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Master Thesis

Clinical Child and Adolescent Psychology

Trajectories of adolescent alcohol use and its bidirectional relation to parent-child

relationship domains

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Abstract

A good parent-adolescent relationship may serve as a protective factor, whereas a poor parental relationship can lead to alcohol related problems later in life. However, the alcohol use behaviour of adolescents may also affect the parent-adolescent relationship. The current study focuses on alcohol use trajectories and their bidirectional relation to parental warmth, conflict and monitoring. Data is drawn from a three-year longitudinal study addressing adolescent risk behaviour. Participants were Dutch adolescents (N=602, mean age=13.5 at baseline). Three adolescent drinking trajectories were identified using cluster analysis: abstainers, initiators, and high users. Repeated measures analysis of variance was implemented to examine the association between parenting factors and adolescent drinking trajectories. Parental warmth, conflict and monitoring at baseline predicted which alcohol use trajectories adolescents follow. Low warmth and monitoring, and high conflict predicted higher use of alcohol, whereas high support and monitoring, and low conflict suggested delay or prevention of alcohol initiation. Overall, abstainers and initiators reported high levels of warmth, with abstainers scoring lowest on conflict and highest on all domains of monitoring. Contrary to expectations, high users showed an increase in warmth towards fathers', whereas a decrease in conflict with mothers' was found, which suggests avoidance of interactions. High users reported an increase of parental monitoring (disclosure and control), implying that parents make an effort to better monitor adolescents engaging in risky alcohol use. Results confirm that a good parental relationship may lead to less risky adolescent drinking behaviours which in turn will lead to more positive future outcomes.

Key words: adolescent alcohol use trajectories, parent-adolescent relationship, parental warmth, conflict, monitoring, bidirectional relationship

Trajectories of adolescent alcohol use and its bidirectional relation to parent-child

relationship domains

Many researchers found an association between the quality of the parent-child relationship and adolescent alcohol use behaviour (Barnes, Reifman, Farrell, & Dintcheff, 2000; Ryan, Jorm, & Lubman, 2010). Specifically, a good relationship with parents can serve as a protective factor against risky alcohol use (Steinberg, 2001), while a poor relationship with parents is positively related to problematic alcohol use amongst adolescents, which is likely to lead to alcohol related problems and alcohol dependence in adulthood (Barnes, Reifman, Farrell, & Dintcheff, 2000; Dodge, Malone, Lansford, Miller, Pettit, & Bates, 2009). However, some longitudinal studies have failed to find such associations (White, Johnson, & Buyske, 2000; Duncan, Duncan, & Strycker 2006). Findings also suggest (Cox et al., 2018; Laird, Pettit, Bates, & Dodge, 2003; Stice & Barrera, 1995) that the above relation may be bidirectional, that is, adolescents' alcohol use also affects the parental relationship. Yet, there is a shortage of recent research that addresses the reciprocal relation of adolescent alcohol use and specific domains of the parent-child relationship, namely, parental warmth, conflict, and monitoring. Therefore, the purpose of this study is to examine whether parental warmth, conflict and monitoring significantly influences adolescents' drinking behaviour and to investigate whether the relation of adolescent alcohol use and the above parental domains may indeed be bidirectional.

Adolescent alcohol use

A great number of youth in the Netherlands experiment with alcohol use in their adolescent years with the majority developing socially acceptable drinking patterns. However, a number of youth engage in risky or problematic alcohol use during adolescent years (Poelen, Scholte, Engels, Boomsma, & Willemsen, 2005). These adolescents are at risk for developing alcohol-related problems in adulthood (Barnes, Reifman, Farrell, & Dintcheff,

2000; Grant & Dawson, 1997). Negative outcomes of adolescent alcohol use include later alcohol dependency and abuse of illicit drugs (Guttmannova et al., 2011; Komro, Tobler, Maldonado-Molina, & Perry, 2010; Loeber, Stepp, Chung, Hipwell, & White, 2010), alcohol-related psychosocial problems, such as depression (Griffin, Bang, & Botvin, 2010; Needham, 2007), school absenteeism and poor academic performance (Henry, Knight, & Thornberry, 2012; Peleg-Oren, Saint-Jean, Cardenas, Tammara, & Pierre, 2009), and risky sexual behaviours in early adulthood (Rothman, Wise, Bernstein, & Bernstein, 2009; Strachman, Impett, Henson, & Pentz, 2009).

Although, an overall trend of alcohol initiation in early adolescence, a peak in early adulthood and a decline in use after the mid-twenties can be found, considerable heterogeneity in the developmental course of substance use and substance use disorders occurs and this heterogeneity may be of etiological significance (Chassin, Flora, & King, 2004). Researchers suggest that alcohol disorders vary in their antecedents as a function of their age of onset (Cloninger, 1987) and course (Zucker, Fitzgerald, & Moses, 1995). Thus, in order to understand the etiological pathways to adolescent alcohol misuse and to identify potential risk and protective factors, it is important to distinguish among groups of youngsters who follow different trajectories over time (Chassin, Flora & King, 2004; Glantz & Leshner, 2000). Studies that promote a person-centred, longitudinal, developmental approach have found a number of patterns in the frequency and quantity of adolescent alcohol use (Colder, Campbell, Ruel, Richardson, & Flay, 2002; Bolland, Bolland, Tomek, Devereaux, Mrug, & Wimberly, 2016; Stice, Barrera, & Chassin, 1998). A consensus is found in the identified trajectory classes: a group of youth who do not drink at all (stable abstainers); minimal experimenters or light drinkers (very infrequent use); moderate escalators; rapid escalators and stable heavy drinkers. These groups could be further classified by the age of onset (early or late initiation). Results are consistent in that early initiators who show stable and high

alcohol consumption and rapid escalators are most at risk for developing alcohol-related problems (Colder, Campbell, Ruel, Richardson, & Flay, 2002; Dawson, Grant, & Li, 2007; Komro, Tobler, Maldonado-Molina, & Perry, 2010).[1]

The parent-child relationship

Numerous findings confirm that parenting influences adolescent alcohol use (Van der Vorst, Engels, Meeus, & Dekovic, 2006; Wang, Dishion, Stormshak, & Willett, 2011). Not only is parental alcoholism associated with an early onset of drinking (Chassin, Flora, & King, 2004), and with trajectories of persistent alcohol use disorders (Jackson, Sher, & Wood, 2000), but the quality of the parent-adolescent relationship, parental monitoring, and parents' influence on their child's social relations have also been identified as predictors of adolescent alcohol use behaviour (Nash, McQueen & Bray, 2005; Webb, Bray, Getz, & Adams, 2002). The current study focuses on three aspects of the parent-child relationship in association with adolescent drinking, namely parental warmth, conflict and monitoring.

Parental warmth as a predictor of adolescent alcohol use

A warm parent-child relationship is characterized by parents' high responsiveness, encouragement, praise and physical affection towards their child. A warm and supportive relationship with at least one adult (primarily one parent) can serve as a protective factor against developing mental health problems, antisocial behaviour, and substance use problems in adolescence and even later in adulthood (e.g. Steinberg, 2001; Wang, Dishion, Stormshak, & Willett, 2011). Most longitudinal studies found parental warmth/support to be protective against youth alcohol misuse (Barnes, Reifman, Farrell, & Dintcheff, 2000; Hair, Park, Thomson, & Moore, 2009; Peterson, Hawkins, Abbott, & Catalano, 1994; Wang, Dishion,

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[1] Though Colder and colleagues (2002) did find a group of youth de-escalating in frequency of drinking, adolescents do not usually show a decrease in alcohol use. A declining tendency in alcohol use typically occurs after the mid-twenties (Sher, Jackson, & Steinley, 2011).

Stormshak, & Willett, 2011), however there is some inconsistency in findings (e.g. White, Johnson, & Buyske, 2000).

