membership, the groups reflect distinctions based on the overall patterns of parenting practices across families. Subsequent group assignment relied on meeting the majority of criteria for membership in the group. Nevertheless, the typology should be subjected to further scrutiny in future research with different samples, and the current findings provide important insights regarding how to focus additional research.

In addition, the characteristics of the sample of families who agreed to participate in the original driving study are not fully representative of the larger population of parents and teens in North Carolina or the United States (Goodwin et al., 2010). There might be something unique about parents who consent to have their driving environments videotaped for a period of several months. Only 43 families were included in the present analysis, and they were skewed overall toward greater affluence and educational attainment (Goodwin et al., 2010). Therefore, it is possible that parenting practice groups would have been different if another sample was included in the analysis. However, the strengths of the qualitative methodology allowed for exploring

relationships between parenting practices in depth to develop the typology, and the range of parent behaviors feasibly captures the essence of what parents are doing to facilitate the learner stage. Therefore, the relationships identified between prevailing parenting practices and groups of parents identified should be considered plausible.

Avenues for Future Research

The study findings provide a useful roadmap for considering future research endeavors. It would be useful to re-examine the parenting practice groups identified to determine whether they are distinguishable in a large sample, and if and how goals and parenting style may be predictive of different patterns of parenting practices. Future research also should assess further what patterns of parent behavior during the learner stage are more likely to promote subsequent safer teen driving upon licensure. Although this study illuminated some of these differences, it would be important for future studies to examine further whether some teens are less likely to be involved in crashes based on the patterns of parenting practices to which they were exposed during the learner stage. It also would be useful for future research to examine potential inter-individual differences that may account for distinctions in parenting practice patterns. Additional analysis of theory-driven predictors of behavior and inter-individual differences will add to the current understanding of what compels parents to engage in certain parenting practice patterns, and this may help in the design of parent-focused interventions.

Another important concern is that the amount of learning that occurs during the learner stage might be very limited (Foss, 2007; R. Foss, personal communication, December 19, 2014). The rise in crashes during the start of independent driving (Lewis-Evans, 2010; Mayhew, Simpson, & Pak, 2003; Shope, 2013) underscores the urgency in better understanding what

learning occurs and whether learning occurs differently for teens with parents exhibiting different practice patterns. Although the current study showed that some parents are doing more higher-level instructing and providing more opportunities for teens to drive in more challenging driving environments than others, if and what teens gained with respect to learning is unknown and should be investigated.

Conclusion

Findings from this study add to the growing understanding of how parents facilitate the learner stage. The use of a well-established theory to guide this research addressed a critical need within the field of young driver safety for theory-guided research, and the in-depth qualitative analysis of data integrated from interviews and video clips presented a novel approach to studying this phenomenon. From this integrated analysis, a typology of parenting practices was identified, with five groups of parents identified and characterized by different predominant behaviors. In addition, certain parenting goals were predictive of subsequent parent behavior for parents in some groups. The notion that some goals were predictive of parenting practices for some groups adds to the understanding of how parents' goals for the learner stage shape their subsequent behaviors and communication with their teens. That parenting style dimensions differed across groups also provides for a richer understanding of how the climate for driving practice might have facilitated an environment more conducive to developing skills through experience for some teens more than others. The findings also provide an indication that teens in some groups received more driving practice than others and that teens with parents with a specific pattern of parenting practices might have driven more safely at the start of the intermediate stage than teens with parents in other groups.

Additional study of these parenting types and independent teen driving behavior will help determine whether: certain practice types are associated with better prepared and safer novice teen drivers, and how best to design parenting interventions to help prepare different types of parents as learner stage supervisors. Potential interventions might have a greater effect on parenting practices and teen outcomes if they account for the divergent constellations of parenting behavior and communication.

CHAPTER FIVE: SUPERVISED DRIVING PRACTICE TIME ACROSS THE LEARNER STAGE

Introduction

The learner stage of graduated driver licensing (GDL) provides an important opportunity for parents to supervise teens' driving practice, thus allowing teens to gain experience needed for subsequent independent driving. Although there is no established minimum length of driving practice time required to produce a safe teen driver, parents appear to spend less time supervising teen driving practice during the learner stage than might be necessary (Goodwin, Foss, Margolis, and Waller, 2010; Goodwin, Waller, Foss, & Margolis, 2006). The central aim of this study is to describe findings from a longitudinal analysis of supervised driving practice time across the learner stage. Guided by the Integrative Model of Parenting (Darling & Steinberg, 1993), theory-driven predictors of practice time, in particular, parenting goals for teen driving and parenting style, were assessed.

Secondary analysis was conducted to examine data collected by the University of North Carolina's Highway Safety Research Center (UNC HSRC). Data were analyzed from interviews with parents and questionnaires administered to parents and teens to examine an average trajectory of supervised driving practice time across the learner stage and the association of -- specific predictors with this trajectory. Growth curve modeling techniques were used to help explain between-individual differences from the average trajectory of how much driving practice time teens received during the learner stage.

Background

McKnight & McKnight (2003) examined more than 2000 police reports of nonfatal young driver crashes. They concluded that the majority resulted from failure to engage in routine safe driving practices—much more often related to a lack of recognition of the danger in failing to employ safe driving practices than deliberately taking risks. Novice drivers have limited hazard and risk perception and judgment (Brooks-Russell, Simons-Morton, & Ehsani, 2014; Ferguson 2003; Hedlund, 2007), largely because sufficiently mastering how to operate a motor vehicle safely requires substantial experience over time (Foss, 2007; Gregersen & Bjurulf, 1996; Transportation Research Board, Board on Children, Youth, and Families, 2007). Almost by definition, novice drivers lack sufficient exposure to a wide range of driving scenarios to develop both their conscious abilities to appraise varied scenarios and their intuitive abilities to recognize and respond appropriately to potentially hazardous driving situations (Kinnear, Kelly, Stradling, & Thomson, 2013). Increased driving practice in a variety of conditions and situations fosters the development of these more efficient automated recognition and decision-making systems (Gregersen, Berg, Engström, Nolén, Nyberg, & Rimmö, 2000).

GDL provides a structure within which young drivers can gain driving experience and exposure to varied conditions progressively, with gradually increasing levels of independence behind the wheel (Foss, 2007; Waller, 2003). The initial of three GDL stages and focus of this study, the learner stage, requires that teens drive while supervised, typically by their parents. The learner stage is followed by an intermediate stage during which teens can drive without adult supervision but with specific restrictions. In the final stage, teens graduate to full licensure with few restrictions (Foss, 2007; Foss & Goodwin, 2003; National Highway Traffic Safety Administration, 2008; North Carolina Department of Transportation, 2014).

There is no established threshold of driving practice hours that guarantees a teen will be a safe driver following the learner stage. Some findings from studies of the effects of policies indicate that a mandatory minimum number of supervised driving hours has no effect on crash rates (Masten, Foss, & Marshall, 2011; O'Brien, Foss, Goodwin, & Masten, 2013). Another study identified that more supervised driving time during the learner stage is more beneficial than less time behind the wheel (Gegersen, Berg, Engström, Nolén, Nyberg, & Rimmö, 2000). Coupled with supervised driving practice time, the conditions and situations to which teens are exposed during the learner stage are of key importance because driving occurs in complex, ever-changing environments (Foss, 2007). Consequently, more driving time should be beneficial to an even greater extent if teens acquire considerable experience in a wide variety driving conditions (Goodwin et al., 2010; Simons-Morton, 2007; Simons-Morton & Ouimet, 2006; Twisk & Stacey, 2007).

Some parents report plans to provide teens with varied exposures; however, driving practice typically occurs in relatively safe conditions (Goodwin et al., 2010). These more benign driving conditions permit parents to focus primarily on helping teens acquire basic vehicle operation and maneuvering skills with less attention paid to helping teen develop higher order skills that might result in reducing crashes after teens begin driving independently (Goodwin et al., 2010; Simons-Morton & Ouimet, 2006). Communication between parents and teens also is important during the learner stage. Although some parents report wanting teens to acquire an awareness of the broader driving environment and ability to anticipate how to handle different situations (Goodwin et al., 2010), parents do not typically discuss these topics with teens during supervised driving practice (Goodwin et al., 2010; 2014; Mirman & Kay, 2012; Tronsmoen, 2011).

Parents frequently report being in favor of teen driver licensing requirements, including those that necessitate more parent involvement (Williams, Braitman, & McCartt, 2011; Brookland & Begg, 2011; Chaudhary, Williams, & Casanova, 2010; McKay, Coben, Larkin, & Shaffer, 2008; Waller, Olk, & Shope, 2000). Among several studies, a national survey found that parents were in favor of a learner stage requiring at least 100 required hours of supervised driving (Williams, Braitman, & McCartt, 2011). The supervised driving experience also might be appreciated more by teens whose parents create opportunities for supervised driving and spend more time driving with them during the learner stage (Taubman-Ben-Ari & Lotan, 2011). However, finding ample time for driving practice can be challenging. Although parents appreciate that driving practice requires a significant time commitment (Jacobsohn, García-España, Durbin, Erkoboni, & Winston, 2012), busy schedules provide competing demands on parents' and teens' time (Goodwin et al., 2010).

Parenting Theory

The Integrative Model of Parenting (Darling & Steinberg, 1993) was used to guide the current study because of the relevance of the theorized relationships to the investigation of parenting practices intended to bring about specific teen outcomes. Figure 5.1 provides the model's theorized relationships between parenting goals, parenting style, parenting practices, teen willingness to be socialized, and teen outcomes (e.g., specific desirable behaviors). Specifically, the intersection of practices, style, and goals has been shown to have an impact on teen behavior (Simons-Morton & Hartos, 2002; Darling & Steinberg, 1993).

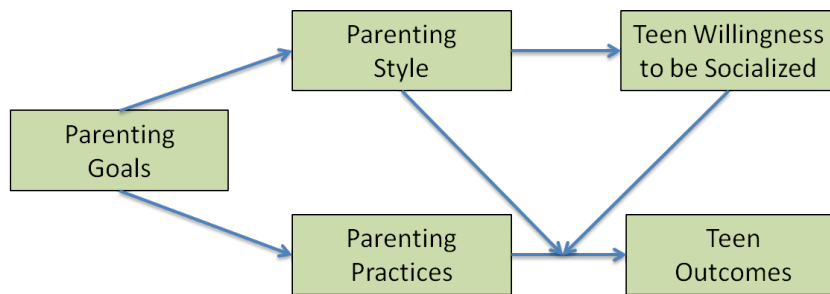


Figure 5.1 Integrative Model of Parenting (Darling & Steinberg, 1993)

As shown in Figure 5.1, parenting goals are theorized to influence parenting practices. Parenting practices, in turn, are hypothesized to have a direct influence on teen behaviors (Simons-Morton & Hartos, 2002; Darling & Steinberg, 1993). Parenting practices, specifically, account for what parents actually do (Patrick, Hennessy, McSpadden, Oh, 2013), and they are directly observable and relate to parent behavior in specific contexts (e.g., supervised driving) (Power, Sleddens, Berge, Connell, Govig et al., 2013). This study focused on a specific parenting practice defined as the length of time parents spent supervising teens' driving practice during the learner stage.

