



# Article Interplay between Parental Knowledge and Adolescent Inebriation, and Their Links to Parent–Child Relationships over Time

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**Abstract:** While parental knowledge of adolescents' whereabouts is generally considered to be a key protective factor for adolescent alcohol use, the developmental links during adolescence are unclear. Focusing on within-family processes on a sample of Swedish early to late adolescents (n = 782; 49% female) over four waves of data, we (1) tested the interplay between parental knowledge and adolescent alcohol inebriation, (2) investigated whether changes over time in parental knowledge and adolescent gender and SES on these potential links. The results from random intercept cross-lagged panel models showed that increases in parental knowledge predicted decreases in frequencies of adolescent inebriation the following year as well a more positive parent–child relationship over time. Increases in adolescent inebriation were not moderated by adolescent gender or SES. The results emphasize the importance of increasing parental knowledge of adolescent activities in order to reduce adolescent involvement in heavy alcohol use as well as the importance of parent–child closeness.

**Keywords:** parental knowledge; parent–child relationships; adolescence; alcohol use; inebriation; RI-CLPM

# 1. Introduction

Despite general declining trends in adolescent alcohol use, inebriation or 'binging' remains a public health concern [1]. In Sweden, for example, about 7% of 15 year olds and 20% of 17 year olds reported binge drinking over the last 12 months [2]. Adolescents who engage in inebriation are at a higher risk of developing alcohol problems as adults, which, in turn, may lead to other negative health-related and social outcomes [3]. Understanding the protective factors for heavy alcohol use in adolescence may have important implications for both theory and prevention policy. One of the major protective and modifiable factors for adolescent alcohol use and inebriation is parenting, including parent–child relationships in general and parental knowledge of adolescents' everyday life in particular [4]. At the same time, as parents and their adolescent children co-engage in their relationships, parenting and the overall parent–child relationship could be affected by changes in adolescent behaviors [5] such as alcohol use. Therefore, in the current study, we aimed to test the dynamic interplay between parental knowledge and adolescent alcohol inebriation as well as their longitudinal effects on parent–child relationships over time.

Parenting an adolescent child with mood tantrums, growing autonomy needs, and new, potentially harmful, behaviors is not always easy. Indeed, the developmental period of adolescence encompasses many developmentally normative biopsychosocial changes, including puberty, with changes in physical appearance, cognitive maturation, and identity formation [6]. Typically, early adolescence (i.e., approximately age 12–14) is considered to



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**Copyright:** © 2024 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https:// creativecommons.org/licenses/by/ 4.0/). be the most critical period of adolescence, with a general rise in risk behaviors, including alcohol use, at the same time as the adolescent need for autonomy and individuation from parents increases [7]. Considering the perceived imbalance in parent-child interactions during early adolescence, conflicts and daily hassles with parents tend to escalate, reaching a peak in mid-adolescence and subsequently decreasing thereafter [6]. In addition, communication between parents and their maturing children undergoes changes, typically between age 13 and 18, with a simultaneous decrease in adolescent disclosure, commonly considered to be the primary source of parental knowledge [8], and parental knowledge of their children's lives and activities [9]. These processes, however, seem to vary within families. Despite the normative changes in parent-child relationships, maintaining positive parent-child relationships and positive parenting practices seem to be key to more positive adolescent developmental outcomes, not least during early adolescence [10]. For example, adolescents living in families with close emotional bonds and support [11,12] and where parents are engaged in adolescent everyday lives [13] are less likely to engage in 'unsanctioned' behavior, including heavy alcohol use [14]. As relationships between parents and their adolescent children become more egalitarian during the later stages of adolescence [6], it is then possible that parenting is particularly protective during early to mid-adolescence.

Theoretically, these ideas suggest that parents, through closeness and bonds as well as their parenting practices, socialize their adolescents, thus shaping the development of adolescents' psychosocial behaviors [5,7]. Accordingly, parents have been seen as active agents responsible for the development of their children, while children have been considered to be merely the recipients of contextual forces. This model is often referred to as the ecological model of development [15] and outlines the child and their development as dependent on their proximal (e.g., parents and school) and more distal ecological systems (e.g., economy and culture). These systems surround the child, directly or indirectly, and have an impact on the developmental transitions of the child. However, an important limitation and critique of the model is the lack of attention given to child agency in interactions with the different systems. The Process-Person-Context-Time (PPCT) model [16,17] extends the ecological model, with greater focus on an individual's own role and person-context interactions in relation to developmental processes [18]. From this perspective, unidirectional parent-child models that only focus on the parent to child impact on the child's development may ignore child to parent impacts [7] and may be missing an important aspect of understanding child development.