Five longitudinal studies examined parental warmth in relation to adolescent drinking trajectories. Peterson, Hawkins, Abbott and Catalano (1994) looked at risk factors that may predict adolescent alcohol abuse on a sample of 450 black and white adolescents over the period of 3 years. They found proactive family management to be a protective factor against adolescents' alcohol use – parents' high monitoring, clear rule setting and positive reinforcement towards their children at age 12-13 significantly decreased likelihood of youth alcohol use at age 14-15. Correspondingly, Barnes and colleagues (2000) explored the influence of parental support and monitoring on individual trajectories of adolescent alcohol use across 6 years. They found that monitoring negatively predicted baseline alcohol use and rate of increase, whereas support made adolescents more receptive to parental monitoring. Yet, the authors argue that it is not possible to determine the relative contribution of support and monitoring, for these aspects are closely combined together (Barnes, Reifman, Farrell, & Dintcheff, 2000). Two longitudinal studies that examined parental warmth (among other parenting variables) in association with adolescents drinking, also included parental drinking as a possible predictor. White, Johnson and Buyske (2000) found parents' drinking to be a predictor of adolescent heavy alcohol use, but failed to find parental warmth and hostility to have a significant impact on adolescent drinking trajectories. Latendresse et al. (2008) examined various parenting factors, including warmth, relational tension and monitoring as mediators between parental and adolescent alcohol use and came to similar conclusions. While parental drinking was found to be a strong predictor of adolescent alcohol use at age 14 and even more so at age 17, no parenting variables, except monitoring and discipline were associated with adolescents' drinking, independent of parents' alcohol use (Latendresse, Rose, Viken, Pulkkinen, Kaprio, & Dick, 2008). These findings imply that parental alcohol use is a

significant predictor of youngsters drinking, and that parental warmth in itself may not be protective against adolescents' alcohol misuse. However, theory and research indicates that the effectiveness of one parenting factor (e.g. monitoring) may depend on other parenting variables (such as warmth). Thus, having a supportive parental relationship may enhance the effectiveness of monitoring and lead to prevention of substance abuse (Baumrind, 1971; Kerr and Stattin, 2000; Latendresse, Rose, Viken, Pulkkinen, Kaprio, & Dick, 2008). Indeed, Hair, Park, Thomson and Moore (2009) investigated several environmental characteristics that predict risky adolescent behaviour (e.g. delinquency, drinking) and examined how the identified risk groups relate to positive (e.g. positive mental and physical health) and negative outcomes (e.g. arrested in past year). Both a good youth-parent relationship and monitoring was associated with positive mental health outcomes later in adolescence, which corresponds to the premise that a supportive parent-child relationship may be a general protective factor against negative future outcomes (Steinberg, 2001).

Conflict between parent and youth as a predictor of adolescent alcohol use

Conflict between parents and adolescents involve negative interactions, such as harsh or offensive communication, criticism, quarrelling, irritation or annoyance at each other. Adolescents with poor parental relationships may score low or high on conflict frequency. High conflict may be due to frequent negative interactions, whereas low conflict can be found when any interaction is scarce between the parent and the adolescent (Chaplin et al., 2012). Findings of a cross-sectional study conducted by Chaplin and colleagues (2012) indicates that parent-adolescent relationships that are highly conflicted and lack warmth and structure may enhance youth to feel physiologically aroused, uncomfortable, and angry which could lead to avoidance of interactions with parents, which in turn may lead to decreased monitoring of youth and initiation of or increase in alcohol use or abuse (Brook, Whiteman, Gordon, & Brook, 1990). Indeed, longitudinal studies also found high levels of parent-adolescent

conflict and difficulty talking to one's parents to be associated with poor adolescent well-being and increased risk for alcohol use (Ackard, Neumark-Sztainer, Story, & Perry, 2006; Neppl, Dhalewadikar, & Lohman, 2016). Duncan and colleagues (1994) analysed the developmental changes in adolescent alcohol consumption by applying latent growth methodology on a longitudinal sample of 340 adolescents. Coercive parent-adolescent exchanges were found to have a significant impact on initial levels of adolescent alcohol use (intercept), but had no effect on changes in alcohol use (slope). (In contrast, inept monitoring was suggestive of higher rates of change, but did not influence initial status of drinking.) As partly discussed above, both White and colleagues (2000) and Latendresse et al. (2008) failed to find parental conflict to have a significant influence on adolescents' drinking. Both study samples assessed adolescents' reports on parenting from middle adolescence onwards (14 and 15 years), thus neither the effects of conflict on initiation (many adolescents already engage in drinking by this age), nor the effects of changes in conflict from early adolescence to mid-adolescent could be assessed, though conflict is found to increase in this period, which could influence youngsters' drinking (Smetana, Campione-Barr, & Metzger, 2006). The authors also argue, that other factors, such as peer influence may become a stronger predictor of adolescents' alcohol use than conflict with parents (Latendresse, Rose, Viken, Pulkkinen, Kaprio, & Dick, 2008; White, Johnson, & Buyske, 2000).

Parental monitoring as a predictor of adolescent alcohol use

Parental monitoring entails a collection of parenting skills that involves monitoring and structuring a child's whereabouts and activities. It has consistently been linked to adolescent alcohol use, with low monitoring increasing risk and high monitoring protecting against early initiation and heavy alcohol use among youth (Dishion & McMahon, 1998; Latendresse, Rose, Viken, Pulkkinen, Kaprio, & Dick 2008; Ryan, Jorm, & Lubman, 2010). Kerr and Sattin (2000) identified three constructs that parental monitoring may consists of.

One involves the adolescent's free, willing disclosure of information. The other two represent parent-initiated efforts: parental solicitation/knowledge - gathering information about children's activities by asking the children themselves or talking with their friends and with friends' parents; and parental control - regulating adolescents' freedom in activities (e.g. needing permission to go out). They found child disclosure to be the strongest predictor of child's norm-breaking, while parental knowledge and control had little positive impact on adolescents' behaviour. In fact, high control was even associated with negative future youth outcomes (e.g. rebellion, delinquency, poor academic results; Kerr & Stattin, 2000). Nevertheless, most findings of longitudinal studies agree, that high parental control and monitoring (commonly meaning knowledge) may indeed have the most direct effect on preventing adolescent alcohol misuse (Duncan, Duncan, Biglan, & Ary, 1998; Steinberg, 2001; Van der Vorst, Engels, Meeus, & Dekovic, 2006). As to some extent already discussed above - in relation to parental warmth and conflict - studies examining parental monitoring in association with adolescents' alcohol use trajectories vary in their results. Only Barnes, Reifman, Farrell and Dintcheff (2000) found parental monitoring to significantly delay adolescents' initial drinking levels (intercepts), as well as decrease their rates of alcohol use (slope). Peterson, Hawkins, Abbott and Catalano (1994) found parents' high monitoring to contribute to a delay in initiation, but did not examine its influence on current alcohol use. Duncan, Duncan and Stoolmiller (1994) found that poor monitoring predicted higher use of alcohol, but failed to find an association between monitoring and initiation of drinking. Accordingly, Latendresse and colleagues (2008) found monitoring to have a strong protective influence on youth's drinking behaviour in early adolescence (at age 14), while perceived parental discipline was found to have greater influence on adolescents' alcohol use in late adolescence (age 17). Hair, Park, Thomson and Moore (2009) found that maternal monitoring led to positive outcomes later in adolescence, but did not examine its influence on onset of

drinking. Finally, two longitudinal studies failed to find parental monitoring to predict adolescents initiation and rate of alcohol use. Duncan and colleagues (2006) examined alcohol use from pre-adolescence to mid-adolescence and while for instance parental and peer encouragement of drinking was found to have significant effects on adolescent alcohol use, parental supervision did not influence initiation or increase of alcohol use. Although Abar and colleagues (2014) found monitoring to be protective against youth delinquency and marihuana use, they did not find parental knowledge to hinder adolescent alcohol misuse. In conclusion out of the seven longitudinal studies examining the association between monitoring and adolescent drinking trajectories, five identified a significant influence of monitoring on adolescent alcohol use, while two studies failed to find such association. Some of these contradictory findings may partly be explained by Kerr and Stattin (2000), in that results vary by according to which aspect of monitoring was actually measured. Studies that failed to find significant influences of monitoring on adolescents' drinking (Duncan, Duncan, & Stoolmiller 1994; Duncan, Duncan, & Strycker, 2006; Abar, Jackson, & Wood, 2014) tended to measure knowledge and/or control, but not disclosure, which - according to Kerr and Stattin (2000) - is the best predictor of youth behaviour with regard to monitoring constructs (Kerr & Stattin, 2000). It is also essential to take into account the reciprocal association of parent-child relationships in the development of alcohol use trajectories, for monitoring may be most effective in a warm and close relationship which allows adolescents' the freedom of self-disclose. Creating a family climate that fosters good communication and openness may be key in the effectiveness of monitoring (Barnes, Reifman, Farrell, & Dintcheff, 2000; Kerr & Stattin, 2000).

Bidirectional relation of adolescent alcohol use and the parent-child relationship

While the above studies present how parenting factors may predict adolescent alcohol use, both theory and research indicates that links between the parent-child relationship and

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adolescent drinking behaviour may be bidirectional (Cox., Ennett, Foshee, Hussong, Lippold, & McNaughton-Reyes, 2018; Stice & Barrera, 1995). Transactional models applied to the parent-child dynamic regarding alcohol use implies that adolescents' misuse of alcohol and parenting behaviours are responsive to each other (Chaplin et al., 2012). Increases in adolescent substance use may correspond to decrease in positive parenting (e.g. increased conflict leads to withdrawal of parents), which in turn increases adolescent substance use. Yet, it is also possible that decreases in positive parenting practices following adolescent substance misuse indicate a corrective response of the parents to address their adolescent's behaviour (Cox, Ennett, Foshee, Hussong, Lippold, & McNaughton-Reyes, 2018).