Parenting goals are focused on specific skills, qualities, or attributes that parents would like their children to obtain or adopt (Jackson & Dickinson, 2009; Simons-Morton & Hartos, 2002). Parenting goals typically are at the foundation of interventions aimed at targeting parenting practices (Simons-Morton & Hartos, 2002). Parenting goals have been associated with adolescent school performance (Spera, 2006), student motivation (Vedder-Weiss & Fortus, 2013), teen employment (Runyan, Vladutiu, Schulman, Rauscher, 2011; Runyan, Schulman, Dal Santo, Bowling, & Agans, 2009) and teen driving (Hartos & Simons-Morton, 2006). In general, parenting goals related to teen driving might be grounded in the expectation that teens will be

safe drivers, with goals related to increased teen driver safety and effective parental management of teen driving (Hartos & Simons-Morton, 2006).

Goals vary along dimensions (e.g., complexity, specificity) that determine how well they facilitate goal achievement (Austin & Vancouver, 1996). Goals that are more specific and more challenging generally are thought to yield greater effort and achievement, in contrast to more generic goals (Latham & Locke, 2007; Locke, Chah, Harrison, & Lustgarten, 1989; Locke & Latham, 2002; 2006). Parenting goals for the learner stage assessed in this study were derived from a prior qualitative analysis of goals reported by parents at the start of the learner stage (Scholl et al., 2015). Most parenting goals identified from that analysis fit into one of two general categories: 1) goals related to facilitating driving practice, and 2) goals related to teen learning objectives. Some goals for facilitating driving practice were generic (e.g., just get teens on the road to get practice; let teens practice driving during routine trips). Other goals were more specific and challenging, converging with what should help prepare teens optimally during the learner stage (e.g., give teens as much driving practice time as possible; give teens highly varied exposure to lots of driving conditions and situations). Similarly, some learning objective goals were challenging and specific, while also congruent with preparing teens effectively during the learner stage (e.g., teens to gain skill driving in challenging condition; teens to gain broader awareness of the driving environment and ability to anticipate challenges). Other learning objective goals were more generic and less challenging, while also less salient for preparing teens for independent driving (e.g., teens to gain basic driving skills).

In contrast to goals and practices, parenting style reflects ways in which parents create an overall emotional climate that sets the tone for how parents interact with their children (Jackson & Dickinson, 2009; Simons-Morton & Hartos, 2002; Steinberg & Silk, 2002). Parenting style

fundamentally is distinguished by relative balance between two primary dimensions: parental *responsiveness* to and *demandingness* of children (Jackson & Dickinson, 2009; Jackson, Henriksen, & Foshee, 1998; Steinberg, Lamborn, Darling, Mounts, & Dornbush, 1994; Darling & Steinberg, 1993; Baumrind, 1991; Maccoby & Martin, 1983). As described by Baumrind (1991) and Maccoby & Martin (1983), responsiveness refers to parental support and attention to children's needs and parental efforts to promote individuality, self-regulation, and self-assertion (Simons-Morton & Hartos, 2002). In contrast, demandingness refers to parental efforts to require mature behavior, compel children to integrate into the family, provide supervision and discipline, and confront disobedience (Baumrind, 1991; Maccoby & Martin, 1983; Simons-Morton & Hartos, 2002).

Specific to teen driving, Ginsburg, Durbin, García-España, Kalicka, & Winston (2009) examined associations between parenting style and teen driving behavior. The investigators identified that teens with highly responsive and demanding parents had a lower crash risk, were less likely to drive after drinking, and were less apt to drive while using a cell phone than teens whose parents were neither responsive nor demanding (Ginsburg et al., 2009). Teens whose parents were highly demanding and highly responsive also were more likely to report using seatbelts and less likely to report speeding (Ginsburg et al., 2009). An additional study found that more responsive parents were in reportedly more mutually supportive relationships with their teens which, in turn, was associated with parents having greater intentions to get teens out for driving practice (Mirman, Curry, Wang, Thiel, & Durbin, 2014). Because responsiveness and demandingness are theorized to influence teens' willingness to adopt desired behaviors (Darling & Steinberg, 1993), teens whose parents exhibit high responsiveness and high demandingness might be more receptive than other teens to spend time in the car with their parents to practice

driving during the learner stage. Therefore, although not theorized by the Integrative Model of Parenting to have a direct influence on parenting practices (Darling & Steinberg, 1993), parenting style dimensions were included in the current study as potential predictors of driving practice time.

Although parents might develop a foundation for what they offer their children via parenting style, goals, and practices, ultimately the objective is for children to be socialized to internalize their parents' goals and aspirations for behaving in specific ways (Darling & Steinberg, 1993; Jackson & Dickinson, 2009). Whether teens behave according to parental desires depends greatly on whether they are receptive to their parents' efforts (Darling & Steinberg, 1993; Grusec & Goodnow, 1994). Consequently, that teens would be willing to drive with their parents during the learner stage is an important component of supervised driving practice.

Studying Predictors of Supervised Driving Time

This study aimed to address gaps in the current understanding of whether time spent supervising driving practice during the learner stage differs among parents in meaningful ways. Initially, this study aimed to examine the average growth pattern (or trajectory) of supervised driving time to better understand the shape of the trajectory across the learner stage. This study also aimed to determine whether parents differed sufficiently with regard to driving practice time across the learner stage to merit examining between-individual differences that could predict deviations from an average trajectory. Given the assumption that a substantial proportion of driving practice time variation might be the result of between-parent differences, another study objective was to examine specific predictors of between-individual differences. Guided by the

Integrative Model of Parenting (Darling & Steinberg, 1993), the effects of parenting goals and parenting style dimensions were modeled as predictors of differences in supervised driving practice time.

Foremost, this study aimed to analyze the potential influence of parenting goals expressed by parents at the start of the learner stage on the average trajectory of driving practice time. Given that more specific, challenging goals might be associated with greater achievement (Locke & Latham, 2002; 2006), goals were considered differentially. In general, that parents had goals for the learner stage would be considered advantageous; however parents' goals for the learner stage were not equally specific and ambitious and thus allowed for considering whether some goals would be predictive of more time in the car for driving practice than other goals. Examining goals distinctly to determine whether more specific and more challenging (or more ambitious) parenting goals are predictive of more thorough preparation of teens during the learner stage has not been examined previously. Therefore, this is the first study to attempt to disentangle different types of parenting goals to identify those that might predict more versus less driving practice time during the learner stage.

It was anticipated that two driving practice facilitation goals would predict more driving time across the learner stage. These goals included those specific to providing teens with as much driving practice time as possible and providing teens with practice in a wide variety of situations. Both of these goals relate to providing teens with lots of driving exposure and were expected to be associated with more time behind the wheel. Additionally, two learning objective goals were expected to predict more driving practice time across the learner stage. These two goals were to have teens gain skill driving in challenging conditions and to have teens gain broader awareness of the driving environment. It was anticipated that achieving these goals

would necessitate providing teens with a tremendous amount of practice time across the year of the learner stage.

In addition, two parenting goals were posited to predict decreased driving practice time across the learner stage because they were relatively non-specific and unambitious with respect to what would be provided during and expected from teens following the learner stage. These included the goal for teens to acquire basic driving skills and the goal to have teens drive during routine trips (e.g., to school or errands). Comparing parents reporting these goals with parents reporting more specific and challenging goals, parents who reported the goal for teens to get basic driving skills largely represented a different group from the parents reporting learning objective goals hypothesized as predictors of more driving time. Similarly, parents who reported the goal for teens to drive during routine trips predominantly were distinct from parents reporting driving practice facilitation goals that were hypothesized as predictors of more driving time.

Given prior findings (Ginsburg et al., 2009; Mirman, Curry, et al., 2014), it was expected that parenting style dimensions would help predict between-individuals differences in supervised driving time. Specifically, it was anticipated that more responsive parents would have teens practicing for a greater number of hours across the learner stage than parents who were less responsive. It also was expected that teens whose parents were more demanding would receive more driving practice time than teens whose parents were less demanding.

In addition, certain family characteristics were included in models to assess their effects on supervised driving time. These family characteristic predictors were chosen selectively, in part based on prior findings from analysis of data from UNC HSRC's sample of parents and other studies of parents during the learner stage. Findings from a prior study found a relationship between teens living in two-parent households and more driving practice (Jacobsohn et al.,

2012). Therefore, it was anticipated that teens with married parents would have driven more across the learner stage, given the potential for multiple supervisors to provide driving practice. Some parents in UNC HSRC's sample reported during interviews that they limited driving practice when teens' (typically younger) siblings were in the vehicle. Consequently, teens who were the only child living at home during the learner stage might have had more opportunities to practice driving than teens whose parents' attention and availability were divided between siblings. Given prior findings that girls in UNC HSRC's sample drove more average hours per week than boys (Goodwin et al., 2010), sex of teen was included as a predictor. Additionally, prior experience as a driving supervisor was anticipated to have an influence on the trajectory of driving practice. In contrast to novice supervisors, it was assumed that parents with prior supervision experience might have had a greater appreciation of the importance of providing teens with a lot of time behind the wheel.

Methods

Study Design and Sample

Between January 2007 and June 2008, data were collected from 50 families for a study of parents and teens during the learner stage (Goodwin et al., 2010). Families were recruited from two North Carolina Division of Motor Vehicles offices (Goodwin et al., 2010). Parent and family characteristic data were gathered using a questionnaire administered to parents at baseline. Semi-structured telephone interviews were conducted with parents at ten time points across the learner stage (Table 5.1). During the first interview, parents were asked open-ended questions about their goals and plans for the learner stage. In subsequent interviews, parents reported the length of time spent supervising teen driving during the previous week. Goodwin et al. (2010) provides

a more detailed description of the data collection procedures, analysis, and findings from the primary study of these families. In the current study, data were analyzed primarily from parent interview data, with additional data analyzed from parent and teen questionnaires.

The sample for analyzing the potential influence of parenting goals on driving practice time across the learner stage included 47 families, excluding parents of two sets of twins, for whom parenting goals were not differentiated, and one family that dropped out of the study after four weeks. The sample for analyzing the potential influence of parenting style included 42 families, excluding five additional families for which parenting style was not assessed.

Table 5.1. Schedule of Semi-structured Telephone Interviews with Parents	
Parent Interview Number	Time Point for Interview (Approximate time frame since teen obtained learners' permit)
1	Within one week of obtaining learner's permit
2	Two weeks
3	Four weeks
4	Six weeks
5	Nine weeks
6	Thirteen weeks
7	Nineteen weeks
8	Twenty-six weeks
9	Forty weeks
10	Fifty-two weeks

* Table based on Goodwin et al., 2010

Measures

Dependent Variable

The dependent variable was the length of time during the previous week parents reported supervising driving practice with their teens. During interviews parents responded to a specific question, asking them to report about how many total hours their teen drove during the past week. Each of the 47 parents reported time spent supervising teen driving at up to nine

interviews. Because the dependent variable was not measured at the baseline parent interview and because many parents had not started providing supervised driving practice at the second interview, the variable is measured at interviews three through ten. Some interviews were missed and during a few interviews time spent supervising driving practice was not reported. Missing outcome data patterns were examined and potential outcome nonresponse bias was assessed.

Independent Variables

Parenting Goals

Parenting goals were derived from qualitative analysis of parent interview data (Scholl et al., 2015). Data were coded and analyzed to determine how different types of goals were distinguished overall and to ascertain how they might differ between parents. The analysis identified a variety of parenting goals, all specified at the beginning of the learner stage during the first parent interview. Parenting goals largely fit within two categories: 1) goals related to how parents would facilitate driving practice; and 2) goals focused on learning objectives for teens. As described, goals varied greatly with respect to their levels of specificity and challenge. In the current analysis, some parenting goals were included that targeted fundamental, generic objectives (i.e., acquisition of basic driving skills; and driving during routine trips). Other goals reflected more specific, challenging achievements (i.e., giving teens as much driving practice as possible; practicing in a wide variety of situations; teens gaining awareness of the broader driving environment; and teens gaining skill driving in challenging conditions). Table 5.2 presents each parenting goal predictor included in the models along with the number of parents reporting the goal.