Transactional models of development suggest that both children and parents are engaged in a chain of interactions, with mutual actions and reactions in their relationships [5,19]. Even though parents and children are unequal in power, both parents and their children express their agency and are receptive and vulnerable to each other's influence [13]. Sameroff's developmental model of transaction [14] extends such a reciprocal view of parent–child interactions, suggesting that the individual develops in response to the changing environment, which, in turn, also changes as a result of the individual's own transformational processes. Translated to parenting and adolescent inebriation, it is then hypothetically possible that that parents and their parenting practices induce changes in the development of their adolescent's behavior, but that also adolescents, with their attitudes, emotional expressions, and normative behaviors, induce changes in parents and their parenting practices. Indeed, such a view has been adopted and called for in recent parenting research where both parent and child effects from a longitudinal perspective have been acknowledged [6].

To address such an interplay between parenting factors and adolescent development, scholars often adopt modelling designs where both parent to child effects (i.e., parenting  $\rightarrow$  child behavior) as well child to parent effects (i.e., child behavior  $\rightarrow$  parenting) are controlled for in reciprocal models (e.g., cross-lagged panel models). Specifically, studies using a two-wave cross-lagged design that tested the links between parental knowledge and adolescent substance use showed that parental knowledge of adolescent whereabouts and adolescent substance use were linked in a bidirectional manner; i.e., parental knowledge

predicted less substance use one year later, while more substance use predicted less parental knowledge one year later [20,21]. These links, however, varied by adolescent personal characteristics such as culture [20] or adolescent temperament [21]. On the other hand, another study using a sample of late adolescents (i.e., 18–19 year olds) and a cross-lagged design showed that the links between parental knowledge and adolescent alcohol use were rather unidirectional, with parental knowledge having an effect on adolescent alcohol use but not the other way around [22]. Yet another study with early to mid-adolescents [23] showed that a decline in knowledge was related to an increase in episodic drinking, while the effect of adolescent drinking on later parental knowledge was modest, reaching a p < 0.10 significance. Thus, parental knowledge may predict lower alcohol use, while higher alcohol use among adolescents may or may not predict less parental knowledge, but these links are non-conclusive and potentially differ between families.

Such confusion could be a result of an important drawback with models that do not disentangle between-person from within-person effects [24,25]. In other words, despite the advances in cross-lagged panel models, it is not possible to separate the differences between families (i.e., whether the adolescents of parents who know about their children's whereabouts drink less than adolescents of parents who have less information about their children) from processes that happen within families (i.e., whether adolescents drink less when their parents have more knowledge of their whereabouts), which makes it difficult to draw any ecologically valid inferences from the results. In that sense, understanding causality, which is often the focal point of research investigations, without being able to test the processes within families is challenging.

Analytical models that can separate changes in both parenting and child outcomes while modelling dynamic interactions between the two at a within-family/person level are necessary to improve our understanding of the causal processes [21]. While studies on such processes between parenting and child developmental outcomes are on the rise [26–28], to our knowledge, no studies have simultaneously addressed within-person changes and interactions between parenting and adolescent substance use. Closest to the approach of testing the dynamic interactions between parental knowledge and adolescent substance use is a study of US early to mid-adolescents that utilized multi-level growth models to separate the within-person from between-person processes in parental knowledge and adolescent substance use. The results indicated that changes in parental knowledge were robustly linked to changes in adolescent substance use, while the opposite effect (i.e., changes in adolescent substance use predicted changes in parental knowledge) was not significant [29]. Such an approach, however, did not allow for the controlling of the child effect (i.e., adolescent substance use), as suggested by scholars [5]. Clearly, there is a need for more studies examining the dynamic changes and interactions between parental knowledge and adolescent alcohol use at the level of within-family/person developmental change. By controlling for both parenting and child effects in a dynamic longitudinal model, our study aimed to fill this research gap.