Stice and Barrera (1995) were among the first researchers who examined the reciprocal effects of parenting and adolescent alcohol use. According to their findings, problematic adolescent alcohol use may result in a less supportive and more distant parental relationship, because parents may emotionally reject adolescents who exhibit problem behaviour due to their antisocial identity (Baumrind & Moselle, 1985). Laird, Pettit, Bates and Dodge (2003) confirm that the engagement in problematic drinking is likely to increase negative interactions between parents and adolescents, resulting in an even worse parental relationship. As stated above, higher levels of parental supervision have repeatedly been associated with less alcohol use at baseline, and consequently, low levels of parental monitoring predicting an increase in alcohol use over time (e.g. Latendresse, Rose, Viken, Pulkkinen, Kaprio, & Dick, 2008; Peterson, Hawkins, Abbott, & Catalano, 1994). Moreover, in bidirectional studies assessing parental monitoring and adolescents' drinking, increased alcohol use was linked to reduction in parental knowledge, suggesting that parents withdraw from monitoring activities or that parents have more difficulty obtaining information from adolescents who are engaged in substance use. Higher levels of alcohol use in early adolescence was also found to predict lower parental supervision effectiveness in middle

adolescence (Abar, Jackson, & Wood, 2014; Laird, Pettit, Bates, & Dodge, 2003).

Interestingly, recent findings of Cox and colleagues (2018) does not support the association

of high alcohol use leading to decreased parental monitoring. In fact, results of their study

showed that higher levels of adolescent alcohol misuse resulted in greater substance-specific

monitoring by parents. Although not a robust finding, this provides some evidence that

adolescents may influence their parents' behaviour, which is the direction of influence often

left out of previous research on adolescent alcohol use within the family context (Cox,

Ennett, Foshee, Hussong, Lippold, & McNaughton-Reyes, 2018).

The present study

The current study aims to examine whether parental warmth, conflict and monitoring

significantly influences adolescents' drinking trajectories, and to investigate if the relation of

adolescent alcohol use and the above parental domains may be bidirectional. While we

cannot specify whether all five trajectory groups will be identified, we do expect to find at

least three trajectory groups: youth who do not drink at all (abstainers), youth experimenting

with drinking (initiators), and adolescents engaging in risky/high use of alcohol (high users).

In the first set of hypotheses we propose that the quality of the parent-child relationship at

baseline will predict which alcohol use trajectory adolescents follow across the study.

Drawing from previous empirical findings, we propose, that abstainers will score highest on

parental warmth and monitoring, and low on conflict. We expect initiators to have a

moderately warm parental relationships with slightly lower levels of monitoring and higher

rate of conflict compared to abstainers. Finally, it is hypothesized, that members of the high

user group will score lowest on warmth and monitoring, and highest on conflict compared to

abstainers and initiators. We will also examine whether different patterns of adolescent

alcohol use will influence the parent-child relationship. We posit that the initiation of alcohol

use will correspond to a decrease in parental warmth, an increase in frequency of conflict

between parents and adolescents, and that the onset of drinking will either lead to an increase (if parents increase their monitoring due to their child's experimentation with drinking) or a decrease in parental monitoring (if the initiation of drinking distances the parent from the adolescent).

Method

Participants

The sample used in the current study was part of a larger 3-year longitudinal study, conducted in the Netherlands called "The Adolescent Risk-Taking (ART) Project," which is a research project on adolescent risk-taking in multiple domains that began in 2012 (Defoe, Dubas, Somerville, Lugtig, & van Aken, 2016). At baseline (wave 1), adolescents (N=602; 53.6 % male, 46.4% female) were either in the 1st or 3rd year of "preparatory middle-level applied education" (VMBO) or "higher general continued education" (HAVO). Adolescents in the youngest cohort were 12–14 years old and adolescents in the older cohort were 14–17 years old at baseline measures. Most participants (93.2 %) named the Netherlands as their country of origin, with 61.1% identifying themselves as Dutch, while 9.3% of adolescents' considered themselves Turkish or Dutch-Turkish, 7.4% (Hindu/Dutch) Surinamese, 5.5% Moroccan or Dutch-Moroccan, 1.1% Dutch Caribbean or Caribbean, 1.5% (Dutch) African, 1.3% Asian, and 12.3% as other. 6.8% of adolescents' reported that their mothers' had no or basic educational qualification, 25.3% of mothers completed vocational training or middle level applied education (Mavo, VMBO, MBO), 7.3% completed higher general continued education (HAVO/VWO), and 12.9% had a university degree (HBO, University). 46.7% of the participants did not know their mothers' educational level. As for reports of fathers' highest level of education at baseline: 6.5% had no or basic education, 23% accomplished middle level qualifications, 6% completed HAVO/VWO, 18.7% had a university degree, and 45.8% is unknown.

Procedure

Participants were recruited from eight high-schools in six different regions of the Netherlands. The inclusion of ethnically diverse schools in the recruitment was a priority. Parents received information letters about the research project as well as dissent letters that could be returned to the schools if parents did not want their children to participate in the study. Data-collection took place at schools, and was led by trained research assistants. Data was collected annually in the form of self-report questionnaires from adolescents, with sample sizes of 602, 582, and 442 across the three waves (Defoe, Dubas, Somerville, Lugtig, & van Aken, 2016).

Measures

Alcohol use behaviour

Adolescents' alcohol use was measured by an instrument derived from standardized, valid questionnaires used for routine health behaviour monitoring in the Netherlands (van Nieuwenhuijzen et al., 2009). Questions concerned frequency ('Do you drink alcohol?', with answers ranging from 0= 'No, I have never drunken alcohol' to 5= 'Yes, every day') and binge drinking (e.g. 'How many times in the past 4 weeks did you drink 5 or more alcoholic drinks in a row?', answers ranged from 0= 'never' to 6= '9 times or more'), participation in pre-drinks ('Do you participate in pre-drinks before going out to a party or club?', answers from 0= 'never' to 4= 'very often'), and being drunk or tipsy ('How many times have you been drunk or tipsy due to the drinking of alcohol in the past 4 weeks?', with answers ranging from 0= '0 times' to 12= '20 times or more'). Raw scores of the answers from the alcohol questions were transformed into standardized Z scores for data analyses. Reliability of the alcohol questions were high across all waves (α=0.86; 0.89; 0.87).

Parental warmth and conflict

Parental warmth and conflict was measured with the Network of Relationship Inventory (NRI - Furman & Buhrmester, 1985) separately for mothers and fathers. 5 items measured parental warmth (e.g. 'How much do you turn to your father for comfort and support when you are troubled about something?', 'Does your mother appreciate the things that you do?'), and 6 items measured negative interactions/conflict with parents (e.g. 'How much do you and your father say mean or harsh things to each other?', 'How often do you and your mother disagree and quarrel?'). All items could be answered on a Likert-scale ranging from 1 to 5 (1= 'little or none'; 5= 'could not be more'). Internal consistency of items were very good (Cronbach α's ranging from 0.83 to 0.93). Parental warmth was measured at baseline and at wave two, conflict was measured across all three waves.

Parental monitoring

Parental monitoring was measured with Parenting Practices, a questionnaire consisting of 21 items with answers ranging from 1-5, where 1 means never and 5 represents (almost) always (Kerr & Stattin, 2000). 9 items measured parental knowledge of adolescents' activities (e.g. 'Does at least one of your parents know where you go to and what you do after school?'), 6 items assessed youths' disclosure (e.g. 'Do you like to tell at least one of your parents about what you did and where you went during the evening?'), and 6 items measured adolescents' perception of parental control (e.g. 'If you have been out past curfew, does at least one of your parents require that you explain why and tell who you were with?'). Reliability of the scale was sufficient to good (α= 0.71 to 0.86). Monitoring was measured at baseline and at wave two.

Strategy of Analyses

All analyses were performed in SPSS Statistics 24. In order to have satisfactory sample sizes we estimated missing data using multiple imputations. After confirming that data was missing at random (EM, Little's MCAR test: Chi-Square= 1923.761, *DF*= 2064, *p*=

.987), we imputed missing data (number of imputations: 5) creating a new dataset including the original dataset and the five imputed datasets. All further statistical analyses were performed using this dataset. The most consistent results are presented in the study, which are mainly results from the original dataset. (Most relevant results across all datasets can be found in appendices.)

K-means cluster analysis was used to identify trajectories of adolescent alcohol use. Based on previous research findings, at least 3 clusters were expected to be found. In order to find the most consistent trajectory groups we ran K-means cluster analysis multiple times on the computed Z scores of alcohol questions, creating 2, 3, 4, 5 number of clusters. Three clusters were decided to be the best fit for consistent trajectories of adolescent alcohol use. These groups were labelled as 'abstainers', 'initiators', and 'high users'.

Analysis of variance at each wave with post hoc tests was run to test whether the four alcohol questions (frequency, binge drinking, participation in pre-drinks, and drunkenness in the past month) differed at all times of measurement per trajectory group.