Table 5.2. Distribution of Time-Invariant Parenting Goals (n=47 parents)			
Type of Goal	Parenting Goals	Yes	No
Facilitating driving supervision	Practice in a wide variety of situations	11	36
	Drive as much as possible	17	30
	Drive during routine trips	18	29
Learning objectives for teens	Gain broader awareness of the driving environment	18	29
	Gain skill driving in challenging conditions	6	41
	Gain basic driving skills	13	34

Parenting Style Dimensions

Parenting style was measured using the 16-item Authoritative Parenting Index (API) (Jackson, Henriksen, & Foshee, 1998) that teens completed at the start of the learner stage. Initial review of the data for the 16 items identified three items with skewness greater than -1.0; all other items had approximate normal distributions. Ultimately, cubed and squared transformations yielded minimally-skewed, approximate normal distributions for these three items for subsequent analysis. Given the small sample for the current study, factor analytic techniques were not appropriate for assessing item loading (Tinsley & Tinsley, 1987); however internal consistency reliability was assessed by examining Cronbach's alpha values for each intended subscale. During development of the API, Jackson, Henriksen, and Foshee (1998) found Cronbach's alpha values that ranged from .71 to .90 for the responsiveness scale and from .65 to .83 for the demandingness subscale. Using data from the existing sample, including data transformations for the three originally skewed variables, standardized Cronbach's alpha values were calculated as .79 for the responsiveness subscale and .75 for the demandingness subscale—both indicating acceptable internal consistency reliability. Following verification of the subscales as derived originally by Jackson, Henriksen, and Foshee (1998), mean scores were constructed for responsiveness and demandingness using non-transformed values for all items. Scores for

responsiveness ranged from 2.00 to 3.78 on a four-point scale, with higher values indicative of higher levels of parental responsiveness. Demandingness scores ranged from 2.43 to 4.00, also on a four-point scale and with higher values indicative of higher levels of parental demandingness. Both responsiveness and demandingness scores were approximately normally distributed.

Family Characteristics

Family characteristic predictors were derived from parent interviews and questionnaires administered at baseline. These family characteristics were included as dichotomous predictors: supervisor parent's marital status; whether the teen was the only child living at home; whether this was the parent's first time supervising a teen during the learner stage; and sex of teen. Table 5.3 presents each of the family characteristic predictors included in the models.

Table 5.3. Distribution of Family Characteristics		
Family Characteristics	Yes	No
Parent's marital status, married	37	10
Teen only child living at home	12	35
Parent's first time supervising a teen during the learner stage	25	22
Teen female	32	15

Analysis

Growth curve modeling was conducted to examine supervised driving time longitudinally by quantitatively assessing systematic change in supervised driving time across the learner stage. For this study, growth curve modeling was applied as a variation of multilevel modeling, in which supervised driving time data collected at multiple time points were clustered within individual respondents, with repeated measures nested within an individual (Bauer & Curran,

2010a; 2010b; Raudenbush & Bryk, 2002). Growth curve modeling was used to assess differences between study participants with respect to the average length of time spent supervising driving practice at the initial, baseline study time point (the intercept) and differences between study participants with respect to the average rate of change time spent supervising driving practice across time (the slope) (Bauer & Curran, 2010a; Curran, Obeidat, & Losardo, 2010). In the growth curve modeling context, the intercept and slope means are considered fixed effects, while estimated variances around the average intercept and slope are considered random effects (Curran, Obeidat, & Losardo, 2010). As random effects increase in value, the implication is that there are greater between-person differences in the values of the average intercept and slope, and these differences can be assessed by examining the influence of specific predictors (Curran, Obeidat, & Losardo, 2010).

After establishing a base (or unconditional) model for the average trajectory of supervised driving practice time across the learner stage, this study examined the influence of parenting goals, parenting style dimensions, and family characteristics as time-invariant predictors of variability in the average trajectory (Bauer & Curran, 2010a; 2010b; Curran, Obeidat, & Losardo, 2010). Time-invariant predictors are assumed to be stable over time (Bauer & Curran, 2010a; Curran, Obeidat, & Losardo, 2010); therefore, goals for the learner stage that were reported by parents during the initial interview were considered static baseline predictors. Parenting style dimensions are considered global attributes that remain constant across situations, therefore, responsiveness and demandingness also were considered time-invariant across the learner stage. Models were constructed separately to examine the potential influence of parenting goals and parenting style predictors, the latter assessed using the more limited available sample. Both models included family characteristic predictors.

Results

Exploratory Data Analysis

Exploratory data analysis was conducted to assess the distribution of the average trajectory of hours of supervising driving practice per week and to assess the potential influence of participants with missing data. The number of hours per week of supervised driving practice reported by parents ranged from 0 to 11 hours, with a mean=1.70, median=1.25, standard error = 0.09, and 45 unique hour values (n=342). Exploratory data analysis revealed that the distribution of the number of hours was positively skewed and kurtotic. A subsequent square-root transformation of hours produced an approximate normal distribution with minimal skewness (0.29) and kurtosis (0.32). This square root-transformed dependent variable was used for all subsequent modeling. Analyses of missing data yielded no specific patterns or significant findings comparing parents with respect to the dependent variable as well as family characteristic and parenting predictors. Nonresponse was examined comparing parents who provided a response of hours of supervised driving at all eight time points and parents who sometimes did not provide responses. Data missingness assessments found no statistically significant differences by complete response status; therefore, the missing data were determined to be missing at random.

As presented in Figure 5.2, the observed means of hours were plotted across the eight available time points to obtain an initial view of the average trajectory of supervised driving practice time across the learner stage. The plot of mean hours across time indicated a linear or quadratic growth function might be appropriate for subsequent modeling; however, individual trajectories exhibited considerable within-individual fluctuation and heterogeneity.

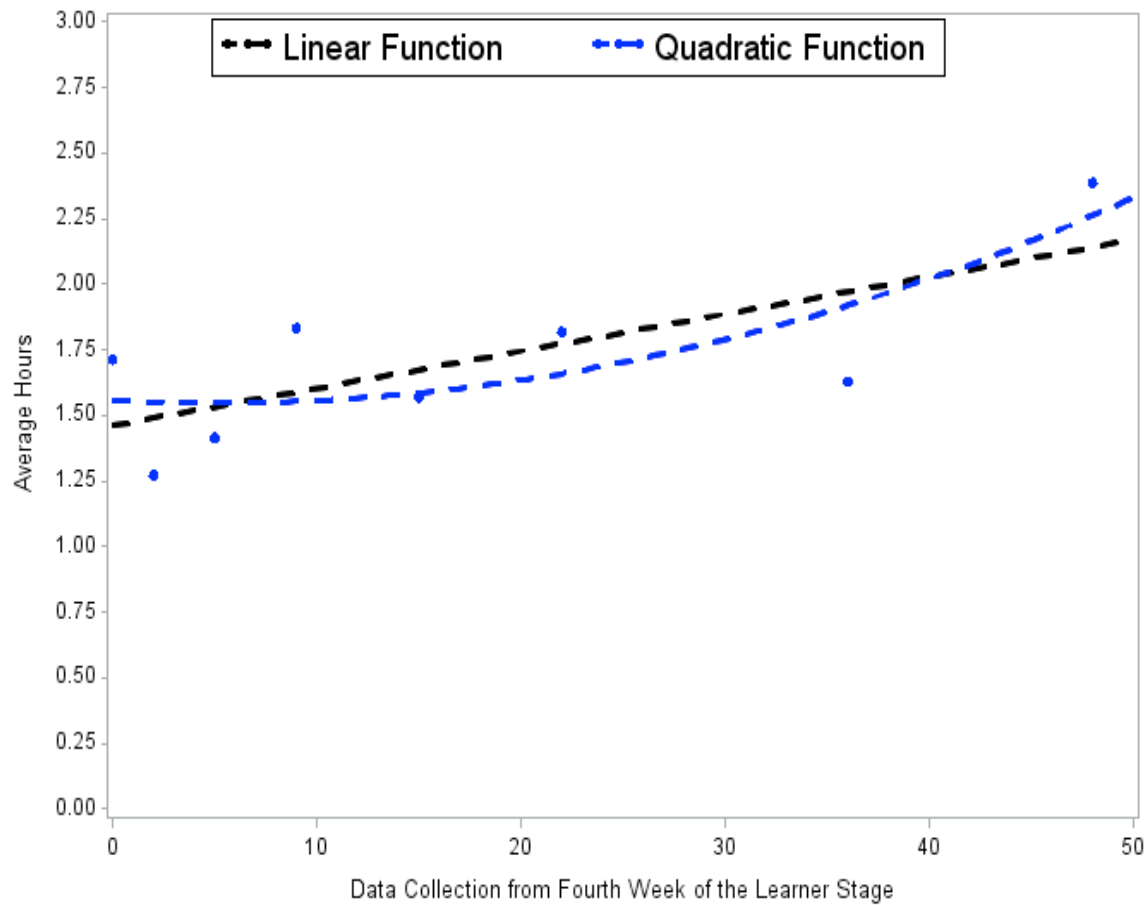


Figure 5.2 Plot of Average Hours of Supervised Driving across the Learner Stage (n=47)

Figure 5.3 provides a plot of individual trajectories for a subsample of ten participants. This plot provided evidence of both between-individual heterogeneity and within-individual fluctuations in individual trajectories.

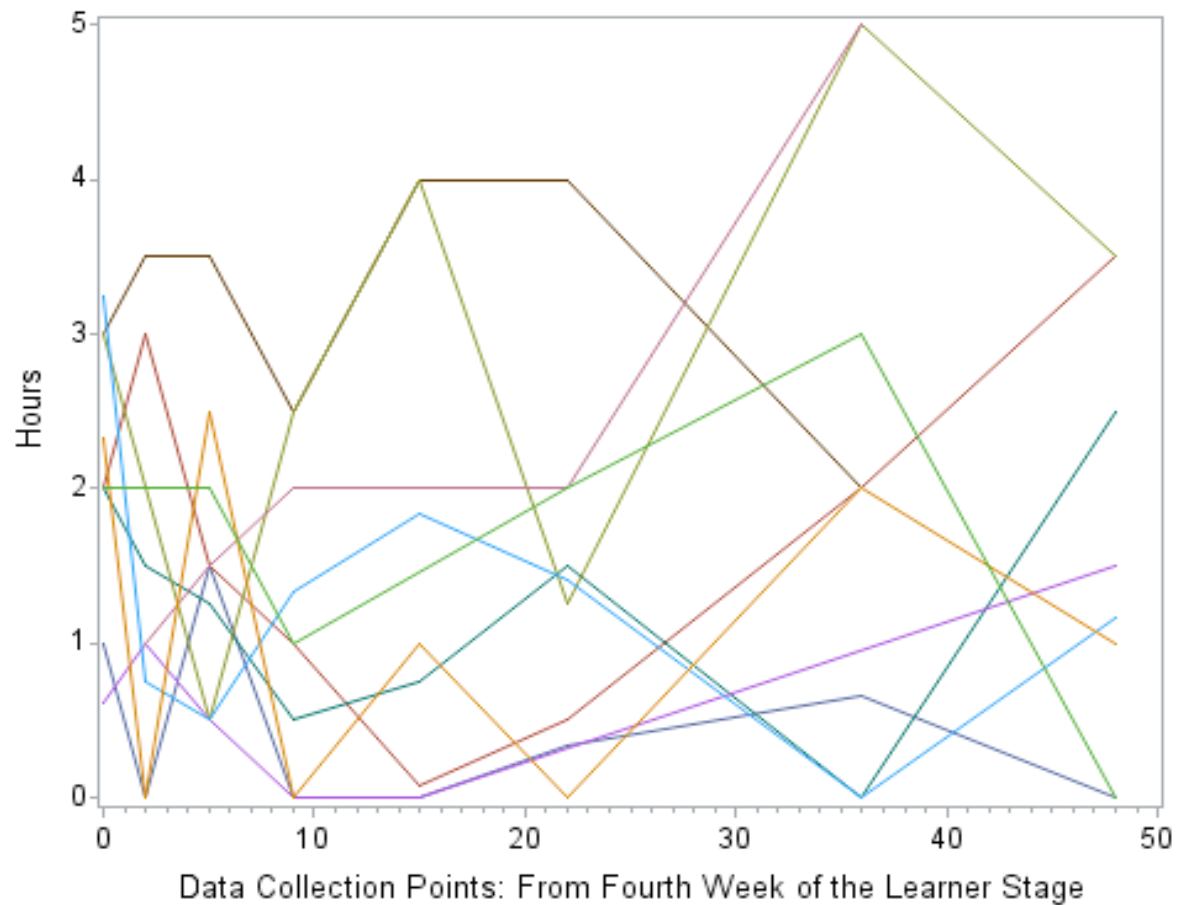


Figure 5.3 Plot of Individual Trajectories for Subsample of Participants (n=10)