With the dynamic changes in parenting and child behavior, it is also possible that the general family climate and the perception of the parent–child relationship changes. Theoretically [5,19], following the idea that contexts change as a result of changes in individuals and their behaviors, such a suggestion is developmentally compelling. While some studies suggest that the quality of the parent–child relationship could be a moderator of the associations between parental knowledge and adolescent behavioral outcomes [12], parental monitoring research suggests that parental knowledge of adolescent whereabouts is intrinsically related to parent–child closeness, and thus the overall parent–child relationship [13]. The idea is that a positive parent–child relationship may enhance parents' actions to gain knowledge of their adolescents' whereabouts (i.e., parent–child relationship  $\rightarrow$  parental knowledge), yet the level of parental engagement and increased knowledge of adolescent whereabouts may be essential for establishing or maintaining a high-quality parent–child relationship (i.e., parental knowledge  $\rightarrow$  parent–child relationship). Similarly, although the quality of the parent–child relationship may influence child behavior, changes in the child's behavior can also lead to alterations in parent–child interactions and relationships [5]. Therefore, grounded within the framework of developmental psychology and transactional models of development [13,14], we aimed to investigate the reciprocal interplay between parental knowledge and adolescent alcohol inebriation as well as the potential effects of these processes on parent–child closeness as a proxy for the parent–child relationship [30] over time. We focused on inebriation rather than alcohol use because whereas some alcohol use may be normative for adolescents in many Western contexts, inebriation or heavy binge drinking during the early and mid-adolescent period might be a better marker of later alcohol problems [31,32].

Finally, as gender roles [33] as well as socio-economic inequalities [34] have an impact on psychosocial development in children, it is possible that gender and socio-economic status (SES) could serve as moderators in associations between parental knowledge, adolescent substance use, and subsequent parent–child relationships. While parenting serves as a protective factor against adolescent involvement in alcohol use, variations in parenting practices and parent–child interactions may exist based on the child's gender [35] and family SES [36]. Consequently, the magnitude of the effects may differ depending on the child's gender or family SES. As the male gender and a low SES are risk factors for increased substance use, including inebriation [37,38], it is possible that parental knowledge is a stronger protective factor for boys and for adolescents from low-SES families in terms of alcohol inebriation.

## The Present Study

The present study drew on four waves of data on Swedish adolescents, aiming to test the dynamic interplay between parental knowledge and adolescent alcohol inebriation as well as their longitudinal effects on parent-child relationships over time. Our main research questions were: RQ1: what is the developmental interplay between parental knowledge and adolescent alcohol inebriation? RQ2: what is the link between the fluctuations in parental knowledge and adolescent alcohol inebriation as well as parent-child closeness over time? RQ3: are the potential links moderated by adolescent gender and SES? To answer these research questions, we used random intercept cross-lagged panel models (RI-CLPMs) with parent-child closeness as a time-invariant outcome [39]. In addition, we utilized multi-group analyses to test the potential moderation by gender and by SES. Contrary to a traditional cross-lagged panel model, the RI-CLPM can separate withinfrom between-person variances, allowing for the analysis of temporal and developmental processes separately from the influence of trait-like factors, which may be deemed to be stable during the study period [25]. The RI-CLPM can, therefore, separate potential familylevel differences while estimating the reciprocal cross-lagged relations between parental knowledge and alcohol inebriation at a within-person level during adolescence. Based on the theoretical assumptions of the transactional model of development [5] and the model of parental knowledge as intrinsically related to the parent-child relationship [13], we hypothesized (1) that the within-person links between parental knowledge and adolescent alcohol inebriation would be negative and reciprocal, and (2) that these fluctuations would be associated with the parent-child relationship over time. We did not formulate any hypotheses about the moderation of the links, given the limited literature on the subject.

#### 2. Materials and Methods

# 2.1. Participants and Internal Drop-Out

Four waves of data were used from the Longitudinal Research on Development in Adolescence (LoRDIA) research program, which was a prospective, total population study of four municipalities in west Sweden comprising two panels of youths a year apart in age who were contemporaneously sampled. All adolescents registered at all schools in the four municipalities were invited, by letter to the legal guardian, to participate in the study. A passive consent model was used for recruitment where legal guardians could opt their child out of the study. An analysis of school records showed that the total recruited sample comprising both panels did not significantly differ from the total population in terms of sex, school absence, or school grades [12].

The current study drew on just one of the two panels as the panel in question had been canvassed using the above measures at ages 13, 14, 15, and 17, whereas the other panel had not. We included all participants who had responded at t1 to questions about parental knowledge and inebriation. This resulted in a final sample of n = 782. In terms of sex, the sample was evenly distributed (49% female; 51% male). Table 1 provides descriptive statistics for three main measures of the final sample for all four waves (T1, T2, T3, and T4).