In order to examine whether parent-child relationship characteristics at baseline (wave 1) predict which alcohol use trajectory adolescents follow, multivariate analysis of variance with post hoc tests (LSD) was run for all five wave 1 parenting factors with trajectory groups as fixed factors and age as a covariate. To answer how parenting factors differ in relation to adolescents' alcohol use trajectories over time, repeated measures analysis of variance was implemented, with time and parents (for warmth and conflict) as within-subject variables, alcohol trajectory groups as between-subject factor, and controlling for age (age as a covariate).

Results

Identifying adolescent alcohol use trajectories

Three clusters were found by means of adolescents' alcohol use with K-means cluster

analysis: a group of youth who do not drink at all (abstainers, *N*= 457 at wave one, *N*=423,

337 at wave two and three, respectively; mean of alcohol use Z scores at wave 1= -.45, *SD*=

.19; wave 2 *M*= -.53, *SD*= .24; wave 3 *M*= -.65, *SD*= .34), youth who are experimenting with

drinking (initiators, *N*= 118 at baseline, *N*=125 and *N*= 86 at waves two and three

respectively; mean of alcohol Z scores at wave 1= .46, *SD*= .72; wave 2 *M*= .75, *SD*= .89;

wave 3 *M*= .82, SD= .76), and a group of adolescents' who engage in risky or high use of

alcohol (high users, *N*= 26 at baseline, *N*= 27 and *N*= 15 at waves two and three; mean Z

score of 2.9, *SD*= 1.01 at baseline, *M*= 2.29, *SD*= .93 at wave 2; and *M*= 1.99, *SD*= 1.13 at

wave 3). Trajectories of adolescent alcohol use are presented in Figure 1.
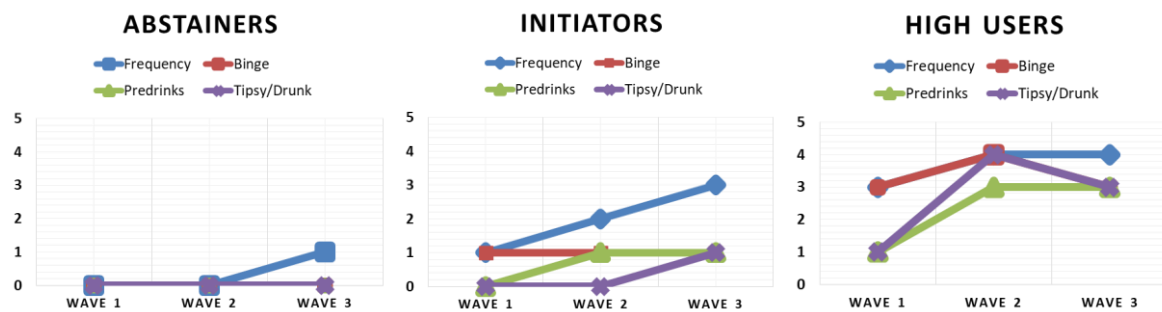

Figure 1. Results of K-means cluster analysis – trajectories of adolescents' alcohol use.

(Graphs are based on raw scores of alcohol questions).

ANOVA for alcohol questions across waves per trajectory

Analysis of variance was performed to test whether frequency, binge drinking,

participation in pre-drinks, and drunkenness in the past month differed by trajectory group at

each wave. Post hoc analyses (LSD) revealed that all clusters (abstainers, initiators, high

users) significantly (*p*< .05) differed from each other in frequency, binge drinking, pre-drinks,

and being drunk or tipsy at all three times of measurement. Significant trajectory by time

interactions were also found on all four behaviours (Frequency: $F_{(4, 602)}$= 5.14, *p*= .000;

Binge: $F_{(4, 528)}$= 3.5, *p*= .008; Pre-drinks: $F_{(4, 572)}$= 34.93, *p*= .000; Tipsy/drunk: $F_{(4, 558)}$= 12.35, *p*= .000).

Parental warmth, conflict and monitoring as predictors of adolescent drinking trajectories

In order to examine whether parent-child relationship characteristics at baseline (wave 1) predict adolescent alcohol use trajectories, multivariate analysis of variance was run for all five parenting factors. Significant cluster effects were found across all parenting factors at Time1, meaning that abstainers, initiators and high users significantly differed from each other in levels of parental warmth ($F(2, 485)= 5.03$, $p= .007$), conflict ($F(2, 481)= 12.49$, $p= .000$), knowledge ($F(2, 372)= 10.3$, $p= .000$), disclosure ($F(2, 365)= 12$, $p= .000$), and control ($F(2, 358)= 8.37$, $p= .000$) at baseline. Post hoc tests (LSD) revealed that high users had significantly higher scores in conflict with parents compared to abstainers ($F(2, 481)= 12.49$, $p= .000$) and initiators ($F(2, 481)= 12.49$, $p= .001$), and had significantly lower levels of warmth, knowledge, disclosure and control, compared to abstainers ($F(2, 485)= 5.03$, $p= .003$ for warmth; $F(2, 512)= 7.04$, p$= .000$ for knowledge; $F(2, 510)= 10.88$, $p= .000$ for disclosure; and $F(2, 503)= 9.76$, p$= .000$ for control) and initiators (warmth: $F(2, 485)= 5.03$, $p= .002$; knowledge: $F(2, 512)= 7.04$, $p= .003$; disclosure: $F(2, 510)= 10.88$, $p= .001$; control: $F(2, 503)= 9.76$, $p= .022$). Abstainers and initiators did not differ significantly in levels of parental warmth ($F(2, 485)= 5.03$, $p= .551$) and knowledge ($F(2, 512)= 7.04$, $p= .221$), but did differ in conflict ($F(2, 481)= 12.49$, $p= .017$), disclosure ($F(2, 510)= 10.88$, $p= .044$) and control ($F(2, 503)= 9.76$, $p= .004$). Neither significant parent effects were found for warmth and conflict ($F(1; 485)= 2.72$, $p= .01$; $F(1;481)$, $p= .795$), nor significant parent by cluster effects (warmth $F(2, 485)= .621$, $p= .538$; conflict $F(2, 481)= .88$, $p= .417$). Result of baseline parenting factors by trajectories with means and error bars are presented in Figure 2.
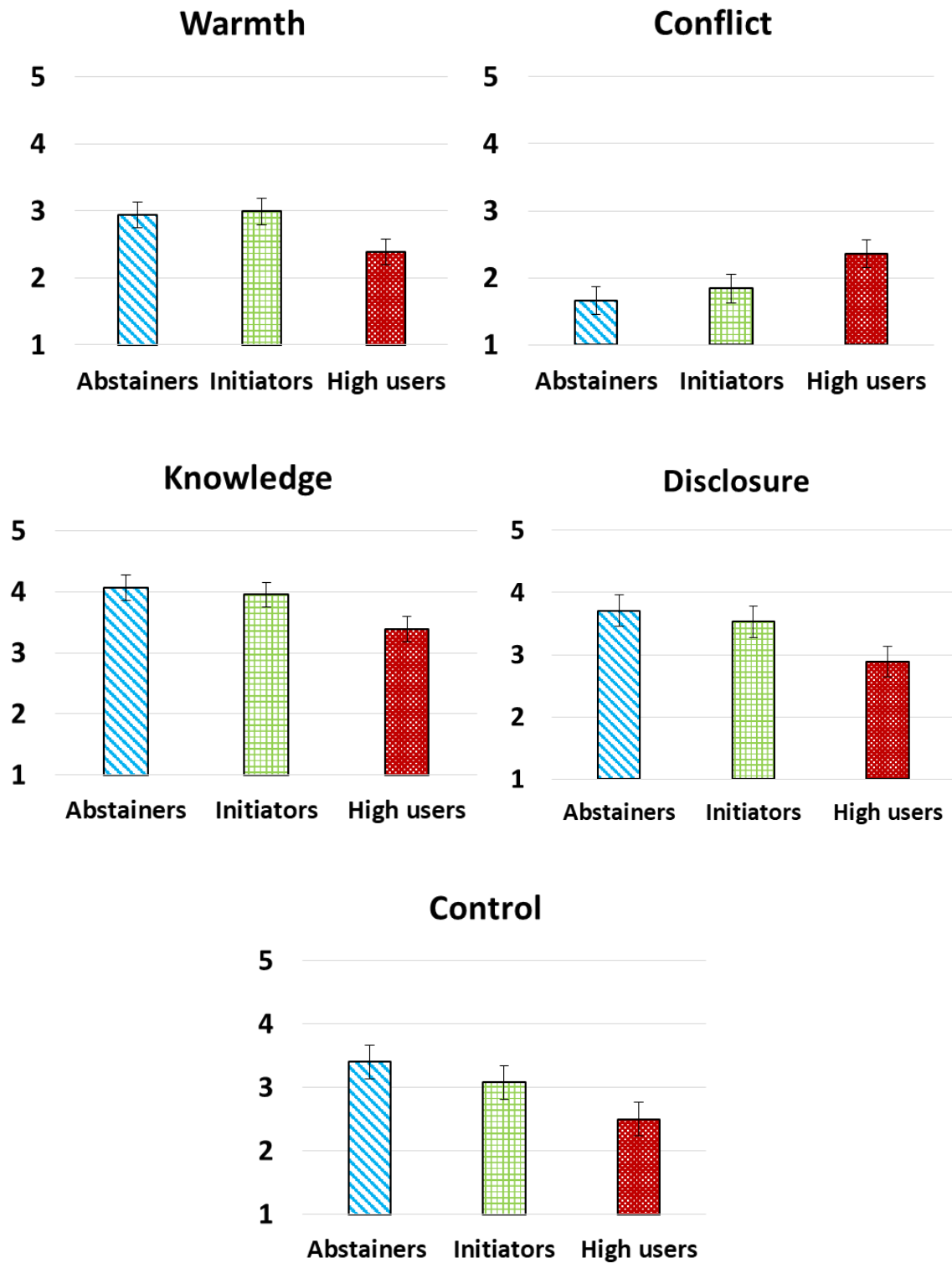
Figure 2. Results of multivariate analyses of variance for parenting factors differing by

alcohol use trajectories at Time1.