Growth Curve Model Construction

An initial random effects ANOVA model was constructed to examine the intraclass correlation (ICC). The model estimated within-individual (Level-1) variance in supervised driving time was 0.3281 ($p < .0001$), and the estimated between-individual (Level-2) variance in supervised driving time was 0.1086 ($p = .0004$). The ICC was 0.2487, indicating that approximately 24.87% of the variance in time spent supervising driving practice was accounted for by differences between individuals (Bauer & Curran, 2010a; Raudenbush & Bryk, 2002). Four additional models then were constructed to examine models with: a) random intercepts; b)

random linear slopes; c) random quadratic slopes; and d) random cubic slopes. These models included fixed effects accounting for average patterns across the learner stage at Level 1 and random effects accounting for between-individual variances in the fixed effects at Level 2. Table 5.4 provides the random and fixed effects and standard errors for the first three of these models (excluding the model with random cubic slopes).

The random intercepts model was constructed to examine the effect of adding a random intercept term to the model; that is, allowing for variability across families with respect to length of supervised driving time reported during the third parent interview (at week 4 of the learner stage). The model estimated within-individual variance was significant ($p < .0001$), as was the estimated between-individual variance ($p = .0004$). The fixed effect for the intercept was statistically significant ($p < .0001$); therefore, the average length of time spent supervising teen driving at the start of the trajectory was statistically significant. The fixed effect of time as a predictor approached statistical significance ($p = .0531$).

Adding random linear slopes to the model did not result in model improvement. Although there was a statistically significant variance among the intercepts ($p = .0044$), the variance among the slopes was non-significant ($p = .1109$) and the covariance between the slopes and intercepts was non-significant ($p = .6093$). Random quadratic slopes then were added to the model, using a rescaled metric for time (i.e., time divided by 48 and mean-centered) to facilitate model convergence and parameter estimation. The intercept variance was significant ($p = .0013$) as was the quadratic slope variance ($p = .0443$); however, the linear slope variance was non-significant ($p = .1461$). All covariances between parameters were non-significant in this model. The fixed effect for the intercept was significant ($p < .0001$); however, the fixed effects were non-significant for the linear slope ($p = .4828$) and the quadratic slope ($p = .4350$). The model with random cubic

slopes had a significant intercept variance ($p=.0016$) and significant within-individual residual variance ($p<.0001$); however, all other random effects were non-significant. Although the fixed effect for the intercept was significant ($p<.0001$), all slope fixed effects were non-significant in the model with random cubic slopes.

Table 5.4. Random and Fixed Effects for Models with and without Random Slopes			
Covariance Parameter Estimates	Random Intercepts Model	Random Linear Slopes Model	Random Quadratic Slopes Model [†]
Within-individual Residual Variance	0.324 [§] (0.027)	0.306 [§] (0.028)	0.277 [§] (0.027)
Intercept Variance	0.108 ‡ (0.032)	0.114 ** (0.043)	0.183 ** (0.060)
Linear Slope Variance		0.0001 (0.0001)	0.225 (0.213)
Intercept-Linear Slope Covariance		-0.001 (0.001)	0.117 (0.088)
Quadratic Slope Variance			3.195 * (1.876)
Intercept-Quadratic Slope Covariance			-0.476 (0.286)
Linear Slope-Quadratic Slope Covariance			-0.578 (0.533)
Fixed Effects			
Intercept	1.051 [§] (0.065)	1.049 [§] (0.065)	1.082 [§] (0.076)
Linear Slope	0.004 (0.002)	0.005 * (0.002)	0.100 (0.143)
Quadratic Slope			0.322 (0.412)

[†] Estimated using rescaled values for time (time in weeks divided by 48) and centered at the mean of time in weeks to reduce multicollinearity between the linear and quadratic slopes.

* $p<.05$; ** $p<.01$; ‡ $p<.001$; § $p<.0001$

A plot of model-implied quadratic trajectories was examined to explore the mix of findings from the quadratic slopes model, specifically the significant random quadratic slope effect and non-significant fixed effects for the linear and quadratic slopes. As seen in Figure 5.4, quadratic growth patterns in this sample differed based on patterns of acceleration and

deceleration across time. Although many model-implied quadratic trajectories exhibited initial declines followed by accelerations, many other quadratic trajectories exhibited the opposite pattern. Collectively, these findings indicate that individuals changed with respect to their rates of change and acceleration in rates of change, but they did so in different directions (Chen & Cohen, 2006). Although this model provided evidence of between-individual variability in the model-implied quadratic slopes, the opposing quadratic growth patterns might have precluded indentifying a significant average linear or quadratic slope in this sample (Raudenbush & Bryk, 2002). Model fit statistics (i.e., Akaike's information criterion [AIC] and Bayesian information criterion [BIC]) were examined to compare the models with random intercepts and random quadratic slopes. Both AIC and BIC values were smaller (and thus preferable) in the model with random intercepts only, identifying that the model with random intercepts had improved fit over the model with random quadratic slopes. A non-significant likelihood ratio test comparing nested models indicated overall lack of improvement by including random quadratic slopes ($p=.1713$). Accounting for all information from examining trajectory patterns and findings from initial model construction, in concert with study aims, the model with only random intercepts was retained as the most appropriate growth curve model for subsequent examination of the effects of Level-2 predictors in this sample.

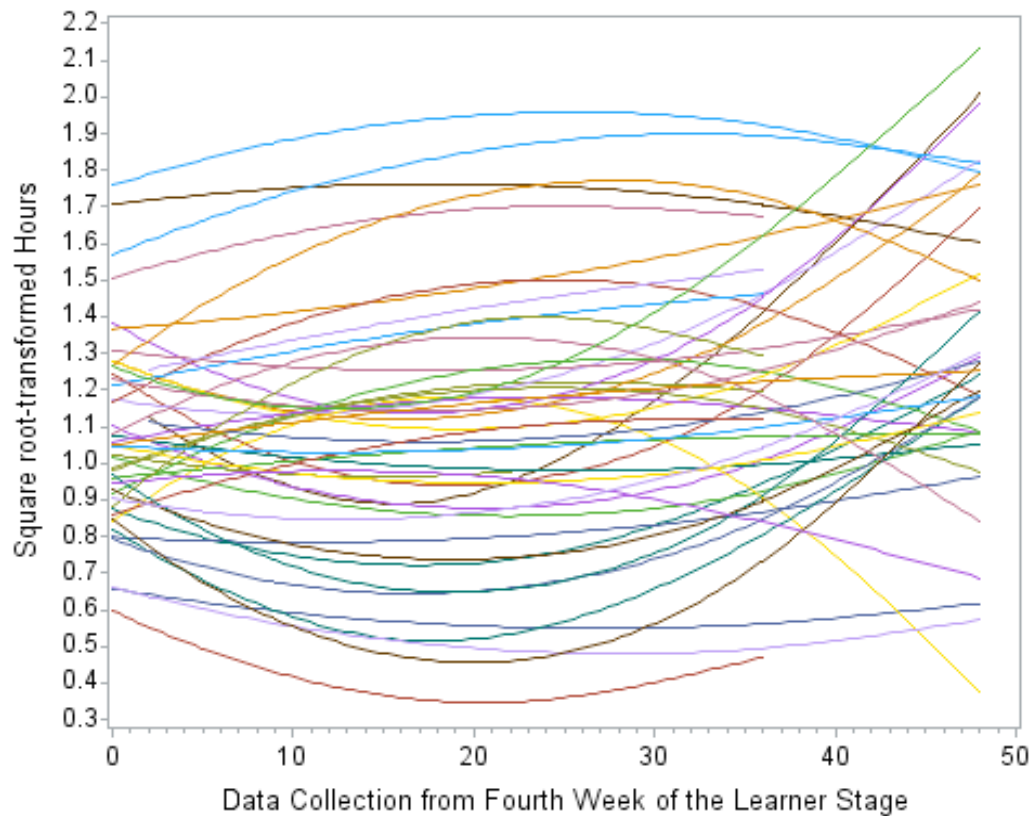


Figure 5.4 Model-Implied Quadratic Trajectories

Models with Time-invariant Predictors

Parenting Goals

Table 5.5 provides the model coefficients and standard errors from the random intercepts models with parenting goal predictors. There were no significant interactions between time and any of the predictors. In the initial model with only family characteristic predictors, the average intercept and average linear slope effects both were significant. In this initial model, there also was a significant effect for marital status indicating less driving and sex of teen indicating more driving time. The significance of this latter effect was not sustained in the subsequent model that included parenting goal predictors. In the model with the six parenting goal predictors, the intercept effect was significant, but the linear slope was non-significant. Whether the primary

driving supervisor was married was a significant predictor of between-individual differences.

The direction of this effect indicates that married supervisors provided less driving practice than unmarried supervisors. Also, whether parents established a goal for teens to acquire basic driving skills (in contrast to more specific and challenging goals) was a significant predictor of between-individual differences. The direction of this effect indicates that parents who reported this goal provided less driving practice than parents who did not report this goal.

Table 5.5. Fixed Effects for Random Intercepts Model with Parenting Goal and Family Characteristic Predictors (n=342 Level-1 observations; n=47 Level-2 observations)		
Intercept	1.154 § (0.220)	1.364 § (0.200)
Linear average slope	0.004 * (0.002)	0.004 (0.002)
Parent married	-0.351 * (0.150)	-0.349 ** (0.128)
Teen only child at home	-0.084 (0.125)	-0.194 (0.117)
Parent's first time as driving supervisor	0.078 (0.102)	0.073 (0.087)
Teen sex female	0.224 * (0.099)	0.112 (0.107)
Goal: Practice in a wide variety of situations		-0.051 (0.190)
Goal: Drive as much as possible		0.078 (0.130)
Goal: Gain awareness of driving environment		-0.081 (0.104)
Goal: Gain skills driving in challenging conditions		-0.129 (0.197)
Goal: Obtain basic driving skills		-0.406 ** (0.116)
Goal: Practice during routine trips		0.013 (0.087)

* p<.05; ** p<.01; † p<.001; § p<.0001

Parenting Style Dimensions

Table 5.6 provides the model coefficients and standard errors from the random intercepts model with parenting style predictors. In the initial model with family characteristics solely, the average intercept effect was significant, but the linear slope was non-significant. None of the family characteristic predictors were significant in this model. In the model with the two parenting style predictors, the intercept effect remained significant, and the linear slope remained non-significant. Parental responsiveness was a significant predictor of between-individual differences in supervised driving practice time. The direction of this effect indicates that higher levels of parental responsiveness were predictive of more supervised driving practice than lower levels of parental responsiveness. The interaction of time (in weeks across the learner stage) and responsiveness was non-significant. Parental demandingness was not a significant predictor.