**Table 1.** Descriptive statistics of the sample over four waves.

Variable	n	M (SD)
Parental knowledge T1	779	2.79 (0.34)
Parental knowledge T2	594	2.66 (0.36)
Parental knowledge T3	624	2.52 (0.42)
Parental knowledge T4	406	2.54 (0.40)
Adolescent inebriation T1	731	1.02 (0.15)
Adolescent inebriation T2	604	1.09 (0.38)
Adolescent inebriation T3	629	1.29 (0.65)
Adolescent inebriation T4	407	1.98 (0.93)
Parent-child closeness T4	395	4.20 (0.71)

A missing data analysis showed that Little's MCAR (missing completely at random) was significant ( $\chi 2 = 210.399$  (168); p = 0.015). The normed chi-squared ( $\chi 2/df$ ) was, however, low (210.399/168 = 1.25), implying a low violation of the MCAR assumption. Further attrition analyses showed that 52% of the sample providing data at the baseline (t1) continued to provide data at t4. The attrited adolescents reported lower levels of parental knowledge (MAttrited = 2.75, MRetained = 2.83, p = 0.02, and d = 0.23) at the baseline but there were no differences in attrition relating to heavy alcohol use, gender, and SES.

## 2.2. Measures

Data were gathered using a self-report questionnaire. Alcohol inebriation, adapted from the annual school survey conducted by The Swedish Council for Information on Alcohol and Drugs (CAN) [2], was measured as a single, 3-step ordinal scale item, assessing how often the adolescent had been inebriated during the last 12 months as "Never", "Sometimes", or "Often".

Perceptions of parental knowledge of adolescents' whereabouts and activities [8] were measured using five items, with questions such as "Do you know what your child does during their free time?". The measure did not distinguish which parent was in mind, so, in the case of two-parent families, the answers reflected the adolescent's subjective compositive view of both parents (or primary caregivers). The ratings ranged from 1 (Never) to 3 (Always), with internal consistencies at different time points (T1:  $\alpha = 0.66$ ; T2:  $\alpha = 0.68$ ; T3:  $\alpha = 0.66$ ; and T4:  $\alpha = 0.69$ ).

Parent–child closeness was measured at T4; thus, when adolescents were 17 years old, emotional closeness between adolescents and their mother and father was assessed, respectively [12,40], with five items such as "When I am angry, sad, or worried, my mother/father can make me feel better". Ratings ranged from 1 (Not true) to 3 (Completely true), with internal consistencies (mother:  $\alpha = 0.85$ ; father:  $\alpha = 0.86$ ). The measure was subsequently averaged with an internal consistency of  $\alpha = 0.90$ . For a full description of the measures, see Appendix A.

Two moderators were also used. Perceived relative family affluence, as a proxy for subjective socio-economic status (SSES), was measured using one question: "How are your family's finances compared to other families where you live?". There were three response categories: 1 = Less money than other families, 2 = The same as other families, and 3 = More money than other families. We dichotomized the measure to low and high SSES based on

the median value of the respondents. A similar subjective measure was extensively used in a health behaviors in school children (HBSC) study [41]. Gender was measured using a self-reported dichotomous question item with two response categories, "Female" and "Male".

#### 2.3. Data Analysis

The intraclass coefficients (ICCs) were first calculated for parental knowledge and inebriation. While the use of a RI-CLPM can be justified partly on theoretical grounds, a threshold for the ICC of >0.1 was set as simulation studies have found that even with an ICC of 0.1, type 1 errors can be higher than 5% and thus a multi-level analysis is warranted [42]. For RQ1, the interplay of parental knowledge and inebriation over the four time points was modelled. For RQ2, parent-child closeness was added to the model as a time-invariant outcome, either regressing on earlier time points or correlating with the contemporaneous time point, and this was freely estimated at each time point to capture developmental changes. For RQ3, measurement invariance tests of the model from RQ2 were run by gender and SSES by comparing a model with lagged parameters constrained to equality with a model with freely estimated parameters. Missing answers were handled using full information maximum likelihood, which allows an estimation of missing data if they are presumed to be MAR. Because of non-normality in the inebriation measure, robust estimators (Huber–White) were used; these provide reliable estimates even with non-normal data [43,44]. The absolute model fit was assessed using robust chi-squared tests  $(\chi 2)$  and comparative fit was assessed using a robust comparative fit index (CFI), robust Tucker-Lewis index (TLI), robust root-mean-square error of approximation (RMSEA), and standardized root-mean-square residual (SRMR) [45]. The comparison of the nested models (for invariance testing) was assessed using the chi<sup>2</sup> difference ( $\Delta \chi 2$ ) alongside a change of >0.01 in robust CFI ( $\Delta$ CFI) [46]. This was because using  $\Delta \chi^2$  alone has been associated with finding higher levels of invariance [47]. Modelling was conducted using RStudio (2023.03.0 Build 386) and lavaan 0.6–7 [48] with code provided by Mulder and Hamaker [39]. Within-person cross-lagged effects were interpreted as strong effect (>0.12), medium effect (>0.07), and small effect (<0.03) [49].