Parental warmth, conflict and monitoring in relation to drinking trajectories over time

In order to investigate how parenting factors differ in relation to adolescents alcohol use trajectories over time, repeated measure analysis of variance was implemented. Results are presented in Figure 3 and Table 1 and 2.

Overall higher levels of warmth for mothers' was found compared to fathers', however this effect size was not significant in the original dataset (result from imputed dataset show a tendency of effect). However, fathers' warmth significantly increased for high users (time by parent by cluster effect: $F(2, 342)= 4.54$, $p= .011$. A general trend of conflict increasing from baseline to wave 2, a peak in mid-adolescence (wave 2) and a decline afterwards (by wave 3) was found (significant time effect $F(2, 185)= 3.1$, $p= .048$). A sharp decrease in conflict with one's mother was found among high users (though time by parent by cluster effect was not significant in the original dataset, a tendency to significant effect was found in two of the imputed datasets). No significant effects were found in the domain of knowledge across waves. While abstainers and initiators show a stable level of disclosure at both times of measurement, a tendency of increase is found among high users (time by cluster effect: $F(2, 365)= 2.84$, $p= .059$). Similarly, a tendency of increase in parental control is found in the high user group (time by cluster effect: $F(2, 358)= 2.98$, $p= .052$.), while abstainers and initiators report stable levels of parental control at both times of measurement.
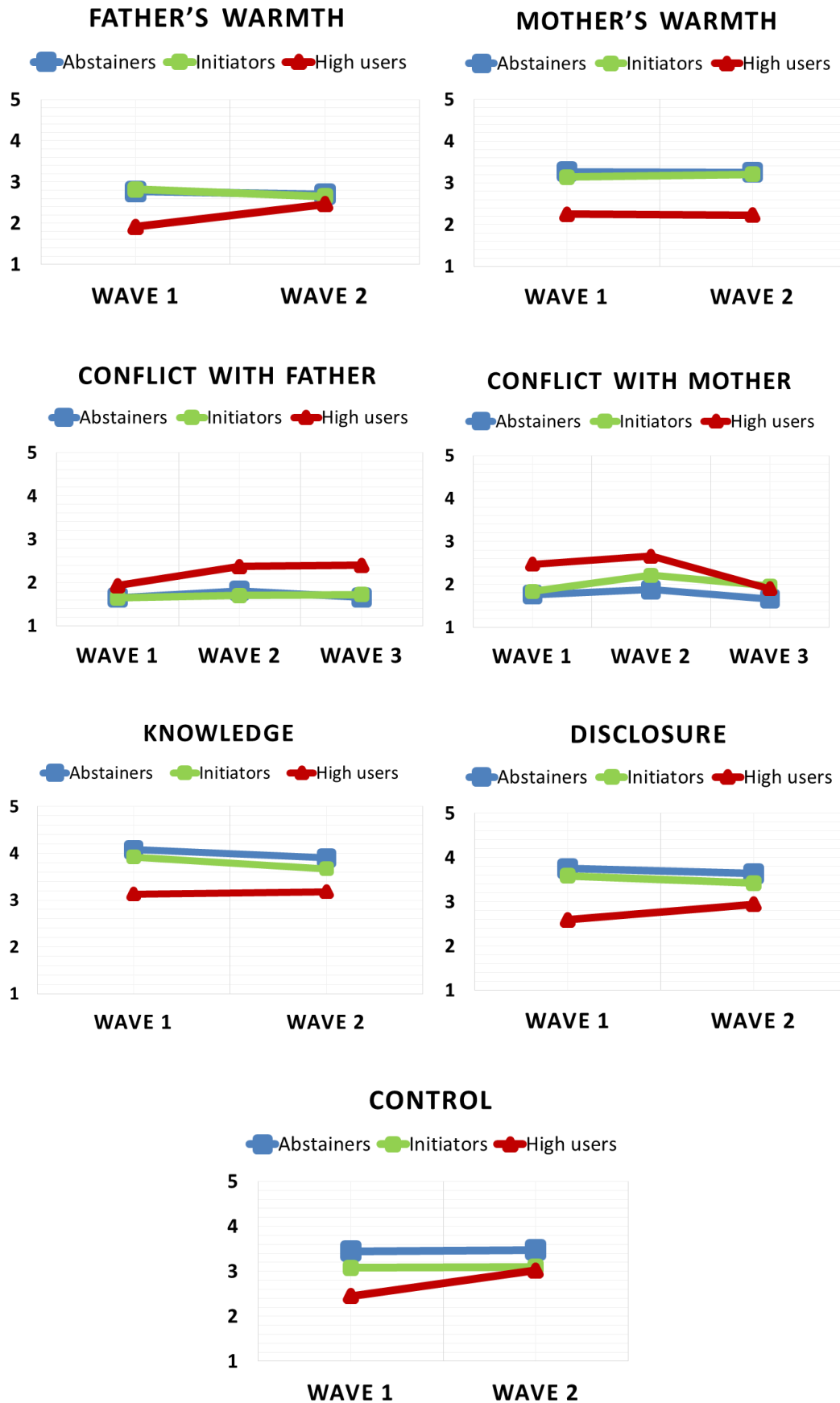
Figure 3. Result of Repeated Measures ANOVA parenting factors by trajectories over time.

Table 1.

Repeated Measures ANOVA effects for parental warmth and conflict.

Effect	Warmth				Conflict			
	F	Hypothesis df	Error	*P*	*F*	Hypothesis df	Error	*p*
Time	1.11	1	342	.294	3.1	2	185	.048
Time * Trajectory	1.44	2	342	.238	.22	4	372	.928
Parent	1.26	1	342	.263	1.19	1	186	.277
Parent * Trajectory	1.09	2	342	.339	.44	2	186	.642
Time * Parent	.08	1	342	.743	.68	2	185	.506
Time * Parent * Trajectory	4.54	2	342	.011	1.07	4	372	.372

Note: Result presented here reflect the results of the original dataset. Results of imputed datasets are found in appendices. For reasons of space restrictions effects for age are not presented here. All result are interpreted within a 95% confidence interval, with significance level at $p < .05$.

Table 2.

Repeated Measures ANOVA effects for knowledge, disclosure and control.

Effect	Knowledge				Disclosure				Control			
	F	Hypothesis df	Error	*P*	*F*	Hypothesis df	Error	*p*	*F*	Hypothesis df	Error	*p*
Time	1.29	1	372	.256	.001	1	365	.981	.001	1	358	.980
Time * Trajectory	.84	2	372	.431	2.84	2	365	.059	2.98	2	358	.052

Note: Result presented here reflect the results of the original dataset. Results of imputed datasets are found in appendices. For reasons of space

restrictions effects for age are not presented here. All result are interpreted within a 95% confidence interval, with significance level at $p < .05$.

Discussion

The current study aimed to examine the influence of parental warmth, conflict and monitoring on adolescents' drinking trajectories, and to investigate how these parenting factors change over time in relation to adolescents' alcohol use. Three adolescent drinking trajectories were found, i.e. a group of youth who did not drink through the three waves of measurement (abstainers), youth who are experimenting with drinking and show an increase in their alcohol use (initiators), and a group of adolescents who engage in risky drinking (frequent/ binge drinking from baseline – high users). Parenting factors at baseline differed by trajectory group, implying that parenting predicts which alcohol trajectory adolescents follow. Abstainers scored highest on all domains of monitoring and lowest on conflict at baseline. Initiators and abstainers had similar levels of warmth and knowledge at baseline, yet initiators had significantly lower levels of disclosure and control, and higher levels of conflict, compared to abstainers. High users reported the lowest parental warmth, knowledge, disclosure, and control, and the most conflict with parents at baseline. No significant decrease of warmth was found due to escalating alcohol use, in fact, an increase in warmth towards fathers' was found among high users. Overall, parental warmth was higher for mothers' than for fathers'. Conflict with parents generally peaked in mid-adolescence (wave two), and declined afterwards, along with high users showing a sharp decrease in conflict with mothers. While none of the monitoring domains (knowledge, disclosure and control) changed for abstainers and initiators over time, a tendency of increase in both disclosure and control was found among high users.