Table 5.6. Fixed Effects for Random Intercepts Model with Parenting Style and Family Characteristic Predictors (n=302 Level-1 observations; n=42 Level-2 observations)		
Intercept	1.067 § (0.231)	1.191 * (0.537)
Linear average slope	0.005 (0.002)	0.005 (0.002)
Parent married	-0.287 (0.156)	-0.203 (0.144)
Teen only child at home	0.010 (0.138)	0.050 (0.130)
Parent's first time as driving supervisor	0.154 (0.106)	0.151 (0.098)
Teen sex female	0.169 (0.102)	0.140 (0.091)
Responsiveness		0.365 ** (0.107)
Demandingness		-0.054 (0.138)

* p<.05; ** p<.01; † p<.001; § p<.0001

Post-hoc Tests

Given the findings from initial modeling, and specifically the absence of significant average slopes, additional measures of supervised driving time were constructed and assessed for potential between-individual differences. These post-hoc analyses did not include modeling growth curves for these additional measures. A measure of the average hours of supervised driving across the learner stage was created using hours reported from interview three through ten. Similarly, a measure of total hours was created using the sum of hours reported during these same interviews. Considering that supervised driving time fluctuated across the learner stage, hours reported during three time periods were assessed to examine means and sums of hours during an early phase of the learner stage (i.e., interviews 3-5); a middle phase of the learner stage (i.e., interviews 6-8); and a late phase of the learner stage (i.e., interviews 9-10). Measures were examined to determine whether driving practice time differed between groups defined by the family characteristic and goal predictors included in growth models. Measures of driving practice time each were assessed using non-parametric Wilcoxon-Mann-Whitney tests given the non-normality of these dependent variable distributions.

Findings from Wilcoxon-Mann-Whitney tests identified statistically significant differences between parents who did and did not report the goal to have teens acquire basic driving skills. Parents who stated this goal reported significantly less average driving time ($p=.0010$) and total driving time ($p=.0010$) across the learner stage. Parents stating the goal to have teens get basic driving skills reported significantly less total driving time ($p=.0008$) and average driving time ($p=.0029$) during the early phase of the learner stage. Similarly, these parents reported significantly less total driving time ($p=.0068$) and average driving time

($p=.0067$) during the late phase of the learner stage. No additional family characteristic or parenting goal predictors identified significant differences in post-hoc driving time measures.

Discussion

A primary objective of this study was to examine driving practice time provided to teens across the learner stage, to identify an average pattern of driving practice. This study also sought to examine differences between individuals to determine whether they helped account for differences from an average pattern of driving practice across the learner stage. Guided by the Integrative Model of Parenting (Darling & Steinberg, 1993), distinctions from the average driving practice pattern were based primarily on the goals parents reported at the start of the learner stage and specific dimensions of parenting style—all posited to have potential effects on the quantity of supervised driving time teens received across the year. Overall this study was able to accomplish some of these objectives by examining supervised driving time differences between parents and examining between-individual differences based on parenting goals and style. However it was less feasible than anticipated to identify a satisfactory single average systematic growth pattern of driving practice. What this study was able to achieve was adding to the current understanding of whether differences between individuals—between families—are important considerations when accounting for how much driving exposure teens receive during the learner stage and whether specific facets of parenting might make a difference in how much driving practice time teens receive.

This study aimed to identify initially whether differences between parents are an important consideration with respect to how much driving practice teens are given across the learner stage. Indeed, findings from the initial model constructed indicate that between-

individual differences accounted for a substantial proportion of average driving practice time. Parents overall might provide less driving practice time than would be optimal; however, there is ample variability between families to merit considering what compels some parents to spend more time with their teens than others in supervised driving practice. Therefore, an initial contribution of this study is affirming the benefit of exploring between-individual differences during the overall pursuit of improving the understanding of the learner stage experience.

This investigation also aimed to add to the current understanding of what might prompt some parents to provide more driving practice time for their teens than others. This study posited to accomplish this objective by identifying an average pattern of driving practice over time—that is a systematic growth trajectory—and to assess between-individual differences from the average pattern. An important finding from this study is that there were substantial fluctuations observed within families in driving time provided. Consequently, assessing a systematic growth pattern of driving practice time, accounting for different rates of change across the learner stage, was not possible. However, it was possible to examine differences from an average trajectory that allowed for each family to have its own intercept value of supervised driving time. This allowed for identifying significant differences between individuals based on goals, parenting style, and family characteristics. Although limited from examining distinctions in rates of change, differences in the random intercept model provide insight into important distinctions between parents based on parenting goals and style dimensions.

Findings Interpreted through the Lens of the Integrative Model of Parenting

Parenting Goals

According to the Integrative Model of Parenting (Darling & Steinberg, 1993), the goals parents have for supervising their teens' driving during learner stage should motivate the practices they enact when supervising their teens. More specific and challenging goals should lead to greater levels of achievement (Locke & Latham, 2002; Latham & Locke, 2007). Although nearly all parents reported goals, the types of goals differed considerably. Several goals included in this study were fairly specific and challenging, and others were more generic and required achieving less arduous objectives. One important finding from the analyses is that parents who reported a goal for teens to get basic driving skills—a goal considered more generic and less challenging—provided less driving practice. Additionally, most parents who reported this goal did not report other goals related to gaining skill driving in challenging conditions or gaining broader awareness of the driving environment. Some parents reporting a goal for teens to get basic driving skills might not have considered additional benefits teens could have reaped by having more practice time overall and in varied driving conditions. Therefore, setting a less rigorous goal for the learner stage appears to have hindered providing teens with experience behind the wheel.

Another interesting finding is that none of the four goals hypothesized to predict more driving practice time had significant effects. All of these goals were considered fairly specific and conveyed a relatively high degree of challenge with respect to goal achievement. Among these goals, perhaps the greatest surprise was that driving practice time was not significantly different for parents reporting a goal to have teens drive as much as possible than for parents not reporting this goal. This goal was extremely specific to the target parenting practice of providing

teens with driving practice time, and this goal appeared to imply an understanding of the commitment needed to provide practice time across the learner stage. Although other goals were less specific to driving time, the goal to have teens drive as much as possible appeared the ideal goal to match the outcome of interest. However, the remaining three goals considered to be specific and challenging also all seemed to necessitate teens receiving a lot of time behind the wheel. That raising teens' awareness to the broader driving environment and gaining experience and skill in varied and challenging driving conditions did not help identify significant between-individual differences was counter to expectations.

The lack of significant parenting goal predictors of more driving practice time might reflect that goals reported at the start of the learner stage should not be expected to have enduring effects on the quantity of supervised driving conducted. Therefore, it might be unrealistic to treat parenting goals stated at the start of the learner stage as time-invariant. Some findings indicate that establishing proximal goals in concert with more distal goals, the latter akin to those examined in this study, bolsters achievement of long-term objectives (Latham & Brown, 2006). Consequently, it might have been useful to ask parents to share their goals for the first month (or first few months) of the learner stage in addition to more distal goals reflecting the entire year.

The findings from this study confirm the complex nature of goals and goal setting. It is likely that many parents in this sample had not given much consideration to short-term, intermediate, and long-term goals, how their goals and expectations might evolve, and what they wanted their teens to acquire with respect to knowledge and skills at different points throughout and by the end of the learner stage. Some parents might not have had ample time to consider plans and goals for the learner stage before the initial interview. Parents also might not have

considered the level of effort that would be required to achieve goals they stated; this might have been especially true for parents without prior experience as driving practice supervisors.

Additionally, parents in some families with shared supervision might not have shared some goals. Driving practice time might have been discordant with goals in some of these families in which the parent reporting goals during the initial interview was not the parent conducting the majority of supervised driving. It would be useful in future research to examine parent goal-setting more comprehensively by asking parents more specific questions about goals and revisiting goals at regular intervals to identify changes during the course of the learner stage. Because goals might have changed over time, perhaps more so for some parents than others depending on a variety of factors (e.g., parent-teen interactions; parent perceptions of teen ability), future studies might try to account for evolutions in goals across the learner stage to determine whether goals change and, if so, whether supervised driving time changes as a result.

Parenting Style

The analysis also identified parental responsiveness as a significant predictor of between-individual differences in the trajectory intercept. This result converges with findings that parent-reported general support of teens was significantly related to a higher level of reported hours of supervised driving practice (Jacobsohn et al., 2012). Although not theorized by the Integrative Model of Parenting to have a direct influence on parenting practices (Darling & Steinberg, 1993), the finding that higher levels of parental responsiveness were predictive of increased time spent supervising driving practice is congruent with what might be expected for parents providing a more responsive, supportive climate for driving practice. These parents might have had teens who were more willing to spend time participating in supervised driving practice.

Given that goals hypothesized to predict more driving practice time were not significant, one consideration is that a supportive driving practice environment instilled through greater parental responsiveness was more salient for driving practice than specific and challenging goals. Because parenting style reflected teens' interpretations of parent-teen interactions over a lengthy period preceding the learner stage, it might be reasonable to expect teens with more responsive parents to find driving practice with their parents more appealing from the outset of the learner stage.

Teen Willingness

As noted, one potential explanation for the lack of significant parenting goal predictors relates to the interactions between parents and teens. Although parents reported little information regarding if and how they communicated with their teens about goals for the learner stage, some parents reported during interviews that their teens were extremely eager to practice driving. Other parents struggled to get teens to practice, and some teens reportedly had no interest in driving practice. A review of interviews with zero hours reported identified that more than half resulted from teens' lack of interest in driving practice. More than one-quarter of weeks with zero practice hours were the result of lack of opportunities to drive (e.g., teen recovering from surgery; teen away). Parents acknowledged limiting teens' driving practice in fewer than 20 percent of interviews with zero practice hours reported.

Although reports of zero hours appear to be the result of different factors, as a whole they help explain the high degree of variability within families across the learner stage that might have precluded identifying a single pattern of systematic growth. These findings, in concert with findings from examining parenting goals and style dimensions, also emphasize the need to examine supervised driving as a bidirectional process across time, accounting for teens as well as

their parents in ongoing research and intervention planning. Parents might provide the keys to the car and serve in their roles as supervisors, but how should they be expected to supervise teens who are disinclined to practice? Future research could help further elucidate the challenges in parent-teen interactions germane to supervised driving practice, and to help provide parents with better guidance regarding these interactions.

Family Characteristics

Contrary to expectations, findings indicated that teens with married parents had significantly less supervised driving than teens whose primary parent supervisors were unmarried. This finding is in contrast to the hypothesized direction of this effect and findings from a prior study (Jacobsohn et al., 2012). However, marital status itself did not guarantee that multiple supervisors would oversee driving practice. Interviews confirmed that multiple adults (e.g., both parents from a divorced marriage) supervised some teens with unmarried parents. Additionally, interview data confirmed that in some families with married parents only one parent conducted the majority of supervision. That married supervisors provided less supervised driving time also might be related to other family characteristics or dynamics between teens and parents in this sample.