#### 3. Results

The ICC for inebriation was 0.04, suggesting that 4% of the variance over the measurement points could be accounted for by developmentally stable (during the study period) between-person differences. The ICC for parental knowledge was higher at 0.28, implying that 28% of the variance was due to between-family/person factors. This suggested that individual differences played less of a role in the developmental trajectory of alcohol inebriation. Inebriation was, therefore, modelled using only observed measurements, whereas parental knowledge was modelled using a random intercept and within-person factors (see Figure 1).



Figure 1. The final model of the study.

#### 3.1. RQ1 Interplay between Parental Knowledge and Inebriation

The model of the reciprocal developmental links between parental knowledge and inebriation had an acceptable fit (robust  $\chi 2 = 41.04$ , df = 11, and p < 0.01; robust CFI = 0.99; robust TLI = 0.97; robust RMSEA = 0.05; SRMSR = 0.03). The regression and correlation model parameters are shown in Table 2. Statistically significant parameters are shown in bold.

Table 2. Parameters for the interplay model between parental knowledge and adolescent inebriation.

Regressions	В	S.E.	Ζ	β
T1 PK-T2 PK	0.16	0.06	2.5	0.15 **
Т2 РК-Т3 РК	0.42	0.05	7.81	0.34 **
T3 PK-T4 PK	0.22	0.03	7.00	0.24 **
T1 AI–T2 AI	0.36	0.20	1.82	0.14
T2 AI–T3 AI	0.47	0.08	6.23	0.29 **
T3 AI-T4 AI	0.42	0.04	11.49	0.29 **
T1 PK-T2 AI	-0.31	0.01	-3.15	-0.24 **
T2 PK-T3 AI	-0.46	0.07	-6.08	-0.23 **
T3 PK-T4 AI	-0.33	0.07	-5.00	-0.14 **
T1 AI-T2 PK	-0.33	0.14	-2.31	-0.16 *
T2 AI-T3 PK	-0.06	0.04	-1.58	-0.06
T3 AI-T4 PK	-0.09	0.02	-4.73	-0.15 *
Correlations				
T1 PK-T1 AI	-0.01	0.006	-2.25	-0.30 *
T2 PK-T2 AI	-0.03	0.007	-4.65	-0.29 **
T3 PK–T3 AI	-0.03	0.009	-3.58	-0.16 **
T4 PK-T4 AI	-0.04	0.009	-3.99	-0.12 **

Note: \*\* *p* < 0.001 \* *p* < 0.05; PK = Parental knowledge; AI = Adolescent Inebriation.

Within-person fluctuations in parental knowledge were negatively associated with changes in inebriation frequency at the subsequent time point across adolescence. Given that these were within-person variance components, they could be interpreted in line with recommendations from Orth and colleagues [49] as strong associations. In short, as parental knowledge increased in relation to an individual's own start point (intercept), this temporal fluctuation was associated with fewer occasions of inebriation in the following period, e.g., one year.

On the other hand, cross-lagged negative associations from inebriation to parental knowledge were also found at two time points: in early adolescence (T1–T2, between age 13 and 14) and in later adolescence (T3–T4, between age 15 and 17). Although these associations were weaker than the links from parental knowledge to adolescent inebriation, the results suggested that frequency of inebriation was linked to lower parental knowledge at the next time point during the early and the later stages of adolescence.

The contemporaneous links between parental knowledge and inebriation were negatively correlated at all time points and showed an approximate decreasing trend in correlations during adolescence.