Though previous studies examining adolescents' alcohol use trajectories have typically identified more than three groups (Bolland, Bolland, Tomek, Devereaux, Mrug, & Wimberly, 2016; Colder, Campbell, Ruel, Richardson, & Flay, 2002), in the current study only three consistent drinking trajectories were found. Although the identified groups are

found by previous studies (e.g. Colder, Campbell, Ruel, Richardson, & Flay, 2002), this study failed to further distinguish groups (e.g. to moderate vs. rapid escalators). Measurement of alcohol use may account for these differences. In the current study, alcohol use was measured with four questions: frequency and binge drinking, participation in pre-drinks and being drunk or tipsy, while other studies generally measured frequency (Bolland, Bolland, Tomek, Devereaux, Mrug, & Wimberly, 2016) or frequency and quantity of drinking (Colder, Campbell, Ruel, Richardson, & Flay, 2002). It could be, that the two added questions (participation in pre-drinks and being drunk or tipsy in the past month) used in this study do not truly reflect adolescents' drinking habits and thus does not contribute to the distinguishing of trajectories. In addition, no question assessed age of onset, while studies that found more trajectory groups were able to distinguish early and late initiators (Bolland, Bolland, Tomek, Devereaux, Mrug, & Wimberly, 2016; White, Johnson, & Buyske, 2000).

Results of multivariate analysis of variance examining trajectory groups and parenting factors at baseline are consistent with previous empirical findings, in that low levels of parental warmth and monitoring, and high levels of conflict increases likelihood of high use of alcohol among youth (Barnes, Reifman, Farrell, & Dintcheff, 2000; Ryan, Jorm, & Lubman, 2010). Highest levels of support and monitoring, and low levels of conflict with parents' were found amongst abstainers, suggesting that these parenting domains may delay or prevent engagement in drinking (Duncan, Duncan, & Stoolmiller, 1994; Latendresse, Rose, Viken, Pulkkinen, Kaprio, & Dick, 2008). However, initiators and abstainers did not significantly differ in their levels of warmth and knowledge, implying that high conflict and low disclosure and control may be most critical parenting behaviours in influencing initiation of alcohol use (Duncan, Duncan, & Stoolmiller, 1994; Fletcher, Steinberg, & Williams-Wheeler, 2004; Kerr & Stattin, 2000).

Repeated measures analysis of variance examining the changes in alcohol use associated with subsequent changes in the parent-child relationship reveal interesting results. Contrary to our expectations based on relevant literature (Stice & Barrera, 1995; Bates & Dodge, 2003), no significant decrease of warmth was found in association with escalating alcohol use. In fact, an increase in warmth towards fathers' was recognized among high users. This somewhat surprising association could be linked to monitoring, for along with growth in warmth, an escalation in disclosure and control was also discovered among high users. It could be, that when fathers recognize that their adolescents engage in risky drinking, an attempt is made to better monitor them, which may have a positive effect on the father-adolescent relationship, resulting in a closer, more supportive relationship. Although Cox and colleagues (2018) indeed found parental monitoring to increase for high users, further research is needed to understand this association regarding warmth, and why it was found for fathers, but not for mothers. Nevertheless, parental warmth was consistently higher for mothers' than for fathers', which is in line with previous findings of Smetana et al. (2006). Also in line with findings of Smetana and colleagues (2006), conflict generally peaked in middle adolescence and showed a decline afterwards. High users showing a sharp decrease in conflict with their mothers could suggest that interactions are decreasing between mothers and adolescents who engage risky alcohol use, thus youth who are active substance users may be distancing themselves from parents (Chaplin et al., 2012). While knowledge, disclosure and control did not change notably for abstainers and initiators over time, a tendency of an increase in both disclosure and control was found among high users. According to recent findings of Cox et al. (2018) this implies that parents make an effort to better monitor adolescents who engage in risky drinking, which may contribute to more positive youth behaviour and future outcomes.

Limitations and future implications

Of course, the present study has many limitations. All data was drawn from self-report questionnaires and thus only reflects adolescents' perception of the parental relationship. Parents' experiences of their relationship with adolescents' in terms of warmth, conflict and monitoring may differ. As presented by Laird and colleagues (2003) adolescent and parent reports show increasing discrepancy over time. Nevertheless, Latendresse and colleagues (2008) - who also found low correlations between parents' and adolescents' reports of parenting – suggest that adolescents' perceptions of parenting may be more useful in gathering information on parenting than parent reports (Latendresse, Rose, Viken, Pulkkinen, Kaprio, & Dick, 2008).

We estimated missing data by using the method of multiple imputations to overcome some lacking information in adolescents' reports. Although data was missing at random, thus imputed data was utilizable, results across imputed datasets were not always consistent. One other shortcoming of this study was the somewhat simplistic statistical analyses used for identifying alcohol trajectories. While previous studies that examined adolescent drinking trajectories tended to use more advanced statistical analyses (e.g. latent class mixture models), a more simple strategy of analyses was chosen (K-means cluster analysis) for the current study. It may be, that with the application of more advanced analyses, our identified drinking trajectories could have further been classified.

One aim of the current study was to assess the bidirectional relation of parenting domains and adolescent alcohol use. Although we did find significant changes in this relation across time, we cannot conclude that adolescents' drinking accounts for these changes, for there is no doubt that other factors also influence the parent-adolescent relationship (e.g. peers, individual differences; White, Johnson, & Buyske, 2000).

Nevertheless, we can conclude that parenting does matter in the development of adolescent alcohol use behaviour. Our results confirm the premise that parental warmth and

monitoring, and low conflict may prevent youth from engagement in risky drinking (Barnes, Reifman, Farrell, & Dintcheff, 2000; Steinberg, 2001). Our results also support Kerr and Stattin's (2000) position, that warm, responsive parents who at the same time attempt to actively regulate their adolescent's behaviour establish a family climate in which self-disclosure is promoted, resulting in less engagement of risky youth behaviour. It would be bold to state that our study resolved the debate whether high parental control leads to positive or negative youth behaviour, yet based on our findings we can conclude that high levels of parental control may indeed be a strong protective factor against engagement in risky alcohol use, supporting the findings of Fletcher, Steinberg and Williams-Wheeler (2004) and Latendresse et al. (2008). Regarding the bidirectional effects of parenting and adolescent alcohol use, our findings demonstrate a fairly optimistic view, in that adolescents who engage in risky alcohol use reported an increase of disclosure and control, implying – according to Cox and colleagues' findings (2018) - that parents make an effort to 'correct' their parenting after realizing that their children are involved in risky drinking.

In conclusion, parenting that promotes high monitoring, especially disclosure – which may best be established in a warm and close parent-child relationship -, and control (direct parental involvement) can contribute to less risky adolescent alcohol use, protecting youth against negative future outcomes (e.g. alcohol dependency, depression, Barnes, Reifman, Farrell, & Dintcheff, 2000; Kerr & Stattin, 2000; Latendresse, Rose, Viken, Pulkkinen, Kaprio, & Dick, 2008; Needham, 2007).

References

Abar, C. C., Jackson, K. M., & Wood, M. (2014). Reciprocal relations between perceived parental knowledge and adolescent substance use and delinquency: The moderating role of parent–teen relationship quality. *Developmental Psychology*, *50*(9), 2176.

Ackard, D. M., Neumark-Sztainer, D., Story, M., & Perry, C. (2006). Parent–child connectedness and behavioral and emotional health among adolescents. *American Journal of Preventive Medicine*, *30*(1), 59-66.

Barnes, G. M., Reifman, A. S., Farrell, M. P., & Dintcheff, B. A. (2000). The effects of parenting on the development of adolescent alcohol   misuse: a Six-Wave latent growth model. *Journal of Marriage and Family*, *62*(1), 175-186.

Baumrind, D. (1971). Current patterns of parental authority. *Developmental Psychology*, *4*(1p2), 1.

Baumrind, D., & Moselle, K. A. (1985). A developmental perspective on adolescent drug abuse. *Advances in Alcohol & Substance Abuse*, *4*(3-4), 41-66.

Bolland, K. A., Bolland, J. M., Tomek, S., Devereaux, R. S., Mrug, S., & Wimberly, J. C. (2016). Trajectories of adolescent alcohol use by gender and early initiation status. *Youth & Society*, *48*(1), 3-32.

Brook, J. S., Whiteman, M., Gordon, A. S., & Brook, D. W. (1990). The role of older brothers in younger brothers' drug use viewed in the context of parent and peer influences. *The Journal of Genetic Psychology*, *151*(1), 59-75.