Within-Individual Fluctuation

A key finding from this study was the considerable within-individual fluctuation observed in the individual trajectories. Although it was feasible to assess between-individual differences in the random intercept model, more informative growth modeling likely was restricted by these fluctuations and the consequent limited systematic change available for analysis (Hoffman, 2013; 2015). As a result, this study highlighted the limited utility of growth

curve modeling for these data, given the within-individual fluctuations observed and that supervised driving practice time does not appear to be a developmental process. That considerable within-individual variation would preclude identifying a single average trajectory is reasonable given the considerable distinctions between time points with respect to driving practice that were reported across parent interviews and that coincided with various reported facilitators and barriers to driving practice that parents described during interviews. These ongoing fluctuations accounted for weeks when no driving practice occurred (e.g., when teens were unwilling to drive; when there were no actual opportunities to drive) and times when many hours were reported (e.g., long-distance road trips during family vacations). These upswings and downswings in the amount of driving time provided might reflect the actual experiences of most families in the broader population of parents and teens during the learner stage, for which there likely are week-to-week shifts up and down in the quantity of driving practice time teens receive. Therefore, rather than trying to model systematic change in driving practice time, it might be more useful to further understand the causes of fluctuation across time and help parents account for these causes of fluctuation (e.g., within-person variation models to describe patterns of variances and covariances over time versus describing between-individual differences in average systematic change [Hoffman, 2013; 2015]). It would be an important message to provide parents that, while the learner stage seems long, let your teen drive as much as you can when you can, given that there likely will be unanticipated obstacles to driving practice at various points across the learner stage.

In addition to the within-individual fluctuations observed in the individual trajectories, the plot of model-implied quadratic trajectories provides an indication that these opposing curvilinear patterns might have negated identifying an average growth trajectory beyond the

random intercept model. This might be an indication that identifying a single significant average trajectory was less achievable for this sample. Future analyses could aim to establish whether multiple latent growth trajectories are observable and plausible for this sample and in the broader population of parent supervisors; however, the rationale for constructing growth mixture models should be considered carefully (e.g., given the potential to over-extract latent groups) (Bauer & Curran, 2003a; 2003b).

Study Limitations

A primary limitation of this analysis was the small sample of families included. The concept of "person-by-time observations" is important when determining whether an investigator has a sufficient sample of data points to conduct growth curve analysis (Curran, Obeidat, & Losardo, 2010). The overall sample sizes including 342 person-by-time observations for examining parenting goals and 302 person-by-time observations for examining parenting style likely were adequate; however the Level-2 samples of 47 and 42 parent supervisors were smaller than optimal. Although growth curve models can be fit to small samples, it may be preferable to have a Level-2 sample size of at least 100 individuals (Curran, Obeidat, & Losardo, 2010). Although the overall sample size was sufficient for modeling and identifying significant main effects for certain predictors, the Level-2 sample size may not have been sufficient to identify cross-level interactions between time-invariant predictors and time (Kwok, Underhill, Berry, Luo, Elliott, & Yoon, 2008). In addition, marital status—identified as a significant predictor in the larger sample used to examine parenting goals—was not significant in the analysis of parenting style that made use of the reduced sample. This difference is useful in highlighting the

sensitivity of the findings to the small Level-2 sample and confirms the need to re-examine predictors using a larger Level-2 sample of families.

Additionally, the sample of families who agreed to participate in the original driving study is not fully representative of the greater population of parents and teens in North Carolina or the United States (Goodwin et al., 2010). There might be something unique about parents who consent to have their driving environments videotaped for a period of several months, and the families included in this analysis were skewed overall toward greater affluence and educational attainment (Goodwin et al., 2010). Therefore, it is possible that if other parents had been recruited for the study, findings might have been different.

Additional Research Needed

Additional exploration of between-individual differences, coupled with a better understanding of how parents use driving practice time, has the potential to shape specific interventions. Such interventions might motivate parents to set and revisit specific goals that could result in giving teens more practice time across the learner stage. Interventions could help parents identify driving practice times that fit within their and teens' busy schedules (Jacobsohn et al., 2012), and consider how to overcome challenges with respect to teens who lose interest in driving practice during the course of the learner stage (Goodwin et al., 2010). It also would be important for future research to examine how driving time is used. For example, are parents who are providing more driving practice also providing teens with exposure to a wide variety of challenging conditions (e.g., rain) and situations (e.g., heavy traffic) or are they providing consistent exposure to relatively benign driving environments (Simons-Morton & Ouimet,

2006)? As noted, future research also should account for teen willingness and the bidirectional relationship between parents and teens across the learner stage as related to supervised driving.

Conclusion

This study highlighted the usefulness of the Integrative Model of Parenting (Darling & Steinberg, 1993) to guide analyses of parenting practices related to teen driving (specifically, supervised driving practice time during the learner stage) and confirmed the need to explore the complexity of relationships between parenting goals, parenting style, teen willingness, and the parenting practice of supervised driving practice time provided to teens during the learner stage. This study identified parenting goal and parenting style predictors of differences in the quantity of driving practice time teens received during the learner stage of graduated driver licensing. Ultimately, greater parental responsiveness was predictive of more driving time and the more generic (less challenging) goal for teens to acquire basic driving skills was predictive of less driving time.

These findings indicate that lack of ambitious goal setting and elements of parenting style might influence the quantity of supervised driving practice provided to teens. Additional exploration of time points with zero hours also confirmed that teen willingness to participate in driving practice plays a substantial role in determining how much driving practice teens receive. Ongoing research is needed to account for the influence of teens as well as parents on how much practice time teens receive during the learner stage. Intervention planning also should account for ebbs in driving practice across the learner stage and the need to account for teen willingness to practice as well as parents' best intentions get teens behind the wheel.

Considering the combination of findings from initial model construction in concert with the purpose of this research to examine potential between-individual differences in the average trajectory, the model with random intercepts was determined to be most appropriate for these data. Considerable within-individual fluctuations in driving practice time, precluded assessing a model of between-individual differences in a single average trajectory allowing for random slopes. Therefore, future research should consider alternative measures and methods for analyzing differences between families with respect to driving practice time across the learner stage.

CHAPTER SIX: SYNTHESIS OF FINDINGS, SIGNIFICANCE AND IMPLICATIONS FOR RESEARCH AND PRACTICE, AND DISCUSSION OF STRENGTHS AND LIMITATIONS

The purpose of my dissertation was to explore differences between parents with respect to how they prepare teens during the learner stage of graduated driver licensing (GDL) and conduct supervised driving practice for their teens. My dissertation was designed to address gaps in what we know about how parents approach and facilitate the learner stage because teen crashes rise dramatically after the learner stage (Lewis-Evans, 2010; Mayhew, Simpson, & Pak, 2003; Shope, 2013; Twisk & Stacey, 2007), parents are largely unaware of how to manage the learner stage (Mirman & Kay, 2012), and parents do not take full advantage of the stage (Goodwin et al., 2006; 2010; 2014; Tronsmoen, 2011).

Principally, I focused my dissertation on different aspects of parenting practices—specific parent behaviors and communication—to identify meaningful differences between parents that would help advance our understanding of what parents are doing. Using the Integrative Model of Parenting (Darling & Steinberg, 1993), I also aimed to identify theory-driven relationships between parenting practices and predictors and facilitators of practice that could improve our understanding of how and why parents behave and communicate in different ways with respect to preparing teens during the learner stage. Given relationships specified by the Integrative Model of Parenting, I also anticipated that how parents facilitated the learner stage would influence teens' interest in driving practice and subsequent independent driving

behaviors. Through my dissertation research, I was able to address each of my three specific aims:

- *Develop a typology of parenting practices for supervised driving and examine it relative to parenting style dimensions and parenting goals for supervised driving and the learner stage.*
- *Examine relationships among parenting practice typology groups and teens' independent driving behaviors during the start of the intermediate stage of GDL.*
- *Assess between-parent differences in the average trajectory of time spent supervising teen driving practice across the learner stage.*

By addressing these aims, I was able to identify that salient differences exist between parents and across groups of parents with respect to the learner stage and driving practice supervision.

Public Health Context

The findings from my dissertation research extend prior insights regarding what parents are doing to prepare teens during the learner stage for subsequent independent driving. Foremost, the typology of parenting practices identified one group with a largely ideal constellation of parent behaviors and communication. The smallest of the five groups exhibited this pattern of practices, supporting the notion that few parents take optimal advantage of the learner stage. This group of independence promoters and the group of conscientious adapters both had patterns of parenting practices that could be seen as useful in preparing teens during the learner stage, and parents in these groups provided teens with considerably more driving practice time on average than parents in the other three groups. Although practice time itself might be insufficient to prepare teens for independent driving, the combination of elevated time behind the wheel,

greater exposure to challenging driving conditions across the learner stage, and a push toward independent learning likely helped these teens be better prepared for the intermediate stage than teens with parents in other groups. The two teens with parents in the independence promoter group also had parents who communicated with them to raise their awareness of the broader driving environment, with attention toward helping teens learn to anticipate challenges in certain situations. Therefore, parents in this group appear to have done the best job to prepare teens during the learner stage—evidenced by how parents facilitated supervised driving and that the teens in this group exhibited the safest driving during the start of the intermediate stage (e.g., lowest proportion of serious driving incidents).

Integrative Model of Parenting

The Integrative Model of Parenting (Darling & Steinberg, 1993) provided conceptual guidance for my dissertation research from development of study aims and research questions to the analysis and interpretation of findings. The model helped in developing my dissertation around the central focus on parenting practices, given the need to address the gap in our understanding of how different parents behave and communicate with teens during supervised driving across the learner stage. The orientation of parent and teen constructs theorized by the Integrative Model of Parenting helped determine how to study the potential influence of goals and parenting style on parenting practices as well as plausible influences on teen outcomes.

The Integrative Model of Parenting helped guide my examination of goals as predictors of parenting practice patterns and time spent supervising driving practice across the learner stage. Although few parenting goals were predictive of parenting practices, in both the qualitative assessment and the growth curve model, the finding that some parenting goals were predictive is

important given that interventions might be more effective by targeting goals as well as specific patterns of behavior (Jackson & Dickinson, 2009; Mirman, Albert, Curry, Winston, Thiel, & Durbin, 2014). The findings also suggest ways that parenting goals should be strengthened for some parents. As described in the growth curve analysis, the one significant parenting goal effect was a generic, unambitious goal that was predictive of less driving practice time. Therefore, parenting goals could be strengthened to help parents set more specific and challenging goals (Locke & Latham, 2002; Latham & Locke, 2006) and to set more proximal goals for achieving objectives during shorter time periods during the learner stage (Latham & Brown, 2006). Findings from my study also highlight the need to help parents understand the connections between the goals they establish, the opportunities they provide teens during the learner stage, and how well teens might be prepared for independent driving.

Findings from my analysis of parenting style dimensions also are important to consider with respect to ongoing research and intervention development. That the typology group with parents who reported adapting practices to improve driving practice and provided the greatest quantity of average practice time had the highest levels of both responsiveness and demandingness is a key finding and converges with what would be theorized by the Integrative Model of Parenting (Darling & Steinberg, 1993). These parents likely provided teens with the optimal environment for driving practice. The finding that higher levels of responsiveness were predictive of increased length of time in driving practice during the learner stage should be re-examined in future studies and a consideration in promoting parental responsiveness to teens during driving practice. This finding from my analysis converges with similar findings, indicating that more responsive parents were in reportedly more mutually supportive relationships with their teens which, in turn, were associated with parents having greater

intentions to get teens out for driving practice (Mirman, Curry, Wang, Thiel, & Durbin, 2014). Collectively findings from my dissertation and from Mirman, Curry, et al. (2014) highlight the need to account for the climate for driving practice that is influenced by parenting style. Findings also emphasize the importance of considering the influence of bidirectional relationships between parents and teens with respect to supervised driving.