#### 3.2. RQ2 Developmental Links between Parental Knowledge, Inebriation, and Parent–Child Closeness

A model with parent–child closeness as an external, time-invariant outcome of parental knowledge and inebriation over the four measurement points had an acceptable fit (robust  $\chi 2 = 41.04$ , df = 1, and p < 0.01; robust CFI = 0.99; robust TLI = 0.97; robust RMSEA = 0.05; SRMSR = 0.03). The additional parameters for associations between parent–child closeness and parental knowledge or inebriation are shown in Table 3. Parent–child closeness at t4 showed positive associations with parental knowledge throughout adolescence. Positive

associations were also found with inebriation, although this was only at two time points during early adolescence and these were two to three times weaker in magnitude.

**Table 3.** Parameters for developmental links between parental knowledge, inebriation, and parentchild closeness at T4.

Regressions	В	S.E.	Z	β	
T1 PK	0.84	0.16	5.14	0.35 **	
T2 PK	0.58	0.12	4.67	0.25 **	
T3 PK	0.42	0.07	6.14	0.23 **	
T1 AI	0.60	0.17	3.45	0.13 **	
T2 AI	0.21	0.07	2.84	0.11 **	
T3 AI	0.05	0.03	1.48	0.05	
Correlations					
T4 PK	0.09	0.01	8.88	0.40 **	
T4 AI	0.02	0.02	1.50	0.05	

Note: \*\* *p* < 0.001; PK: parental knowledge; AI: alcohol inebriation.

## 3.3. RQ3. Measurement Invariance Tests by Gender and SSES

Constraining the lagged parameters to be equal across sex had an equivalent model fit (robust  $\chi 2 = 32.93$ , df = 34, and p = 0.52; robust CFI = 1.00) compared with a model where the parameters were freely estimated by sex (robust  $\chi 2 = 22.30$ , df = 22, and p = 0.44; robust CFI = 1.00:  $\Delta \chi 2 = 9.83$ , df = 12, and p = 0.63;  $\Delta$ CFI = 0). Similarly, constraining the lagged parameters to be equal across the two levels of SSES had an equivalent model fit (robust  $\chi 2 = 27.52$ , df = 34, and p = 0.78; robust CFI = 1.00) compared with a model where the parameters were freely estimated by sex (robust  $\chi 2 = 19.63$ , df = 22, and p = 0.61; robust CFI = 1.00:  $\Delta \chi 2 = 7.22$ , df = 12, and p = 0.84;  $\Delta$ CFI = 0). Thus, the lagged parameter part of the model was deemed to be invariant by the two moderators of gender and SSES.

# 4. Discussion

Previous studies have suggested that parents, as children's proximal socializing agents [15], may protect adolescents from initiating or escalating substance use, including alcohol inebriation [4]. There has, however, been a lack of focus on an adolescent's own role in terms of alcohol-use development as well as interactions with their parents [19]. Moreover, the lack of emphasis on fluctuations in parenting and adolescent inebriation within families [25] has caused confusion in terms of the ecological validity of previous results. To address these gaps, we used a random intercept cross-lagged panel model (RI-CLPM) with early to late adolescents to investigate the interplay between parental knowledge and adolescent inebriation as well as the potential effects of these processes on parent–child relationships over time. In addition, we also tested the moderating effects of adolescent gender and SES on the links between parental knowledge, adolescent inebriation, and subsequent parent–child relationships.

Our analyses showed that at a within-person level, parental knowledge was linked to less alcohol inebriation, both concurrently and at the next time point, which was consistent with our hypothesis. This indicated that while controlling for possible contemporaneous and stability effects throughout adolescence, an increase in parental knowledge of adolescents' activities within the family over and above the 'usual' level was linked to lower frequencies of adolescent inebriation the following year. This is important, as such a finding suggests and upholds the importance of parents' awareness of adolescents' activities and everyday lives on influencing their development. Increasing parental awareness of adolescents' whereabouts provides parents with opportunities to offer guidance and support in their adolescents' lives, which may reduce potential harm that adolescents may encounter and promote healthier drinking behavior such as reduced binging or heavy use [4].