Chaplin, T. M., Sinha, R., Simmons, J. A., Healy, S. M., Mayes, L. C., Hommer, R. E., &

Chassin, L., Flora, D. B., & King, K. M. (2004). Trajectories of alcohol and drug use and dependence from adolescence to adulthood: the effects of familial alcoholism and personality. *Journal of Abnormal Psychology*, *113*(4), 483.

Cloninger, C. R. (1987). Neurogenetic adaptive mechanisms in

alcoholism. *Science*, *236*(4800), 410-416.

Colder, C. R., Campbell, R. T., Ruel, E., Richardson, J. L., & Flay, B. R. (2002). A finite

mixture model of growth trajectories of adolescent alcohol use: Predictors and

consequences. *Journal of Consulting and Clinical Psychology*, *70*(4), 976.

Cox, M. J., Ennett, S. T., Foshee, V., Hussong, A., Lippold, M., & McNaughton-Reyes, H. L.

(2018). Bidirectional Relationships Between Alcohol-Specific Parental Socialization

Behaviors and Adolescent Alcohol Misuse. *Substance Use & Misuse*, 1-12.

Crowley, M. J. (2012). Parent–adolescent conflict interactions and adolescent alcohol

use. *Addictive Behaviors*, *37*(5), 605-612.

Dawson, D. A., Grant, B. F., & Li, T. K. (2007). Impact of age at first drink on stress-reactive

drinking. *Alcoholism: Clinical and Experimental Research*, *31*(1), 69-77.

Defoe, I. N., Semon Dubas, J., Somerville, L. H., Lugtig, P., & van Aken, M. A. (2016). The

unique roles of intrapersonal and social factors in adolescent smoking

development. *Developmental Psychology*, *52*(12), 2044.

Dishion, T. J., & McMahon, R. J. (1998). Parental monitoring and the prevention of child and

adolescent problem behavior: A conceptual and empirical formulation. *Clinical Child

and Family Psychology Review*, *1*(1), 61-75.

Dodge, K. A., Malone, P. S., Lansford, J. E., Miller, S., Pettit, G. S., & Bates, J. E. (2009). A

dynamic cascade model of the development of substance-use onset. *Monographs of the

Society for Research in Child Development*, *74*(3), vii-119.

Duncan, T. E., Duncan, S. C., & Stoolmiller, M. (1994). Modeling developmental processes

using latent growth structural equation methodology. *Applied Psychological

Measurement*, *18*(4), 343-354.

Duncan, S. C., Duncan, T. E., Biglan, A., & Ary, D. (1998). Contributions of the social context to the development of adolescent substance use: a multivariate latent growth modeling approach. *Drug and Alcohol Dependence*, *50*(1), 57-71.

Duncan, S. C., Duncan, T. E., & Strycker, L. A. (2006). Alcohol use from ages 9 to 16: A cohort-sequential latent growth model. *Drug and Alcohol Dependence*, *81*(1), 71-81.

Fletcher, A. C., Steinberg, L., & Williams-Wheeler, M. (2004). Parental influences on adolescent problem behavior: Revisiting Stattin and Kerr. *Child Development*, *75*(3), 781-796.

Furman, W., & Buhrmester, D. (1985). Children's perceptions of the personal relationships in their social networks. *Developmental Psychology*, *21*(6), 1016.

Glantz, M. D., & Leshner, A. I. (2000). Drug abuse and developmental psychopathology. *Development and Psychopathology*, *12*(4), 795-814.

Grant, B. F., & Dawson, D. A. (1997). Age at onset of alcohol use and its association with DSM-IV alcohol abuse and dependence: results from the National Longitudinal Alcohol Epidemiologic Survey. *Journal of Substance Abuse*, *9*, 103-110.

Griffin, K. W., Bang, H., & Botvin, G. J. (2010). Age of alcohol and marijuana use onset predicts weekly substance use and related psychosocial problems during young adulthood. *Journal of Substance Use*, *15*(3), 174-183.

Guttmannova, K., Bailey, J. A., Hill, K. G., Lee, J. O., Hawkins, J. D., Woods, M. L., & Catalano, R. F. (2011). Sensitive periods for adolescent alcohol use initiation: Predicting the lifetime occurrence and chronicity of alcohol problems in adulthood. *Journal of Studies on Alcohol and Drugs*, *72*(2), 221-231.

Hair, E. C., Park, M. J., Ling, T. J., & Moore, K. A. (2009). Risky behaviors in late adolescence: Co-occurrence, predictors, and consequences. *Journal of Adolescent Health*, *45*(3), 253-261.

Henry, K. L., Knight, K. E., & Thornberry, T. P. (2012). School disengagement as a predictor of dropout, delinquency, and problem substance use during adolescence and early adulthood. *Journal of Youth and Adolescence*, *41*(2), 156-166.

Jackson, K. M., Sher, K. J., & Wood, P. K. (2000). Trajectories of concurrent substance use disorders: A developmental, typological approach to comorbidity. *Alcoholism: Clinical and Experimental Research*, *24*(6), 902-913.

Kerr, M., & Stattin, H. (2000). What parents know, how they know it, and several forms of adolescent adjustment: further support for a reinterpretation of monitoring. *Developmental Psychology*, *36*(3), 366.

Komro, K. A., Tobler, A. L., Maldonado-Molina, M. M., & Perry, C. L. (2010). Effects of alcohol use initiation patterns on high-risk behaviors among urban, low-income, young adolescents. *Prevention Science*, *11*(1), 14-23.

Laird, R. D., Pettit, G. S., Bates, J. E., & Dodge, K. A. (2003). Parents' monitoring-relevant knowledge and adolescents' delinquent behavior: evidence of correlated developmental changes and reciprocal influences. *Child Development*, *74*(3), 752-768.

Latendresse, S. J., Rose, R. J., Viken, R. J., Pulkkinen, L., Kaprio, J., & Dick, D. M. (2008). Parenting mechanisms in links between parents' and adolescents' alcohol use behaviors. *Alcoholism: Clinical and Experimental Research*, *32*(2), 322-330.

Loeber, R., Stepp, S. D., Chung, T., Hipwell, A. E., & White, H. R. (2010). Time-varying associations between conduct problems and alcohol use in adolescent girls: The moderating role of race. *Journal of Studies on Alcohol and Drugs*, *71*(4), 544-553.

Nash, S. G., McQueen, A., & Bray, J. H. (2005). Pathways to adolescent alcohol use: Family environment, peer influence, and parental expectations. *Journal of Adolescent Health*, *37*(1), 19-28.

Needham, B. L. (2007). Gender differences in trajectories of depressive symptomatology and substance use during the transition from adolescence to young adulthood. *Social Science & Medicine*, *65*(6), 1166-1179.

Neppl, T. K., Dhalewadikar, J., & Lohman, B. J. (2016). Harsh parenting, deviant peers, adolescent risky behavior: Understanding the meditational effect of attitudes and intentions. *Journal of Research on Adolescence*, *26*(3), 538-551.

Peleg-Oren, N., Saint-Jean, G., Cardenas, G. A., Tammara, H., & Pierre, C. (2009). Drinking alcohol before age 13 and negative outcomes in late adolescence. *Alcoholism: Clinical and Experimental Research*, *33*(11), 1966-1972.

Peterson, P. L., Hawkins, J. D., Abbott, R. D., & Catalano, R. F. (1994). Disentangling the effects of parental drinking, family management, and parental alcohol norms on current drinking by black and white adolescents. *Journal of Research on Adolescence*, *4*(2), 203-227.

Poelen, E. A., Scholte, R. H., Engels, R. C., Boomsma, D. I., & Willemsen, G. (2005). Prevalence and trends of alcohol use and misuse among adolescents and young adults in the Netherlands from 1993 to 2000. *Drug and Alcohol Dependence*, *79*(3), 413-421.

Rothman, E. F., Wise, L. A., Bernstein, E., & Bernstein, J. (2009). The timing of alcohol use and sexual initiation among a sample of Black, Hispanic, and White adolescents. *Journal of Ethnicity in Substance Abuse*, *8*(2), 129-145.

Ryan, S. M., Jorm, A. F., & Lubman, D. I. (2010). Parenting factors associated with reduced adolescent alcohol use: a systematic review of longitudinal studies. *Australian and New Zealand Journal of Psychiatry*, *44*(9), 774-783.

Smetana, J. G., Campione-Barr, N., & Metzger, A. (2006). Adolescent development in interpersonal and societal contexts. *Annual Review of Psychology*, *57*, 255-284.

Steinberg, L. (2001). We know some things: Parent–adolescent relationships in retrospect and prospect. *Journal of Research on Adolescence*, *11*(1), 1-19.

Stice, E., & Barrera, M. (1995). A longitudinal examination of the reciprocal relations between perceived parenting and adolescents' substance use and externalizing behaviors. *Developmental Psychology*, *31*(2), 322.

Stice, E., Barrera Jr, M., & Chassin, L. (1998). Prospective differential prediction of adolescent alcohol use and problem use: Examining the mechanisms of effect. *Journal of Abnormal Psychology*, *107*(4), 616.