Avenues for Intervention and Research

The most critical intervention developed to-date to prevent young driver crashes is GDL, and the learner stage provides parents with the opportunity to shape teen driving before teens are on the road without supervision. The findings from my study affirm that different approaches might be needed to help different parents make the most of their time during the learner stage to prepare teens for independent driving. Although not practical or even feasible to identify parents fitting within a given typology group prior to the learner stage, typology group descriptions could be used in interventions to help parents identify different example patterns of communication and behavior. For example, typology group descriptions could be provided as vignettes, shared with parents as they begin supervising their teens during the learner stage. These vignettes could help parents identify ways in which they might be inclined to behave and communicate and to help them tailor their practices to prepare teens as thoroughly as possible. Interventions also should be designed to be flexible and adaptable to address the needs of different types of parents at the start and throughout the learner stage. Given that goals are posited to have a direct and important influence on parenting practices, interventions that focus on goal setting could provide parents with a helpful roadmap for the learner stage. As goals may need to evolve across the learner stage, parents should be encouraged to revisit, revise, and

establish new goals. Parents also should be encouraged to set stronger, more ambitious goals if necessary. Goals also should be reviewed in concert with parenting practices at regular intervals to help parents assess progress toward achieving goals. It also might be beneficial to involve teens in goal-setting, assessment of learner stage experiences in concert with goals, and re-assessment of goals and plans for practice.

The learner stage provides a ripe opportunity for these collaborations, as parents and teens generally appear to enjoy their time together during the learner stage (Goodwin et al., 2006; 2010) and communicate frequently about driving during supervised practice (Goodwin et al., 2014). Given that parents in one typology group reported making a deliberate effort to change some parenting practices to improve the experience of supervised driving, it would be useful for interventions to promote dialogue between parents and teens and help parents appreciate the value of being flexible to make adjustments as needed. Adapting throughout the learner stage might help parents facilitate a climate and experience for driving practice that are both appealing to teens and useful in preparing them for independent driving.

Interventions also should aim to improve and evaluate the amount of learning that occurs during the learner stage, given that actual learning might be very limited (Foss, 2007; R. Foss, personal communication, December 19, 2014). The rise in crashes during the start of independent driving (Lewis-Evans, 2010; Mayhew, Simpson, & Pak, 2003; Shope, 2013) underscores the urgency in better understanding what learning occurs and whether learning occurs differently for teens with parents exhibiting different practice patterns. This also provides an important area for future research.

It would be useful to re-examine the parenting practice groups identified to determine whether they are distinguishable in a larger sample, and if and how different types of parenting

goals might be more predictive of patterns of parenting practices. Future research also should assess further what patterns of parent behavior and communication during the learner stage are more likely to promote subsequent safer teen driving upon licensure. Although my dissertation illuminated some of these differences, it would be important for future studies to examine further whether some teens are less likely to be involved in crashes based on the patterns of parenting practices to which they were exposed during the learner stage. It also would be useful for future research to examine potential inter-individual differences that may account for distinctions in parenting practice patterns. Although I was able to identify some predictors of between-individual differences in a trajectory of supervised driving time, additional analyses of predictors of behavior and inter-individual differences will add to the current understanding of what compels parents to engage in certain parenting practice patterns. In turn, this might help in the design of interventions.

Strengths and Limitations

My research had a few important strengths and limitations. Foremost among the strengths, I conducted longitudinal analyses of parenting practices, incorporating data from multiple sources to identify patterns across time and develop a thorough understanding of parenting across the learner stage. Conducting these longitudinal analyses involved a mixed-methods analysis, with respect to the methods applied and data analyzed across study aims. Development of the typology involved predominantly qualitative methods, although certain data accounting for the quantity of exposures to challenging driving conditions were transformed and incorporated into narratives during analysis (Caracelli & Greene, 1993; Sandelowski, 2000). In addition, the analysis of parenting style was conducted by examining means of responsiveness

and demandingness across the qualitatively-derived typology groups. In a similar manner, data for means of time spent supervising teen driving and proportions of teens' independent driving behaviors were examined across the typology groups. In addition, parenting goals analyzed from qualitative coding of parent interview data were incorporated as predictors in quantitative growth curve modeling to assess between-parent differences in the average trajectory of driving practice time across the learner stage.

The sample included in my dissertation overall was small for some of the analyses I conducted, in particular the small numbers in each typology group from which I assessed differences by goal, parenting style, time spent supervising driving, and teens' independent driving behaviors. The sample was small yet adequate for conducting the growth curve modeling analysis. However, the sample size was more than adequate for conducting the in-depth qualitative analysis of parenting practices to identify patterns of practices and develop the typology. The sample from the UNC Highway Safety Research Center's (HSRC's) study of the learner stage also was not fully representative of the larger population of parents and teens in North Carolina or the United States (Goodwin et al, 2010). Families in the HSRC study were more affluent and less racially diverse than the general population and parents reported a higher level of educational attainment than is typical (Goodwin et al., 2010). There also might be something unique about parents who consent to have their driving environments videotaped for a period of several months. As a result there may be limited generalizability of my findings. Although it would be implausible to draw firm conclusions regarding parents and teens, the strengths of the qualitative methodology and quantitative growth curve modeling analysis permitted me to explore the relationships between parenting practices and identify plausible differences between and across groups of parents. As with any study, findings should be

subjected to further scrutiny in future research with different samples. However, findings from my study are informative about how to focus additional research with other samples and to consider the application of the typology to potential development of interventions for the learner stage.

There also were some limitations in my use of the video clip data in assessing parenting practices. Although video recording of driving was ongoing while cameras were installed in designated vehicles, specific video clips were saved solely for driving events where the g-force threshold was exceeded (Goodwin et al., 2010). Therefore, I reviewed many video clips in which driving events were benign (e.g., occasions when a teen drove over a curb built into a driveway) and in which there were no interactions between parents and teens. It also is possible that the video clips were not representative of the typical supervised driving experiences for a given parent and teen; especially if they drove together frequently but few clips were saved (i.e., if the g-force threshold was not exceeded frequently). These limitations noted, the video clips provided direct observation of a phenomenon that otherwise would be extremely challenging to study directly. Therefore, I analyzed the video clips with the caveat that they might not be fully representative of the supervised driving experience but with the notion that they would be informative as a complement to the data from other sources and to help triangulate findings from the parent interviews and teen questionnaires.

Conclusion

Findings from my dissertation research indicate that parents are not a homogenous group with respect to behaving and communicating with teens during the learner stage.

Ultimately differences between parents should be taken into account in the design of interventions and during future research. Findings from my research also affirm the urgent need to consider the influence of teens on the learner stage and supervised driving experiences.

Although I did not analyze teen willingness directly, I was able to elucidate ample support to conclude that parents are not solely accountable for the experiences and exposures teens receive during the learner stage. By adopting a more nuanced understanding of how to intervene with parents, allowing for flexibility and adaptability as well as the bidirectional relationship between parents and teens, interventions might be more effective in compelling a more comprehensive learner stage experience and greater preparation of teens for independent driving.

APPENDIX A: QUALITATIVE ANALYSIS CODEBOOK

Process Code Name	Code Definition	Example Of Coded Text From Interviews
Advising general	Parent provided general driving advice before or during practice driving session; parent reported discussing a specific driving issue with teen	Before he started driving tonight in the parking lot, I said "Ok, before you go anywhere- what do you need to watch for?"
Chatting (non driving)	Parent talked with teen about non-driving topics (e.g., school, work, sports, peers)	We continue to have conversation about her day, and what she's doing, and what's doing after school, and what her plans are. Um, how school's going, um, talking about 3 weeks left of classes, staying focused, summer's not here, and at the same time, other times, talking about her summer, and what the plans are.
Constraining communication	Parent reported intentionally refraining from communicating with teen (e.g., to let teen drive without instruction to reduce conflict, to promote independence, to reduce distractions)	I kept guarding my tongue to go "Okay, you better change lanes soon, 'cause you have to turn right, and you're in the left lane," but he did fine / Oh very much so on purpose. I wanted to see how he did without any instruction
Creating relaxed/positive atmosphere	Parent reported maintaining a relaxed atmosphere in the car, talked respectfully with teen, stayed calm	You'll love some of the footage whenever we pull up in front of our house. She slams on the breaks, and we both do one of those 'try not to hit the dashboard things' Then we both laugh- 'cause she didn't crash the car / Well, I think you've got to be calm- I mean, and you can't constantly talk at 'em, you gotta- you gotta let 'em drive along, and kind of see what they're doing, and obviously not be too critical because they're pretty sensitive about being criticized, so I always try to keep it in a positive tone, like "Oh- you know, you tried a lane change, and there was someone there- and those kinda things happen to all of us, so here's what you need to do the next time. You know- so not to make it, you know, like she feels like she's gonna get yelled at, or somebody's gonna be overly harsh or critical with her.
Creating stressful/negative atmosphere	Parent reported promoting a stressful atmosphere in the car, being critical of teen, arguing with teen, losing patience with teen, making teen nervous	'cause when I tell him stuff before, and you do it again, I just get kinda frustrated- "I've told you this a couple of times before and you still don't listen to me. I talk about complete stops- you do have to- will have to stop. And he like to stop and immediately take off. You gotta wait for like five seconds or so. Yeah.
Creating/expanding opportunities	Parent reported creating opportunities for teen to practice driving that require finding alternative routes or planning for changes in schedules to help teen practice where and when parent is comfortable / Parent sought to find times to engage in practice driving outside of typical daily/weekly routine	We've done a little bit more road driving. For example, she drove for 2 hours coming back from Kinston yesterday / We went out to the movies, and he drove home- cause that was nighttime. I said "try some nighttime driving,