Additionally, given the theoretical assumption that children and parents are mutually linked and influence each other and their behaviors [5,19], we also wanted to understand

whether changes in adolescent inebriation would induce changes in the amount of knowledge that parents would have of their adolescents' activities. Contrasting the results from other studies [29], the results from our study showed that changes in adolescent inebriation predicted negative changes in parental knowledge over time (i.e., increased inebriation predicted less parental knowledge at the next time point), which suggests reciprocal associations between adolescent inebriation and parental knowledge [20,21]. These results substantiated our hypotheses regarding the reciprocal associations between parental knowledge and adolescent inebriation. It should, however, be noted that the effects of adolescent inebriation to parental knowledge were somewhat unstable and evident only during early adolescence (between the age of 13 and 14) and late adolescence (between the age of 15 and 17), and that the effects were generally smaller than the effects of parental knowledge to adolescent inebriation. Although it would be rather unexpected that parents would have less knowledge as a result of adolescent inebriation, we speculate that the secrecy that generally co-develops with adolescent drinking habits [50] plays an important role in this association. As parental knowledge is generally a product of adolescent disclosure [21], any secretiveness and concealment of information from parents would likely have an impact on what parents know of their adolescents' whereabouts. Another possible explanation is that parents become more relaxed in their parenting practices to ease the dissonance between their own strict attitudes and adolescent behavior [51]. At the later stage of adolescence, when alcohol use becomes both more common [2] and normative [52], it is also possible that adolescents perceive parental involvement and knowledge as less legitimate [53] and disclose less information to their parents over time [54], thus bringing about a reduction in parental knowledge. As such, parents are likely to acknowledge their adolescents' need for privacy and relax certain parenting practices that they potentially used at earlier stages of adolescent development.

To understand whether adolescent alcohol inebriation and parental knowledge was linked to the overall parent-child relationship, we also tested whether within-person variations in parental knowledge and observed variations in alcohol inebriation during adolescence were associated with parent-child closeness at age 17 (wave 5). Generally, adolescent alcohol use and inebriation was linked to the quality of the parentchild relationship [4]. Adolescent inebriation, which is commonly prohibited by parents, may be the origin of parent-child conflicts [55], which, in turn, could induce strain on parent-child relationships. Therefore, it was expected that increased levels of adolescent alcohol inebriation would have a negative effect on parent-child relationships over time. To our surprise, the results showed positive associations between adolescent inebriation at T1 and T2 and the parent-child relationship at T4, suggesting that increases in inebriation were linked to higher parent-child closeness and, therefore, a higher quality of the parent-child relationship over time. These effects were, however, small and inconsistent throughout adolescence. We suspected that the non-normality in the distribution of inebriation at T1 and T2 may have produced biased and inflated statistics [56], which may have increased Type I errors despite the use of robust estimators. Another explanation for this unexpected result may be that the positive associations between inebriation and parent-child relationships may have been confounded by another variable that would have carry-over effects on the quality of the parent-child relationship over time. These ideas need to be explored further.

We found that the level of parent–child closeness was predicted by higher parental knowledge at each of the four time points. As hypothesized, this indicated that increases in parental knowledge, in relation to the individual average during the study period, were associated with a higher level of parent–child closeness at age 17. In other words, temporal or state-like fluctuations in parental knowledge were linked to higher levels of parent–child relations. The general theoretical assumption is that parental knowledge of adolescent whereabouts is facilitated by a warm family climate and a satisfactory parent–child relationship [39]. Although that may be the case, we suggest that the level of parental knowledge may have an impact on the level of the parent–child relationship over time. When parents

have an increased insight into their adolescents' whereabouts and activities, that gives them an opportunity to be involved in their adolescents' lives, providing adolescents with interest in and attention to their lives, which, in turn, may strengthen an overall sense of closeness to their parents. Although we did not address the bidirectionality of the associations between parental knowledge and parent–child closeness, it is theoretically possible that they are reciprocally related [13]. Further research is needed to explore this supposition.

Earlier studies have found some moderating effects between parental knowledge and early alcohol initiation [4], suggesting somewhat larger protective effects of parental knowledge for girls than for boys. In addition, as a low socio-economic status is linked to higher levels of substance use [38], we suggested that it was possible that the links between parental knowledge and adolescent inebriation would be stronger for adolescents coming from less resourceful families. However, when testing whether the cross-lagged parameters central to the current study were invariant by adolescent gender and SES, no such moderating effects were found.