Strachman, A., Impett, E. A., Henson, J. M., & Pentz, M. A. (2009). Early adolescent alcohol use and sexual experience by emerging adulthood: A 10-year longitudinal investigation. *Journal of Adolescent Health*, *45*(5), 478-482.

Van der Vorst, H., Engels, R. C., Meeus, W., & Deković, M. (2006). Parental attachment, parental control, and early development of alcohol use: A longitudinal study. *Psychology of Addictive Behaviors*, *20*(2), 107.

van Nieuwenhuijzen, M., Junger, M., Velderman, M. K., Wiefferink, K. H., Paulussen, T. W., Hox, J., & Reijneveld, S. A. (2009). Clustering of health compromising behavior and delinquency in adolescents and adults in the Dutch population. *Preventive Medicine*, *48*(6), 572-578.

Wagenaar, A. C., Tobler, A. L., & Komro, K. A. (2010). Effects of alcohol tax and price policies on morbidity and mortality: a systematic review. *American Journal of Public Health*, *100*(11), 2270-2278.

Wang, M. T., Dishion, T. J., Stormshak, E. A., & Willett, J. B. (2011). Trajectories of family management practices and early adolescent behavioral outcomes. *Developmental Psychology*, *47*(5), 1324.

Webb, J. A., Bray, J. H., Getz, J. G., & Adams, G. (2002). Gender, perceived parental monitoring, and behavioral adjustment: Influences on adolescent alcohol use. *American Journal of Orthopsychiatry*, *72*(3), 392-400.

White, H. R., Johnson, V., & Buyske, S. (2000). Parental modeling and parenting behavior effects on offspring alcohol and cigarette use: A growth curve analysis. *Journal of Substance Abuse*, *12*(3), 287-310.

Zucker, R. A., Fitzgerald, H. E., & Moses, H. D. (1995). Emergence of alcohol problems and the several alcoholisms: A developmental perspective on etiologic theory and life course trajectory.

Appendices

Table 3. Results of repeated measures ANOVA across original and imputed datasets.

Repeated Measures ANOVA for warmth

Imputation Number	Effect	*F*	Hypothesis df	Error	*p*
Original data	Time	1.106	1	342	.294
	Time * trajectory	1.442	2	342	.238
	Parent	1.256	1	342	.263
	Parent * trajectory	1.086	2	342	.339
	Time * parent	.108	1	342	.743
	Time * parent * trajectory	4.541	2	342	.011
	Trajectory	4.925	2	342	.008
1	Time	4.465	1	597	.035
	Time * trajectory	3.208	2	597	.041
	Parent	5.248	1	597	.022
	Parent * trajectory	.273	2	597	.761
	Time * parent	.399	1	597	.528

	Time * parent * trajectory	2.367	2	597	.095
	Trajectory	.157	2	597	.855
2	Time	.807	1	597	.369
	Time * trajectory	.958	2	597	.384
	Parent	2.140	1	597	.144
	Parent * trajectory	1.486	2	597	.227
	Time * parent	9.095	1	597	.003
	Time * parent * trajectory	2.358	2	597	.095
	Trajectory	1.535	2	597	.216
3	Time	.247	1	597	.619
	Time * trajectory	.870	2	597	.420
	Parent	3.171	1	597	.075
	Parent * trajectory	.089	2	597	.915
	Time * parent	2.156	1	597	.143

	Time * parent * trajectory	2.494	2	597	.083
	Trajectory	2.030	2	597	.132
4	Time	.000	1	597	.983
	Time * trajectory	.909	2	597	.404
	Parent	3.192	1	597	.075
	Parent * trajectory	.169	2	597	.845
	Time * parent	.048	1	597	.827
	Time * parent * trajectory	5.965	2	597	.003
	Trajectory	.733	2	597	.481
5	Time	1.040	1	597	.308
	Time * trajectory	2.145	2	597	.118
	Parent	3.788	1	597	.052
	Parent * trajectory	.720	2	597	.487
	Time * parent	.000	1	597	.992

	Time *	1.794	2	597	.167
	parent *				
	trajectory				
	Trajectory	.151	2	597	.860

Repeated Measures ANOVA for conflict

Imputation Number	Effect	F	Hypothesis df	Error	p
Original data	Time	3.097	2	185	048
	Time * trajectory	.218	4	372	.928
	Parent	1.187	1	186	.277
	Parent * trajectory	.444	2	186	.642
	Time * parent	.684	2	185	.506
	Time * parent * trajectory	1.069	4	372	.372
	Trajectory	5.609	2	186	.004
1	Time	8.227	2	596	.000
	Time * trajectory	5.962	4	1194	.000
	Parent	5.214	1	597	.023

	Parent * trajectory	.312	2	597	.732
	Time * parent	2.096	2	596	.124
	Time * parent * trajectory	4.162	4	1194	.002
	Trajectory	22.039	2	597	.000
2	Time	9.722	2	596	.000
	Time * trajectory	6.659	4	1194	.000
	Parent	1.312	1	597	.253
	Parent * trajectory	.376	2	597	.687
	Time * parent	6.487	2	596	.002
	Time * parent * trajectory	.504	4	1194	.733
	Trajectory	17.456	2	597	.000
3	Time	3.649	2	596	.027
	Time * trajectory	7.543	4	1194	.000
	Parent	1.533	1	597	.216

	Parent * trajectory	.427	2	597	.653
	Time * parent	2.757	2	596	.064
	Time * parent * trajectory	.109	4	1194	.979
	Trajectory	18.909	2	597	.000
4	Time	7.811	2	596	.000
	Time * trajectory	6.134	4	1194	.000
	Parent	.311	1	597	.577
	Parent * trajectory	.801	2	597	.449
	Time * parent	2.526	2	596	.081
	Time * parent * trajectory	2.044	4	1194	.086
	Trajectory	21.206	2	597	.000
5	Time	6.748	2	596	.001
	Time * trajectory	6.006	4	1194	.000
	Parent	1.020	1	597	.313

	F	Hypothesis df	Error	p
Parent * trajectory	1.511	2	597	.222
Time * parent	3.118	2	596	.045
Time * parent * trajectory	.684	4	1194	.603
Trajectory	20.733	2	597	.000

Repeated Measures ANOVA for knowledge

Imputation Number	Effect	F	Hypothesis df	Error	p
Original data	Time	1.293	1	372	.256
	Time * trajectory	.843	2	372	.431
	Trajectory	10.300	2	372	.000
1	Time	.043	1	597	.828
	Time * trajectory	4.138	2	597	.016
	Trajectory	5.503	2	597	.004
2	Time	.380	1	597	.538
	Time * trajectory	.298	2	597	.742
	Trajectory	6.432	2	597	.002

3	Time	.001	1	597	.971
	Time * trajectory	1.231	2	597	.293
	Trajectory	10.308	2	597	.000
4	Time	.260	1	597	.610
	Time * trajectory	2.681	2	597	.069
	Trajectory	7.693	2	597	.001
5	Time	2.957	1	597	.086
	Time * trajectory	2.056	2	597	.129
	Trajectory	8.247	2	597	.000

Repeated Measures ANOVA for disclosure

Imputation Number	Effect	F	Hypothesis df	Error	p
Original data	Time	.001	1	365	.981
	Time * trajectory	2.844	2	365	.059
	Trajectory	11.998	2	365	.000
1	Time	.051	1	597	.822
	Time * trajectory	.688	2	597	.503
	Trajectory	12.315	2	597	.000

2	Time	.207	1	597	.294
	Time * trajectory	.696	2	597	.238
	Trajectory	9.839	2	597	.000
3	Time	3.172	1	597	.075
	Time * trajectory	.661	2	597	.517
	Trajectory	12.222	2	597	.000
4	Time	.759	1	597	.384
	Time * trajectory	2.788	2	597	.062
	Trajectory	13.364	2	597	.000
5	Time	.083	1	597	.774
	Time * trajectory	6.246	2	597	.002
	Trajectory	11.452	2	597	.000

Repeated Measures ANOVA for control

Imputation Number	Effect	F	Hypothesis df	Error	p
Original data	Time	.001	1	358	.980
	Time * trajectory	2.982	2	358	.052
	Trajectory	8.374	2	358	.000

1	Time	.330	1	597	.566
	Time * trajectory	5.565	2	597	.078
	Trajectory	7.381	2	597	.001
2	Time	1.953	1	597	.163
	Time * trajectory	2.225	2	597	.109
	Trajectory	12.736	2	597	.000
3	Time	1.838	1	597	.176
	Time * trajectory	2.115	2	597	.121
	Trajectory	9.357	2	597	.000
4	Time	1.789	1	597	.182
	Time * trajectory	4.745	2	597	.009
	Trajectory	8.422	2	597	.000
5	Time	.817	1	597	.366
	Time * trajectory	5.531	2	597	.004
	Trajectory	8.642	2	597	.000