Process Code Name	Code Definition	Example Of Coded Text From Interviews
Debriefing	Parent reported talking with teen after driving practice session about how teen handled a specific driving situation or driving practice more generally	When you're done just give them feedback / Just because in the moment, he still has all the feelings attached to it- like my heart in my throat- we could have gotten him, or we could have done this- but take the emotion out of self, and just talk about the overall theme- just reflecting back on it, and hopefully he can hear it- but I realize that I don't do it that much.
Declining opportunities	Parent reported declining when parent thinks teen not able to handle practice driving (e.g., teen too tired) OR when parent not interested in supervising (e.g., hassle, in a rush, don't want to waste gas)	It was yesterday, matter-a-fact, we were going to football practice. And it was like 4:35, and I had to pick him up and try and get there by 5, I said "no, [TEEN], you can't drive today." You know. / No, no sometimes I just say no because I am just lazy. [Laughter] I just don't feel like doing it right then.
Directing	Parent reported co-driving or giving teen step-by-step instructions; Providing teen with driving directions (i.e., where to go) or specific vehicle operations	so I'd say, "Coming up there's going to be a stoplight- you're gonna go through the stoplight." So, I kind of would tell her what's coming up. And there was one kind of unusual intersection that we came to, so I had to get her in the right lane and through the intersection, and then there's an immediate left hand turn, and so I kind of guided her through that. / I direct him what's coming up, 'cause he hasn't driven that route yet, when he's got to move over or turn or whatever.
Dismissing	Parent identified something teen need to work on to improve driving, but parent acknowledged not having discussed it with teen or not working on it with teen	I think she got passed it. We don't really talk much. We don't really talk to [TEEN]- [TEEN] knows everything (laugh) / He knew- I don't know- I'd have to ask him- why he did that.
Encouraging/praising	Parent reported giving teen praise or other encouragement to help teen know when teen did well and to build teen's confidence	Whenever she makes a good, safe movement, then I give her praise / Just be patient. Tell 'em it does get better and I'm still of the school that encouragement and positive reinforcement is better than anything else. So, like if he does notice something I will compliment him on "You responded well to that situation" or "I'm glad you saw that person getting ready to pull out in front of you and responded appropriately." I think catching them doing the right thing builds their confidence. So it's not always a negative feedback that their getting.
Focusing parent attention elsewhere	Parents reported doing other things besides observing and attending to teen's driving (e.g., talking on phone, reading a book)	I'm okay for most- for the most part. I mean, I can read a book, or do other things while he driving for the most part, I'm okay. / I just let him do it, I don't pay terribly close attention to what he's doing, 'cause I feel like he's able to do it
Giving teen the driver's seat	Parent let teen drive whenever teen and parent in car together; Parent reported letting teen drive in any situation to be encountered (including challenging conditions, such as rain, interstate, or heavy traffic); Parent asking or pushing teen to drive when teen not requesting	I let her- anytime anywhere.....I don't think I've stopped her. No. Not- nope. / Yeah, it's been, usually if I say, "You want to drive? / Sometimes I just (missing word) to the passenger seat and let him drive

Process Code Name	Code Definition	Example Of Coded Text From Interviews
Guiding	Parent provided guidance to raise awareness about driving in specific conditions and to anticipate various situations	So, I told him- more likely it will, I will tell you. So, you can't always assume someone is turning 'cause their signal is on- 'cause they don't do it all of the time. So you got to be very careful of that. / I think it's still related to being aware of traffic and what may happen. Sometimes she has right of way but I'm pointing to her that she has to look at other cars who may not be aware of the fact that she has right of way. So, we're talking about it. You know, although it's your turn to go, you still have to look for other cars when they cut you in traffic. And there are other things – nothing that pops into my mind. But we do get discuss the situations on the road.
Instructing non-verbally	Parent used non-verbal gestures, cues to provide teen with instruction	That's right, I'm definitely not saying anything. I just have this finger motion that I do. / I think just doing what she asks me to do like don't say left and, now I'm pointing. She told me what to do and it makes me better
Limiting exposure	Parent reported limiting teen from driving in situations where parent doesn't think teen is ready / limiting teen from driving in situations due to parental fears of teen having such exposures / limiting (or not pushing teen) when teen not interested in trying new, perhaps more challenging, driving condition	Well, all of them are- she literally would love to drive everywhere that we have to go, but uh, for example, 2 weekends ago, I drove to Greensboro. I wasn't ready for that- I wasn't ready to let her be the driver. / and when there's an opportunity for him to drive, it's probably not a good time of day for him to drive / a couple of weekends ago, My brother was here and we were going somewhere. Oh, I think we were going somewhere in downtown Durham, and I said "you don't know where you're going and there's three other people in the car. You're not driving."
Modeling/showing teen how	Parent modeled driving situations while parent driving; Using props to show teen something about driving; Discussing parent's driving while parent behind the wheel	And when asked today when I was driving, I (missing words) Home, and said, "I want you to watch what I do, and I'm gonna explain the reason why I'm doing what I'm doing what I'm doing." So that she can mimic it the next time we drive.
Negotiating/modifying practice	Parent reportedly changed the way parent handled practice driving based on interaction with teen	Well, we're just continuing to stay with it, and continuing to practice, and the learning process, and we were able to do... she was able to give me feedback about what I was doing that wasn't helpful to her, and I've given her the same, and we have an understanding, and we'll keep practicing
Policing practice/threatening consequences	Parent reported establishing and enforcing rules for supervised driving and even threatening and delivering consequences for violating rules	No. I did find myself- and whenever you get this video tape, it's going to be quite interesting, I did find myself getting so frustrated that I threatened that I wouldn't let him drive. Which I never thought I would do.
Practicing specific	Parent facilitated driving practice to give teen practice to develop certain skills or to provide teen with added exposure to specific challenges and situations	We've been doing- and we're still working on getting into traffic on the highway, so we've been practicing that a little bit more, and definitely practicing in the parking lot a bit more, 'cause there are things that we haven't done yet.
Promoting independence	Parent let teens identify own solutions, let teen make mistakes	I'm kinda trying to let him self correct some things and think "hmm, would you hear a siren if your radio was that loud." So, he self- corrected. I mean, hopefully these behaviors will stay long term. / I wanted to see how he did without any instruction- I mean, I just watched him, when he pulled out of the driveway, he pulled to the stop sign, he looked both ways, and I didn't have to say "put your signal on"

Process Code Name	Code Definition	Example Of Coded Text From Interviews
Providing specific challenging exposures	Parent reported teen had exposure to specific challenging driving conditions during the previous wee	1) busy parking lot, 2) changing lanes in traffic, 3) rain, 4) dark, 5) two-lane country roads, 6) heavy traffic, 7) freeway/interstate.
Reacting physically	Parent acknowledged pushing imaginary brake pedal or otherwise having physical reaction simulating driving in reaction to some driving experience while teen behind the wheel	There was one time this week when her braking was not gradual enough, or it was too quick of a brake, where I started pushing my foot down on the floorboard.
Reducing distractions	Parent reported trying to reduce distractions	Right. She's allowed to have the radio on in the car, but not too loud, and of course, absolutely no talking on the phone. If her phone rings, she has to wait until we're stopped- parked. She's easily distracted. Even if I pointed at something, she would look, so she needs to concentrate on the road.
Relying on teen to initiate practice	Parent reports relying on teen to bring it up that teen wants to drive; rather than parent pushing teen to get practice / Parent not pushing teen to get driving practice, but rather waiting for teen to ask to drive	Well, on the occasion that he does drive, it's on the occasions that he brings it up / Usually, because it doesn't dawn on me that he's able to drive, I usually wait for him to ask.
Responding to correct	Parent made corrections when teen made driving mistakes	I mean there's times that I'll say you know- "You didn't look, or you didn't..." / Every once and a while, I have to encourage her to slow down, or ask her how fast she's going
Scripting practice	Developing a specific plan for a given driving session--in concert with teen	I think she feels comfortable. It's also probably more helpful to her if she knows exactly where she's going, versus me telling her every turn. You know, if I say "we're going to go to- You know- Kohl's on 15-501, do you know how to get there? What are the three ways that we can get there?" You know, so talk about how we're gonna get there, and what is the route that she's gonna take, rather than saying "ok, go out here, go to the light," and then... and then me picking the route. You know, she- I'll say to her, "You can go Garrett Rd, or you can go 40."
Teaching/modeling risky driving behavior	Parent reports teen observing parent driving risky, or parent actually teaching teen to drive in risky/aggressive manner	She, I guess, accelerating quickly, maybe cutting into traffic a little, a little aggressively, although I have myself to blame cause I kind of sort a tried to teach her to do that. / She could not be talking on the phone and driving at the same time. She said she knew and she was going to just make it real quick... Of course, she sees me doing that all of the time
Warning to prevent	Providing urgent warning to help teen avoid serious incident	And he didn't react as quickly, probably, as he could have, or should have. So, I said "He's pulling out in front of you, [TEEN]." / SUV that was in front of him had one of its taillights out, so he didn't- it didn't register to him that the car was stopped till he got much closer. So, I warned him about that.

APPENDIX B: SAMPLE OF CODED VIDEO CLIPS

	CLIP 1	CLIP 2	CLIP 3	CLIP 4	CLIP 5
Main notes	Mom humming to music, while looking ahead at approaching intersection where teen would take left-hand turn; As they approached the intersection with green light, no arrow, teen moved into left turn lane and mom said if you go fast you can go now, with another car coming down the road; Teen turned after that car went by and mom told teen she did "the exact right thing" but mom had intended for teen to go before the car went by	Mom focused on the road ahead, seeming calm but serious, as teen approached stop light and made left turn; Mom then looked to see if adjacent lane was clear before instructing teen to change lanes	Mom focused on the road ahead, seeming calm but serious, as teen approached red light--mom warned teen about braking for red light	Mom focused on the road ahead, seeming calm but serious as teen approached yellow light; Teen realized light was yellow a bit late and hit brakes a little hard to stop, but mom said nothing, only looking left and right very briefly after teen stopped at red light	Mom focused on road ahead, seeming calm but serious as teen drove into parking area; Teen saw speed hump later than desired and hit brakes hard to slow down as they hit the speed hump; Mom grimaced and may have made a sound as teen saw the speed hump and made a sound herself; After hitting speed hump teen apologized, laughed, and said the speed hump wasn't there the last time they drove into this shopping area
Driving conditions	Night time, in the dark; On main roads with moderate traffic; Moderate traffic on main road; Radio on quietly	Daytime, overcast; Minimal traffic on main road with 2 lanes each way; Radio on moderate volume	Daytime, sunny blue sky; Minimal traffic on main road with 2 lanes each way; Radio off	Daytime, sunny blue sky; Minimal-moderate traffic on main road with 2 lanes each way; Radio on fairly loud	Nighttime, dark; Minimal traffic entering well-lit roadway into parking area of shopping area; Radio on moderate volume
G-force trigger	Rapid left turn with oncoming traffic	Rapid left turn	Braking for red light	Braking for yellow light turning red	Braking for speed hump
Clip characteristics	TUE, 2/06/2007 @ 9:02 PM; Between Int #4 and #5	SAT, 2/17/2007 @ 9:05 am; Before Int #5	SAT, 2/24/2007 @ 12:45 pm; After Int #5	SUN, 3/11/2007 @ 3:39 pm; Before Int #6	SAT, 3/31/2007 @ 8:01 pm; Between Int #6 and #7
Advising general					
Chatting (non driving)					
Debriefing					

Directing	Instructed teen to go fast and take left turn before oncoming car went by	Responded to teen's question to let teen know she could make her left turn if she turned quickly in front of oncoming traffic; Directed teen to change lanes after making turn	After warning teen about red light, light turned green, and mom instructed teen that she then had a green light		After the speed hump, mom calmly instructed teen to turn into the parking lot in the direction the needed to go
Dismissing					
Guiding					
Instructing non-verbally					
Responding to correct					
Warning to prevent			Mom repeated "Your light's red" three times fairly calmly and quietly to alert teen to brake for light		
Constraining communication				Mom said nothing to teen during clip	
Creating relaxed/positive atmosphere	Mom seemed calm, initially humming to music and then calm talking with teen about her decision to wait for oncoming car to go by before making left turn	Mom talked quietly-no yelling	Mom stayed relatively calm, even while warning teen		Mom stayed calm
Creating stressful/negative atmosphere					
Encouraging/praising	Mom told teen she did the "exact right thing" taking her turn		After teen admitted she was looking at a traffic light further down the road, mom validated that and said that happens		
Focusing parent attention elsewhere					

Negotiating/ modifying practice					
Policing practice/ threatening consequences					
Promoting independence					
Reacting physically					
Reducing distractions					
Scripting practice					
Creating/ expanding opportunities					
Declining opportunities					
Giving teen driver's seat					
Limiting exposure					
Relying on teen to initiate practice					
Modeling/ showing teen how					
Practicing specific					
Teaching/ modeling risky driving behaviors					

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