The results of the current study were not without limitations. First, while the sample was deemed not to differ from the total population from which it was drawn, based on gender and school attendance, the sample used in the current study could have differed in other unknown ways. For example, adolescents not attending school would be excluded, which poses a small threat to external validity. Participants lost at follow-up had lower levels of parental knowledge at baseline, which may also have reduced the generalizability of the results to such children who already had low parental engagement. Further, there was a risk of common method bias as we only used adolescents' reports on both their own inebriation and their perception of parental knowledge and parent-child relationships. Other studies have shown that parents' and adolescents' views of parenting [57] and parental knowledge of adolescents' whereabouts specifically differ [58], which is why we suggest that future studies should also include parents' own perceptions of parenting practices and parent-child relationships to strengthen the study results. Some measurement and analytical issues should be noted: (1) alcohol inebriation was a single-item measure, which may have affected the reliability and validity; and (2) the prevalence of adolescent alcohol inebriation was very low during the first measurement year. Although this was in line with survey studies of alcohol use among adolescents in Sweden [2], the initial skew at t1 presented analytical problems. To address the non-normality in the data, we used robust estimators (Huber–White) that were robust to sparse data [43,44]. However, we recommend that some results, particularly those with small effects, should be cautiously interpreted.

As parental knowledge of adolescent whereabouts is intertwined with general parenting processes, encompassing parental expectations and attitudes toward parenting [13], further exploration of different relational processes within families could be achieved in future research. Specifically, investigations could delve into the role of parenting style in relation to the processes between parental knowledge and alcohol use. This could be approached through a person-oriented perspective on parenting dynamics [59].

Moreover, as the data for the current study did not permit an examination of parental knowledge of adolescent drinking behaviors, future research could delve into the dynamics of alcohol-specific parenting. This could include exploring aspects such as rules and communication about alcohol as well as investigating the reciprocal links to adolescent alcohol use and inebriation.

## 5. Conclusions

Protecting adolescents from alcohol use, including inebriation, is crucial for healthy adolescent development. We found that increased levels of parental knowledge of adolescents' whereabouts and activities were linked to lower levels of adolescent inebriation over time. Adolescents with parents who had increased awareness of their adolescents' everyday lives, including knowledge of friends they engaged with and the places they visited, appeared to engage in fewer occasions of alcohol inebriation. This potential effect appeared to be consistent throughout adolescence. Moreover, increased parental knowledge may induce higher emotional connectedness between parents and their adolescent children. Although more occasions of inebriation in late adolescence may also have a reciprocal effect, leading to reduced parental knowledge, this may be related to normal maturational processes. Despite this, we conclude that parental knowledge of adolescents' whereabouts and activities is a key protective factor for adolescent alcohol inebriation during early to late adolescence.

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**Institutional Review Board Statement:** The study was conducted in accordance with the Declaration of Helsinki for studies involving humans and approved by the Regional Research Review Board in Gothenburg, Sweden, before each data collection wave (No. 362–13; 2013-09-25; 2014-05-20; 2015-09-02; 2017-07-25).

**Informed Consent Statement:** Written informed consent was obtained from all subjects involved in the study. Parental written informed consent was obtained when adolescents were below the age of 15.

**Data Availability Statement:** The data presented in this study are available on request from the corresponding author. The data are not publicly available because this study's ethical review does not allow for study data to be placed in a public repository.

**Conflicts of Interest:** The authors declare no conflicts of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

#### Appendix A

Full description of the measures used in the study.

#### Parental knowledge of adolescent wherabouts

- 1. Do your parents usually know when you have an exam at school?
- 2. Do your parents know which places you go to when you are out with friends at night?
- 3. In the last month, have your parents ever had no idea of where you were at night?
- 4. Do your parents know what you do during your free time?
- 5. Do your parents know what you spend your money on?

# Parent-child emotional closeness

Closeness to mother

- 1. I feel comfortable sharing my private thoughts and feelings with my mother.
- 2. I feel that I can try new things because I know my mother supports me.
- 3. When I am angry or sad my mother can help me feel better.
- 4. I know that my mother is there when I need her.
- 5. My mother encourages me to pursue my dreams.

Closeness to father

- 1. I feel comfortable sharing my private thoughts and feelings with my father.
- 2. I feel that I can try new things because I know my father supports me.
- 3. When I am angry or sad my father can help me feel better.
- 4. I know that my father is there when I need him.
- 5. My father encourages me to pursue my dreams.

# Adolescent alcohol inebriation

1. During the last 12 months, how often have you been inebriated?

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